IJRAR.ORG E-ISSN: 2348-1269, P-ISSN: 2349-5138

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Ref No : IJRAR/Vol 11/ Issue 2/ 508

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Publication Date 2024-05-23 13:52:55

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About IJRAR : UGC and ISSN Approved - International Peer Reviewed Journal, Refereed Journal, Indexed Journal, Impact Factor: 7.17, E-ISSN 2348-1269, P- ISSN 2349-5138
UGC Approval : UGC Approved Journal No: 43602
Registration ID : IJRAR_291031
Paper ID : IJRAR24B3508
Title of Paper : ANALYSIS & DESIGN OF RCC FRAMED STRUCTURE SUBJECTED TO BLAST LOADS BY USING ETAB
Impact Factor : 7.17 (Calculate by Google Scholar) | License by Creative Common 3.0
DOI :
Published in : Volume 11 | Issue 2 | May 2024
Publication Date: 2024-05-23 13:52:55
Page No : 287-296
Published URL : http://www.ijrar.org/viewfull.php?&p_id=IJRAR24B3508
Authors : Prof. P. R. Bhalke, Ankit Prakash Parmar, Kuldeep Pradeep Patil, Geeta Laxman Shikhare, Jatin Dilip Kamble, Shubham Chandrakant Mane

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E-ISSN 2348-1269, P- ISSN 2349-5138 IJRAR

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International Journal of Research and Analytical Reviews - IJRAR
(E-ISSN 2348-1269, P- ISSN 2349-5138)

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Manage By: IJPUBLICATION Website: www.ijrar.org | Email ID: editor@ijrar.org

IJRAR.ORG E-ISSN: 2348-1269, P-ISSN: 2349-5138

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An International Open Access, Peer-reviewed, Refereed Journal

ANALYSIS & DESIGN OF RCC FRAMED STRUCTURE SUBJECTED TO BLAST LOADS BY USING ETAB

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Abstract : The threat of accidental or intentional explosions has necessitated the design of structures to withstand blast loads. This project aims to analyze and design a reinforced concrete (RCC) framed structure subjected to blast loads using the structural analysis software ETABS. The study focuses on evaluating the behavior and performance of the RCC frame under various blast scenarios.

The project begins with the selection of a typical multi-story RCC framed building and the determination of appropriate blast load parameters based on established codes and standards. The selected structure is modeled in ETABS, and linear static and non-linear dynamic analyses are performed to assess the structural response under different blast intensities and stand-off distances.

The study investigates the effects of blast loads on various structural elements, including beams, columns, and slabs. The demand-capacity ratios, deflections, and internal force distributions are examined to identify critical regions and potential failure modes. The design is then optimized by incorporating appropriate reinforcement detailing and capacity-based principles.

The results of the analyses are critically evaluated, and the performance of the RCC framed structure under blast loads is assessed based on established acceptance criteria. The study highlights the importance of considering blast loads in the design of structures, particularly in areas with potential blast threats. The findings contribute to the advancement of knowledge in the field of blast-resistant design and provide valuable insights for engineers and researchers.

***Index Terms* -** Analysis, Design, RCC framed structure, Blast loading, ETAB, Blast effects, Dynamic response, Deflections, Stresses, Strains, Nonlinear dynamic analysis, Structural elements, Columns, Beams, Slabs, Material properties, Load combinations, Safety factors, Evaluation, Resilience.

I. INTRODUCTION

The analysis and design of reinforced concrete (RCC) framed structures subjected to blast loading is a crucial aspect of ensuring the safety and resilience of buildings in areas prone to explosive events. Blast loading refers to the sudden release of energy caused by explosions, which can exert significant forces on structures, leading to severe damage or collapse. Therefore, it is essential to analyze and design RCC framed structures to withstand such extreme loading conditions.

This project focuses on utilizing ETAB, widely used software, to analyze and design an RCC framed structure under blast loading. ETAB is a powerful tool that offers advanced analysis capabilities, including nonlinear dynamic analysis, which is crucial for accurately capturing the behavior of structures subjected to blast loading.

The project aims to provide a comprehensive understanding of the analysis and design considerations for RCC framed structures under blast loading conditions. It involves modelling the structure in ETAB and applying blast loads based on established guidelines and standards. The dynamic response of the structure, such as deflections, stresses, and strains induced by the blast, is determined through the analysis process.

The design phase focuses on ensuring that the structural elements, such as columns, beams, and slabs, are adequately designed to resist the blast-induced forces. ETAB's design modules are utilized to perform the necessary calculations and checks, considering factors such as material properties, load combinations, and safety factors.

By analyzing and designing an RCC framed structure subjected to blast loading using ETAB, this project aims to provide valuable insights for engineers and designers involved in similar projects. The findings and results obtained from the analysis and design process will contribute to enhancing the safety and resilience of structures in high-risk environments.

Overall, this project addresses the critical need for analyzing and designing RCC framed structures to withstand blast loading, utilizing the capabilities of ETAB as a powerful tool in ensuring the structural integrity and safety of buildings in areas prone to explosive events.

II. LITERATURE REVIEW

Sr. No.	Author Name	Title Of Paper	Insights
1	Rajvee Patel	Comparative Analysis Of Blast Load On Multi Storey R.C.C. Building At Different Locations	Blast loads pose intense, short-lived challenges for blast-resistant design. Material and structural response is nonlinear, time-dependent, complex. Explosions can be unconfined or confined, with confined causing high pressures/stress waves damaging buildings. Blast effects include overpressure, thermal, debris, cratering, ground shock. Overpressure decreases with distance from explosion. Computer software analyzes structural blast response. Standoff distance and charge weight are critical, with increased standoff and reduced charge weight enhancing integrity and reducing blast impact.
2	Tung Thanh Pham	Impact Behaviour Of No-Stirrup Reinforced Concrete Beam With Cushion	This study investigated the impact response of reinforced concrete beams with polystyrene or polycarbonate cushion layers using drop-weight experiments. Beams with cushion exhibited flexural failure with fewer cracks and improved load capacity compared to beams without cushion. A simplified fibre model accurately predicted the contribution of the cushion based on maximum deflection, enabling performance prediction of beams with and without cushion under impact.
3	Mittakolu Harveen Sai	Analysis Of Reinforced Concrete Framed Structure Subjected To Blast Load Using Sap2000	This study analysed reinforced concrete framed structures' response to blast loads from different standoff distances and charge weights. Blast loads increase kinetic energy, causing large displacements, highest at minimum standoff. Shear walls and lateral moment resisting frames mitigate effects by added resistance, reducing displacement. Non-linear dynamic time history analysis captures the non-linear displacement-time relationship under blast loading.
4	Dan (Danesh) Nourzadeha	Comparison Of Response Of Building Structures To Blast Loading And Seismic Excitations	Blast loading and earthquakes are highly destructive for building structures, with comparable response magnitudes. Blast loading induces significantly larger lateral story drifts compared to seismic drifts, necessitating consideration of global response and parameters like lateral drifts and floor responses in design and assessment. A benchmark 10-story building's response to moderate blast loading is compared to synthetic seismic ground motions. Blast loading generates inter-story drifts exceeding those

			from seismic events, even at higher design seismic levels. Nonlinear analysis using Open SEES software with concrete and steel material models reveals blast loads can cause lateral deformations similar to or greater than seismic action.
5	Lucia Figulia	Design And Analysis Of Blast Loaded Windows	This paper analyzes the dynamic behaviour of blast-loaded glazing windows, which are vulnerable during blasts. It assesses blast resistance of old wooden and new PVC windows for office buildings, highlighting the need for open-air experimental tests. Blast loads are described as time-pressure profiles with positive and negative phases. While no comprehensive European standard exists for blast-loaded windows/facades, existing EU regulations provide guidelines and testing procedures. The design aim is to keep glass panels intact, in the frame, and the frame attached to the wall. Risk assessment, testing, and advanced simulations are crucial.
6	Ramon Codinaa	Alternatives To Prevent Progressive Collapse Protecting Reinforced Concrete Columns Subjected To Near Field Blast Loading	This document highlights the importance of blast load research for understanding explosion damage, predicting structural vulnerability, and developing blast-resistant materials and protective elements. Protecting reinforced concrete (RC) columns from progressive collapse is crucial, with alternatives like steel jacketing and crushable materials explored. The use of sacrificial cladding such as optimized sandwich panels is discussed for blast mitigation. Experimental and numerical studies investigate the dynamic response of RC columns under blast loading, evaluating protective measures like steel jacketing and reinforced resin panels. Comparative analysis shows reinforced resin panels and steel jacketing can significantly reduce deflection and damage to RC columns.
7	Ganavi S	Behaviour Of Framed Structure Subjected To Explosion On The Ground	Regular above-ground structures are more vulnerable to blast loads than military structures designed for explosions. Terrorist threats have increased interest in understanding structures' behaviour under blast loads to protect lives and structural integrity. Blast pressure decreases with increasing standoff distance from the explosion source, reducing story drift, displacement, and beam forces, while increasing column forces at shorter distances. A study on a G+4 storey RCC building found the structure remained safe against blast loads at 80m standoff distance with no member failures.
8	Yasser E. Ibrahim	Response Of Reinforced Concrete Framed Structures	Terrorist attacks worldwide have highlighted the need to analyse framed concrete structures' performance under severe blast loads, as many structures are highly vulnerable not being designed for such loads initially. Detailed finite element analysis using ABAQUS

		Under Blast Loading	software is employed to assess reinforced concrete frames' structural response under blast loading. The study explores alternative designs and shows modifying external columns, particularly with concrete-filled steel tube sections, improves structural response.
9	M. D. Goel	Collapse Behaviour Of Rcc Building Under Blast Load	This investigation focuses on the impact of an intentional explosion on load-bearing structural members of a 4-story RCC building with 3x3 bays. It analyzes the behavioural changes in critical ground floor columns after the removal of a load-bearing member due to blast loading. The study highlights the importance of ground floor columns in load transfer and joint displacement, identifying them as the most critical. It also reveals the differential behaviour of adjacent columns based on their location, with transverse columns experiencing more reaction transfer and longitudinal columns experiencing more axial force transfer.

Table 1: Summary Of Literature Review

III. METHODOLOGY

3.1 Problem Statement

The absence of comprehensive guidelines and expertise in this area poses a critical challenge, as it leaves critical structures vulnerable to potential damage and jeopardizes occupant safety. This project aims to address this issue by conducting a detailed analysis and design of an RCC framed structure subjected to blast loading using ETAB software.

3.2 Problem Identification

- Existing design codes and guidelines often lack specific provisions for blast loading, leaving engineers to rely on conservative assumptions or empirical methods.
- The dynamic nature of blast loading introduces complex phenomena such as shock waves, high pressures, and impulse loads, which can cause significant damage to reinforced concrete structures.
- Failure to accurately predict the behavior of reinforced concrete structures under blast loading can result in catastrophic consequences, including loss of life and property.

3.3 Methodology

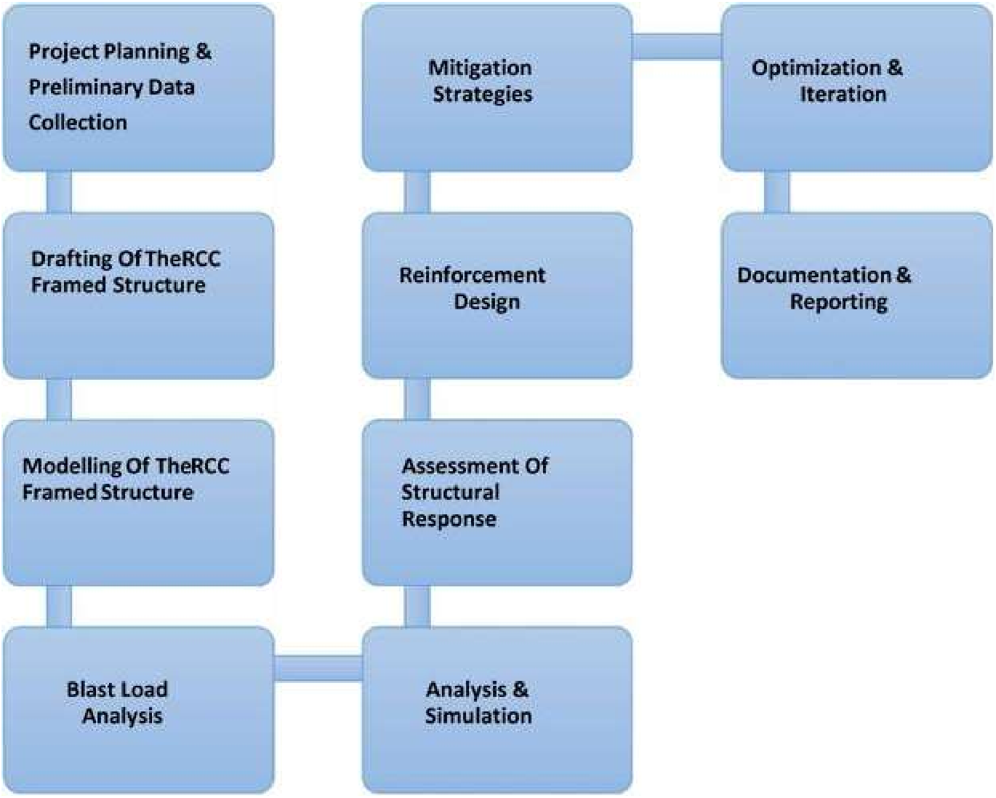
Project Planning & Preliminary Data Collection
Drafting Of TheRCC Framed Structure
Modelling Of TheRCC Framed Structure
Blast Load Analysis
Analysis & Simulation
Assessment Of Structural Response
Reinforcement Design
Mitigation Strategies
Optimization & Iteration
Documentation & Reporting

Fig 1: Methodology

3.4 Project Details

- Building Type – G+15 Building
- Location – Seismic Zone IV (Northern Bihar)
- Blast Load Code – IS 4991:1968
- Wind Speed – 39 m/s - 55 m/s
- Soil Classification – Alluvial deposits (Silty clay, Clayey silt, Stiff clay, Dense sandy soil)
- Soil Stratification – Filled up soil (0-2m)
  Silty clay/Clayey silt (2-6m)
  Stiff to very stiff clay (6-15m)
  Dense sandy soil (15m+)
- Shear Strength Parameters – Silty Clay: $c = 20\text{-}30$ kPa, $\varphi = 22°\text{-}28°$, $\gamma = 18\text{-}20$ kN/m³
  Stiff Clay: $c = 40\text{-}60$ kPa, $\varphi = 20°\text{-}25°$, $\gamma = 20\text{-}22$ kN/m³
  Dense Sandy Soil: $c = 0$ kPa, $\varphi = 32°\text{-}38°$, $\gamma = 18\text{-}20$ kN/m³
- Bearing Capacity – 150-250 kPa (2-3m depth)
- Ground Water Table – 4-6m below ground level
- Chemical Properties – Generally non-aggressive, except for pockets of high sulphate content
- Seismic Properties – Silty Clay: $G = 20\text{-}40$ Mpa
  Stiff Clay: $G = 40\text{-}80$ Mpa
  Dense Sandy Soil: $G = 80\text{-}120$ Mpa
- Pile Load Test Data – 500-800 kN for 500mm diameter bored cast-in-situ pile
- Moisture Content – 10% to 30%
- Atterberg Limits – Liquid limit: 20% to 60%
  Plastic limit: 15% to 40%
  Plasticity index: 5 to 30
- Shear Strength – Cohesion: 5 kPa to 50 kPa
  Friction angle: 20° to 40°
- Concrete Compressive Strength – M20 for slabs
  M25 for beams
  M30 for columns and shear walls
  M30-M40 for foundations
- Reinforcing Steel Strength – Yield strength of 500 MPa, dynamic increase factor of 1.10
- Dynamic Increase Factor – 1.10 (for reinforcing steel)
- Damping Ratio – 5%
- Explosive Charge Weight – 500 kg TNT equivalent
- Standoff Distance – 15 meters
- Peak Incident Pressure – Approximately 300 kPa
- Positive Phase Duration – Approximately 50 ms
- Seismic Zone Characteristics – PGA: 0.36 g
  Av. Vs30: 300 m/s
  Fa: 0.08
  Fv: 0.12

IV. NUMERICAL MODELLING

4.1 Blast Loads On Structures

The pressure profile at each distance from the fracture site is shown in Figure 4.1. The shock wave front reaches a certain time point and disappears after increasing to the maximum value of Ps, where the high event is, i.e., positive time. In addition, it is characterized by negative pressure (lower than the surface height) and reversal of particle flow with the highest value of Ps. The negative phase is usually less important in the design than the positive phase, and in any case its amplitude should be less than Ps - mean air pressure Po. The incident pulse rate associated with the noise wave is the joint area under the time curve and is denoted by is+ for the positive phase and is- for the negative phase.

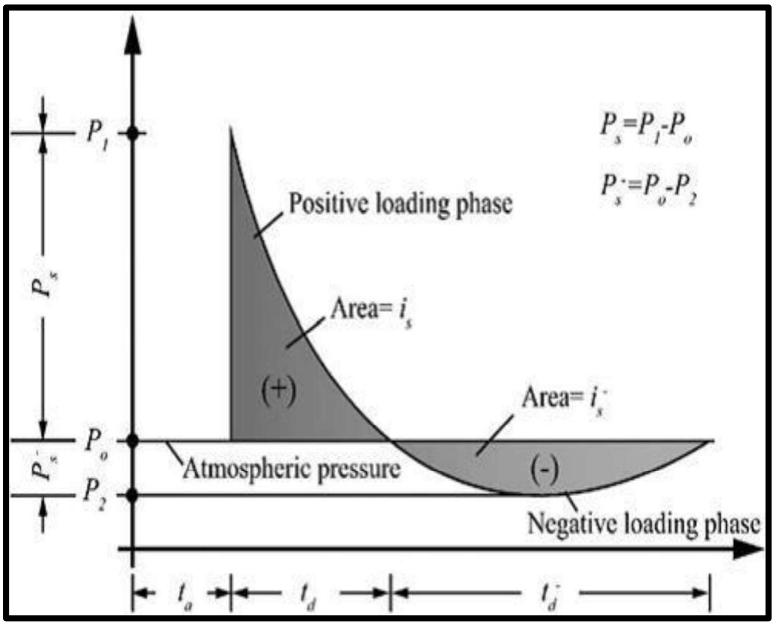

Fig 2: Idealized pressure-time variation curve

4.2 Procedure For Blast Load Calculation

Considered blast load of 10 kg of TNT at a distance of 10m from the wall panel of size 20 m X 3 m.

Step 1: Data

Charge Weight (W) = 10 kg
Standoff distance (R) = 10 m
Width (B) = 20 m
Height (H) = 3 m

Step 2: Calculate RG (Distance from Blast to the point of interest)

$RG = \sqrt{}R2 + H2$

RG = 10.440 m

Step 3: Calculate (Z) Scaled Distance

$Z = RG/W^{1/3}$

$\mathbf{Z = 4.846\ m/kg^{1/3}}$

Step 4: Calculate peak overpressure (Ps)

$PS=678.4(W/R^3G)+294(W/R^3G)$

$\mathbf{P_S = 33.521\ kPa}$

Step 5: Calculate coefficient of the reflected over-pressure (Cr)

$C_r=3P_S^{1/4}$

where Ps is in units of bars

$P_S = 0.3352$ bars

$C_r = 3\times0.3352^{1/4}$

$\mathbf{C_r = 2.283}$

Step 6: Calculate reflected over-pressure (P_r)

$P_r = C_rP_s$

$P_r = 2.283 \text{ X } 33.521$

$\mathbf{P_r = 76.528\ kPa}$

Step 7: Calculate arrival time (t_a)

$t_a=[\{8543(R_G/W^{1/3})-0.996\}/a_0]$

where a_o is the speed of sound in air 340 m/s

$t_a = 5.2$ ms

Step 8: Calculate positive phase duration (t_d)
$t_d = 10W^{1/3}$
$t_d = 21.5$ ms

Step 9: Calculate Blast Load
Blast Load = P_r (Surface Area of Wall)
Blast Load = $P_r \times (B \times H)$
Blast Load = 76.528 kPa×(20×3)
Blast Load = 4591.68 kN

Floor	W (kg)	R (m)	B (m)	H (m)	R_G (m)	Z $m/kg^{1/3}$	P_s (kPa)	C_r	P_r (kPa)	t_a (ms)	t_d (ms)	Blast load (kN)
Ground	10	10	20	3	10.440	4.846	33.521	2.283	76.519	5.2	21.5	4591.165
1	10	10	20	6	11.662	5.413	27.622	2.175	60.075	4.7	21.5	3604.525
2	10	10	20	9	13.454	6.245	21.626	2.046	44.243	4.0	21.5	2654.598
3	10	10	20	12	15.620	7.250	16.839	1.922	32.361	3.5	21.5	1941.669
4	10	10	20	15	18.028	8.368	13.304	1.812	24.104	3.0	21.5	1446.262
5	10	10	20	18	20.591	9.558	10.727	1.717	18.417	2.6	21.5	1105.024
6	10	10	20	21	23.259	10.796	8.827	1.635	14.434	2.3	21.5	866.056
7	10	10	20	24	26.000	12.068	7.399	1.565	11.576	2.1	21.5	694.573

V. NON-LINEAR DYNAMIC RESPONSES OF FRAMES UNDER BLAST LOADS

5.1 Non-Linear Dynamic Analysis

Nonlinear analysis methods are best applied when either geometric or material nonlinearity is considered during structural modelling and analysis. We done a nonlinear dynamic analysis for G+2, G+5, G+7, G+10 and G+15 building.

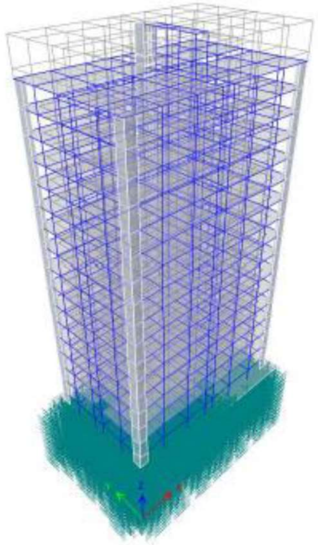

Fig 3: ETAB Model

5.2 Case I: Non-linear dynamic Responses for G + 2 storey structure

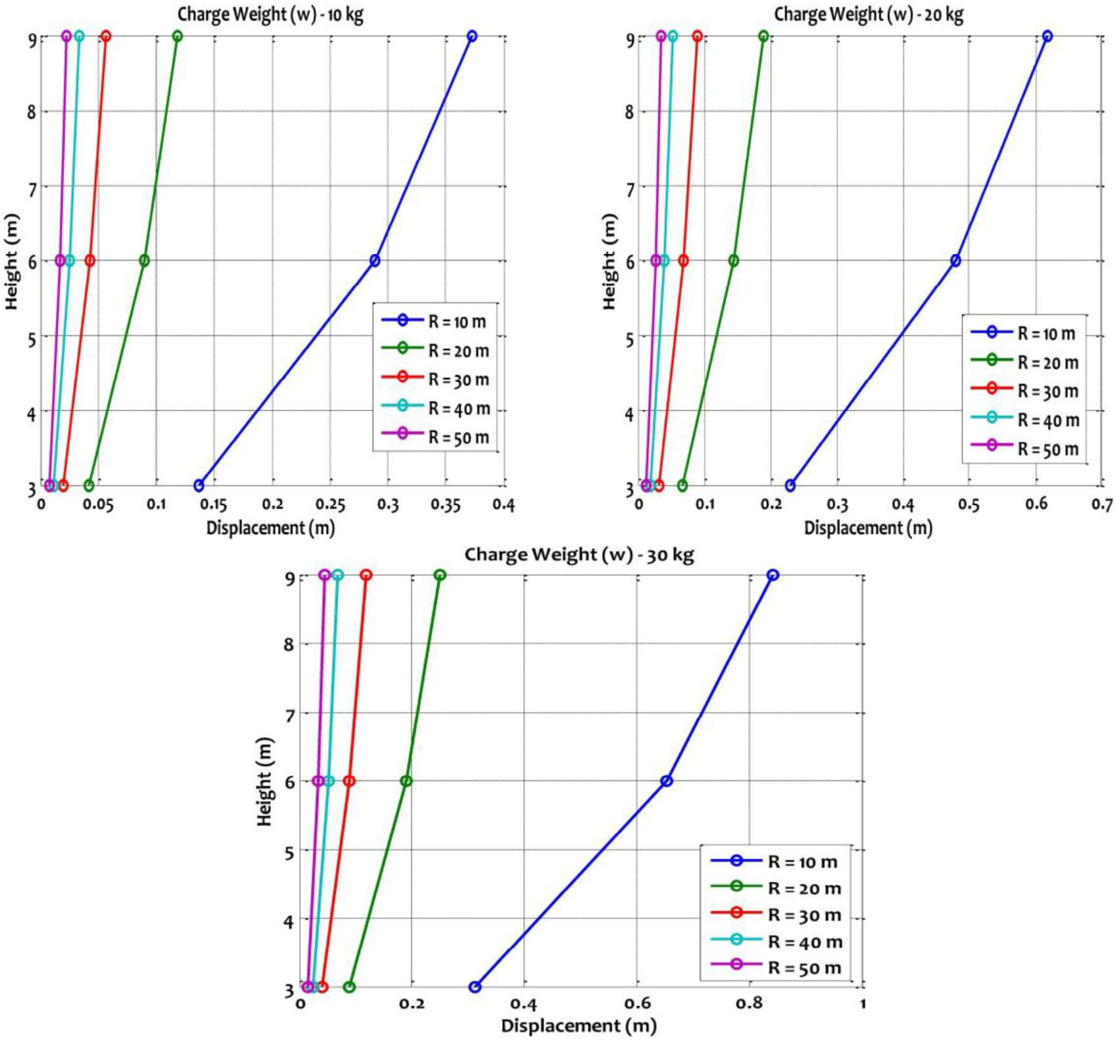

Fig 4: Maximum displacement values for G + 2 structure under different charge weights and standoff distances

This shows the response of two storey 4 x 4 bay structure subjected to 10 kg, 20 kg and 30 kg charge weight and standoff distances 10 m, 20 m, 30 m, 40 m and 50 m. As we increase standoff distance from 10 m to 20 m, 30 m, 40 m and 50 m with respect to standoff distance for charge weight 10 kg the maximum displacement at top floor is reduced to 68%, 84%, 90% and 94%, for charge weight 20 kg the maximum displacement at top floor is reduced to 69%, 85%, 90% and 94% and for charge weight 30 kg the maximum displacement at top floor is reduced to 78%, 86%, 91% and 95%.

VI. STRENGTHENING METHODS

6.1 Strengthening Methods

The aftermath of terrorist attack or blast explosion striking extensive damage to innumerable buildings varying degree i.e., either full or partial or slight. This damage to structures in its turn causes irreparable loss of life with a large number of casualties. As a result, frightened occupants may refuse to enter the building unless assured of the safety of the building from future terrorist attack or blast explosion. We provided a solution that majority of such blast damaged buildings may be safely reused, if they converted into blast resistance structures by employing a few retrofitting measures.

6.1.1 Local Jacketing

The main aim of this study is to reduce the displacement of structure by increasing the size of the columns through retrofitting techniques. Jacketing is one of the most frequently and popularly used techniques to strengthen reinforced concrete (RC) columns. Jacketing of columns consists of added concrete with longitudinal and transverse reinforcement around the existing columns. This type of strengthening improves the axial and shear strength of columns while the flexural strength of column and strength of the beam-column joints remain the same.

The figure below shows the nonlinear response of G + 15 building with charge weight 20 kg and standoff distance 20 m. we observed that after increasing the size of column as 0.5 m × 0.5 m and 0.6 m × 0.6 m the maximum displacement at top floor is reduced 29 % and 40% respectively.

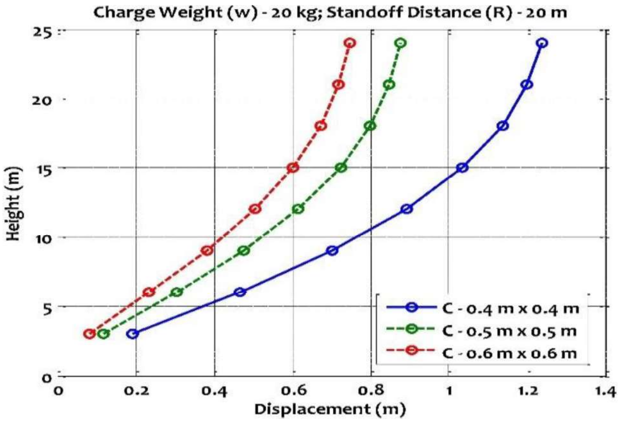

Fig 5: Maximum displacements with respect height of floor for G + 15 structure before and after providing local jacketing

6.1.2 Bracings

Single Bracing

The lateral deflection of a tall building subjected to lateral loads can be decomposed into shear and bending components. Properly oriented single diagonal bracings are introduced in order to bring advantageous interactions between these two modes of deflection resulting in a reduction of the overall lateral deflection of the frame.

The figure below shows the nonlinear response of G + 15 building with charge weight 20 kg and standoff distance 20 m. we observed that after providing single diagonal bracings of size 0.1 m × 0.1 m, 0.2 m × 0.2 m and 0.3 m × 0.3 m on blast effected phase at ground floor the maximum displacement at top floor is reduced 0.04%, 0.12% and 0.26% respectively. As compared to local jacketing the reduced displacement in single diagonal bracings is very less.

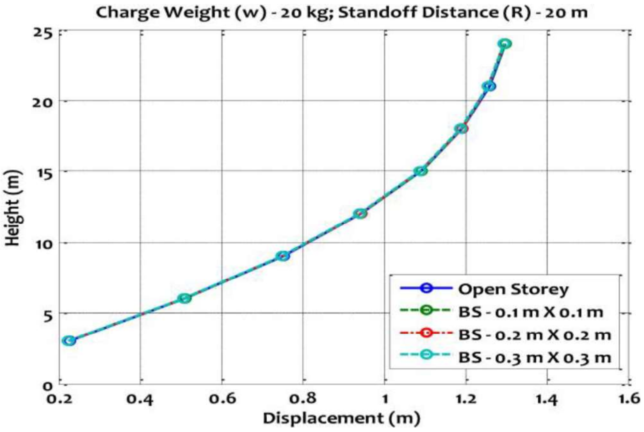

Fig 6: Maximum displacements with respect height of floor for G + 15 structure before and after providing single diagonal bracings

Double Diagonal Bracing

The figure below shows the nonlinear response of G + 15 building with charge weight 20 kg and standoff distance 20 m. we observed that after providing double diagonal bracings of size 0.1 m × 0.1 m, 0.2 m × 0.2 m and 0.3 m × 0.3 m on blast effected phase at ground floor the maximum displacement at top floor is reduced 0.03%, 0.11% and 0.4% respectively. As compared to local jacketing and single diagonal bracings the reduced displacement in double diagonal bracings is very less.

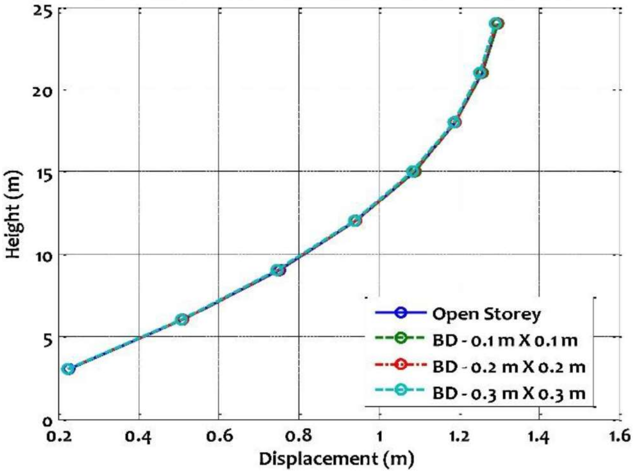

Fig 7: Maximum displacements with respect height of floor for G + 15 structure before and after providing double diagonal bracings

VII. CONCLUSION

7.1 Conclusion

The explosion near structure can cause damage to the structure. Injuries and deaths can be caused by exposure to explosion wave front, collapse of the structure, impact of parts, fire and smoke. Blast load for surface explosion was determined and simulated on a model building using ETAB, the conventional software for the dynamic analysis of structures. Loading was defined as a record of blast load over time (blast load - time history analysis) with the parameters calculated by the available literature. The maximum displacements at particular joints for different buildings (G + 2, G + 5, G + 7, G + 10 and G + 15 buildings) having different charge weights 10 kg, 20 kg and 30 kg and different standoff distances 10 m, 20 m, 30 m, 40 m and 50 m are calculated by using non-linear dynamic analysis in ETAB. We observed that maximum displacement is decreased gradually with increase in standoff distance.

After providing strengthening techniques:

i. Local Jacketing
ii. Bracings (single diagonal and double diagonal bracings)

for G + 15 building with charge weight 30 kg and standoff distance 20 m the maximum displacement values are reduced. Compared to bracings the displacement in local jacketing very less. So local jacketing provides safety against the surface explosions or blasts.

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E-ISSN: 2348-1269, P-ISSN: 2349-5138

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ANALYSIS & DESIGN OF RCC FRAMED STRUCTURE SUBJECTED TO BLAST LOADS BY USING ETAB

Published In IJRAR (www.ijrar.org) UGC Approved - Journal No : 43602 & 7.17 Impact Factor

Volume 11 Issue 2 May 2024, Date of Publication: 23-May-2024

PAPER ID : IJRAR24B3508

Registration ID : 291031

R.B.Joshi

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Published In IJRAR (www.ijrar.org) UGC Approved (Journal No : 43602) & 7.17 Impact Factor

Volume 11 Issue 2 May 2024, Date of Publication: 23-May-2024

PAPER ID : IJRAR24B3508
Registration ID : 291031

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Published In IJRAR (www.ijrar.org) UGC Approved (Journal No : 43602) & 7.17 Impact Factor

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Published In IJRAR (www.ijrar.org) UGC Approved (Journal No : 43602) & 7.17 Impact Factor

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PAPER ID : IJRAR24B3508

Registration ID : 291031

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Volume 12 Issue 5 May 2024 , Date of Publication: 27-May-2024

UGC Approved Journal No: 49023 (18)

ISSN
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REAL-TIME AIR QUALITY MONITORING IN RESIDENTIAL CONSTRUCTION SITES: A STUDY USING LOW-COST DUST SENSORS IN PUNE

[1] S. D. Redekar, [2]Bansi Jaywant Ludbe, [2]Hrushikesh Prakash Divekar, [2]Shubham Mangesh Khedekar, [2]Arpita Madhav Chavan, [2] Abhishek Maruti Kumbhar
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Abstract: In order to protect public health and safety, particulate matter (PM) monitoring in residential construction sites is crucial. Traditional monitoring methods often involve expensive equipment and complex procedures, limiting their accessibility and scalability, particularly in resource-constrained settings. This study explores the feasibility of utilizing cost-effective dust sensors for real-time PM monitoring in construction residential environments, with a focus on sites in Pune. A comprehensive assessment of the performance of these sensors was conducted through deployment in various construction sites across Pune, measuring PM concentrations over extended periods. The results demonstrate the efficacy of the cost-effective dust sensors in providing timely and accurate PM data, enabling proactive management of air quality in construction areas. The findings highlight the potential of these sensors to enhance environmental monitoring practices and support sustainable development initiatives in urban construction projects. This research contributes to advancing the adoption of affordable technologies for effective PM surveillance, thereby promoting healthier and more liveable communities amidst construction activities in Pune and similar urban settings.

***Index Terms* –** Particulate matter, Air Quality Impact, Low-cost dust sensor, Construction site, Real time monitoring

I. INTRODUCTION

Particulate matter pollution poses significant risks to human health and the environment, particularly in urban areas undergoing rapid development and construction. Construction residential sites, in particular, are hotspots for PM emissions due to various tasks including material handling, demolition, and excavation Heart difficulties and respiratory issues might result from significant PM exposure., and other adverse health effects among residents and workers in these areas. Therefore, effective monitoring and management of PM pollution in construction residential sites are crucial for safeguarding public health and promoting sustainable urban development. Traditional methods of PM monitoring typically involve sophisticated equipment and complex procedures, making them inaccessible and impractical for widespread deployment, especially in developing regions. However, recent advancements in sensor technology have led to the development of cost-effective dust sensors capable of real-time PM monitoring. These sensors offer a promising solution for enhancing environmental surveillance in construction sites by providing timely and accurate data at a fraction of the cost of traditional monitoring methods. This paper focuses on the application of cost-effective dust sensors for monitoring PM in construction residential sites, with a specific emphasis on sites located in Pune, India. Pune, a rapidly growing urban center, is experiencing significant construction activity, leading to concernsconcerning public health and air quality. Through a comprehensive analysis of the collected data, including comparison with traditional monitoring methods and assessment of sensor performance under different environmental conditions, this study seeks to provide valuable insights into the potential of cost-effective dust sensors for improving PM surveillance in construction residential sites Policymakers, urban planners, and environmental practitioners looking for practical ways to reduce PM pollution and safeguard public health in quickly expanding cities like Pun should consider the study's conclusions.

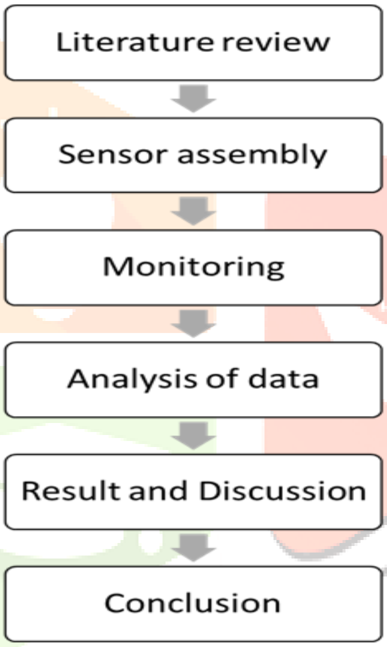
II. LITERATURE REVIEW

Sr No.	Author Name	Title of Paper	Outcomes
1	Muhammad Asifi, Rida Atizaz Ul Haq, (2022)	Particulate matter emission and their control technologies.	Highlights the global issue of PM contamination, emphasizing its impact on health and the environment. The study underscores the urgent need for pollution reduction policies and carbon control measures to mitigate the adverse effects of PM on public health.
2	Ingrid Priscylla Silva Araújo and Dayana Bastos Costa, (2022)	Measurement and Monitoring of Particulate Matter in Construction Sites: Guidelines for Gravimetric Approach.	Proposes guidelines for PM monitoring in construction, aiming to promote safety and health for workers and residents. The study emphasizes the importance of standardized monitoring procedures and equipment selection to ensure accurate and reliable measurement of PM levels in construction sites.
3	Hyunsik Kim, Sungho Tae, Pengfei Zheng, Geonuk Kang and Hanseung Lee, (2021)	Development of IoT-Based Particulate Matter Monitoring System for Construction Sites.	Discusses policies to regulate PM concentration on construction sites, focusing on South Korea's measures. The paper highlights the effectiveness of policy interventions in reducing PM emissions from construction activities and protecting public health in urban areas.
4	Daniel Cheriyan, jae-ho choi, (2020)	A review of research on particulate matter pollution in the construction industry	Examines PM exposure from construction activities, urging research to reduce PM exposure and develop effective control measures. The paper emphasizes the importance of implementing stricter regulations and guidelines to minimize PM emissions from construction sites.
5	Hai-Ying Liu, Philipp Schneider, Rolf Haugen, (2019)	Performance assessment of a low cost PM2.5 sensor for a near four-month period Osla.	Evaluates the performance of low-cost PM sensors, emphasizing potential misuse in citizen science applications and personal air quality monitoring. The study stresses the need for proper calibration and validation procedures to ensure the reliability of PM sensor data in various environmental conditions.
6	Nadezhda Menzelintseva, Natalia Karapuzova, Awadh M Redhwan, Ekaternia Fomania Volgograd State Technical University, (2019)	Study of dust particle size distribution in the air of work areas at cement production facilities.	Investigates shop air contamination with dust in cement production, highlighting the importance of particle size distribution analysis in understanding PM emissions. The study emphasizes the significance of controlling dust emissions in industrial settings to mitigate

			adverse health effects on workers and nearby residents.
7	Shafayet Ahmed, Ingrid Arocho, (2019	Emission of particulate matters during construction: A comparative study on a Cross Laminated Timber (CLT) and a steel building construction project.	Compares PM emissions from construction materials, identifying CLT as safer than steel in terms of PM emission. The study highlights the need for adopting sustainable construction practices to minimize PM emissions and protect public health in urban areas undergoing rapid development.
8	Marek Badura, Piotr Batog, Anetta Drzeniecka-Osiadacz, and Piotr Modzel, (2018)	Evaluation of low-cost sensors for Ambient PM2.5 Monitoring.	Assesses the operational stability of PM sensors, emphasizing the importance of proper use, especially outdoors, to obtain accurate and reliable data. The study underscores the need for ongoing maintenance and calibration of PM sensors to ensure their long-term performance and effectiveness in air quality monitoring.
9	Fatima Khanum, Muhammad Nawaz Chaudhry, Prashant Kumar, (2017)	Characterization of five-year observation data of fine particulate matter in the metropolitan area of Lahore.	Studies PM2.5 trends in urban areas, emphasizing the need for understanding sources and variability to develop effective air quality management strategies. The research underscores the importance of continuous monitoring and analysis of PM levels to assess the effectiveness of pollution control measures over time.
10	Rita Jane Brito de Moraes, Dayana Bastos Costa, Priscylla Silva Araújo, (2016)	Particulate Matter Concentration from Construction Sites: Concrete and Masonry Works.	Explores PM emissions during construction, advocating for more quantitative data and understanding of particle characteristics to mitigate health risks. The study emphasizes the importance of implementing dust control measures and promoting proper waste management practices on construction sites to reduce PM emissions and protect workers' health.
11	Francis Olawale Abulude, (2016)	Particulate Matter: an approach to air pollution, Research gate.	Highlights the global health implications of PM pollution, emphasizing collaborative efforts to address the issue and mitigate its impact on public health. The paper underscores the need for international cooperation and policy initiatives to combat air pollution and protect vulnerable populations from the adverse effects of PM exposure.
12	Ingrid P. S. Araújo, Dayana B. Costa 2, Rita J. B. de Moraes, (2014)	Identification and Characterization of Particulate Matter Concentrations at Construction Jobsites.	Discusses PM emissions from construction activities, emphasizing the need for more research in this area to develop effective mitigation strategies.

			The study underscores the importance of identifying and quantifying PM sources in construction sites to implement targeted control measures and minimize environmental and health risks.
13	Emily Goswami, Timothy Larson, Thomas Lumley & L.-J. Sally Liu, (2011)	Spatial Characteristics of Fine Particulate Matter: Identifying Representative Monitoring Locations in Seattle	Investigates spatial variability of PM2.5, emphasizing the importance of site selection for monitoring to accurately assess ambient exposures. The study underscores the need for strategic placement of monitoring stations in urban areas to capture representative PM concentrations and inform air quality management decisions effectively.

III. RESEARCH AND METHODOLOGY



3.1 Particulate matter emission

The project starts with gathering evaluations of the literature on particulate matter for PM monitoring, which includes a methodical process that starts with an issue and a hypothesis.The data was obtained from various finding in the literature, with the help of literature the gaps and insights were identified. Various gaps in the study of literature review werethe standard instruments available in the market for the study of particulate matter emission are costly, handling of the instruments can only be done by skilled person, data entry with the help of filter paper in air sampler can have multiple errors while handing it. The sensor assembly which is done by our group eliminates all the above gaps as the data entry is directly done in the excel sheet format per second of the analysis. There are various constructions activities on the residential constructions siteswhich cause the emission of dust during extraction of ground, drilling, steel cutting, dumping of waste from upper floor to lower floor.

3.2 Instrument assembly

This instrument represents a portable solution for measuring particulate matter (PM) concentration, incorporating the PMS7003 sensor, an Arduino microcontroller, an RTC module, an LCD display, and an SD card module, all enclosed within an acrylic housing. Capable of accurately measuring PM1.0, PM2.5, and PM10 levels, it provides real-time data visualization on an LCD screen and logs this information with precise timestamps onto an SD card for subsequent analysis. With the RTC module ensuring accurate timekeeping and the Arduino managing data collection, processing, and storage, this cost-effective tool serves as a reliable option for air quality monitoring in diverse settings, ranging from urban environments to industrial facilities.

3.3 Site selection and instrument set up

We conducted an extensive search for suitable residential construction sites across Pune, focusing on those that, while not very large, were actively engaged in typical construction activities. After careful evaluation, we identified key PM emission activities at these sites, including cutting concrete blocks, unloading cement, and cutting and polishing tiles, among others. These activities were crucial for our study as they generate significant amounts of particulate matter, making them ideal for assessing the performance and effectiveness of our dust sensor system.

Once the sites were selected, we proceeded with the setup of our monitoring instruments. We equipped the sensors with a reliable power supply using power banks, ensuring uninterrupted data collection. The sensors were strategically positioned at a height of 1.5 meters, aligning with the breathing zone, which is the typical height at which people inhale air. This placement was essential for capturing accurate and representative air quality data relevant to human exposure. In scenarios where we deployed two instruments at a single site, we maintained a distance of 5 meters between them. This spacing was carefully chosen to provide comprehensive coverage and to ensure that the data collected was representative of different points within the construction area.

3.4 Data analysis

The collected data was continuously saved onto SD cards integrated into each instrument. This approach ensured secure and efficient storage of large datasets over extended monitoring periods. Upon completion of the data collection phase, the data was extracted from the SD cards and imported into Excel for analysis. In Excel, we organized the data, performing initial cleaning and processing to eliminate any anomalies or errors. Subsequently, we conducted a detailed analysis to examine the patterns and trends in PM levels corresponding to different construction activities. The processed data was then represented in graphical formats, including line graphs, bar charts, and scatter plots, which provided clear visual insights into PM concentration variations over time and across different sites. These graphical representations enabled us to identify peak emission periods, correlate specific activities with higher PM levels, and assess the overall air quality impact of residential construction site.

IV. OBSERVATIONS

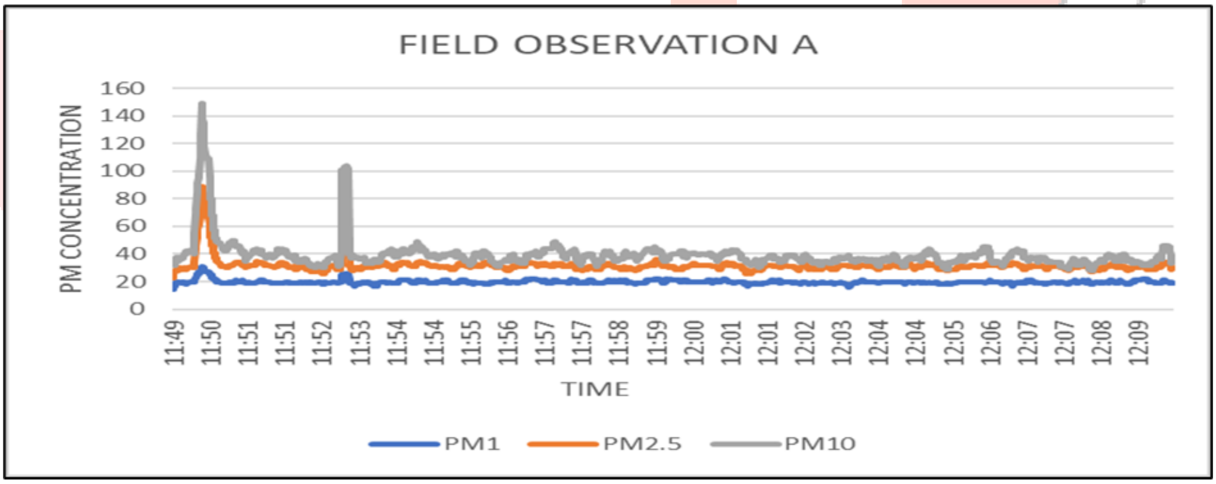
During our field observation at the residential construction site in Ambegaon Taluka, Haveli, Pune, we monitored PM emissions using three instruments set up at strategic locations on the site. Initially, we recorded PM levels when there were no construction activities, although some vehicular activity was present. On this day, with clear skies and moderate wind, the PM levels were relatively low. The following day, we monitored the site during active construction activities under similar weather conditions. The findings showed that PM emissions have significantly increased. This sharp variation underlines how building activities have a significant impact on air quality and emphasizes the necessity of efficient dust control methods to reduce dangers to human health and the environment.

3.1 DAY 1 FIELD OBSERVATION

On the first day, we recorded PM levels when there were no construction activities, although some vehicular activity was present. There was a light breeze, clear skies, and comparatively low PM levels. This baseline data served as a point of comparison when assessing how different building projects affected the quality of the air.

Fig no. 1, 2 & 3 showing PM emission on site.

1.



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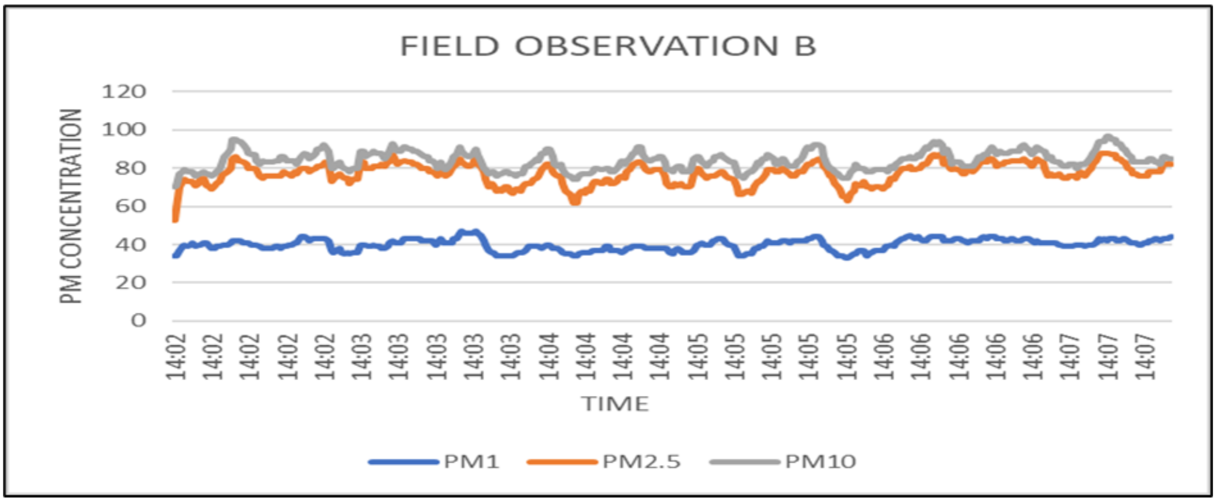

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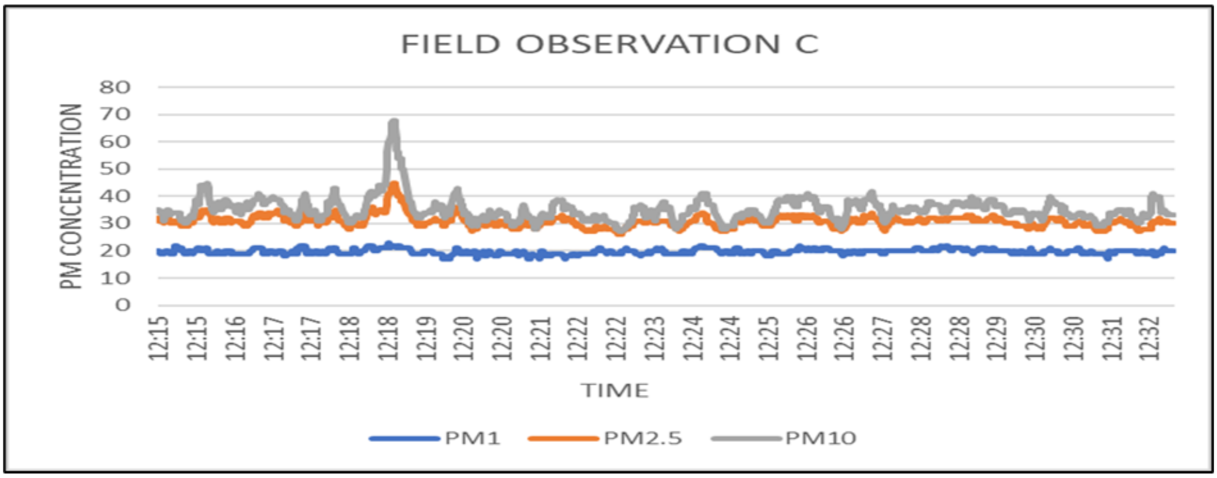


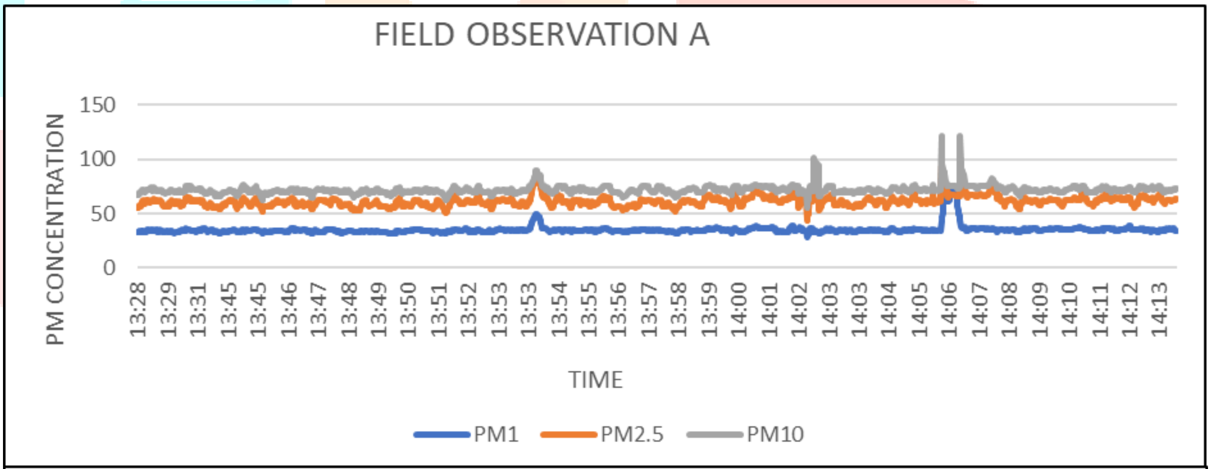
On the first day of our field observation at the residential construction site in Ambegaon Taluka, Haveli, Pune, we began by setting up our instruments and checking the parameters. The temperature was 26.7°C, the humidity was 45%, the wind speed was 4.5 m/s, the area of the site was 6,325 sqft, and the instrument height was 1.5 meters. We observed some fluctuations in PM levels due to vehicular movement, particularly when trucks were unloading aggregates.

3.2 DAY 2 FIELD OBSERVATION

On the second day of our field observation at the residential construction site in Ambegaon Taluka, Haveli, Pune, we monitored the site during active construction activities. The weather conditions were similar to the first day, with clear skies and moderate wind. Throughout the day, there were frequent movements of material trucks and unloading of cement. PM emissions increased significantly as a result of these activities in comparison to the first day. The significant influence of construction work on air quality was brought to light by the heightened PM levels during these periods, highlighting the significance of putting in place efficient dust control methods.

Fig no. 4, 5 & 6 showing PM emission on site.

4.



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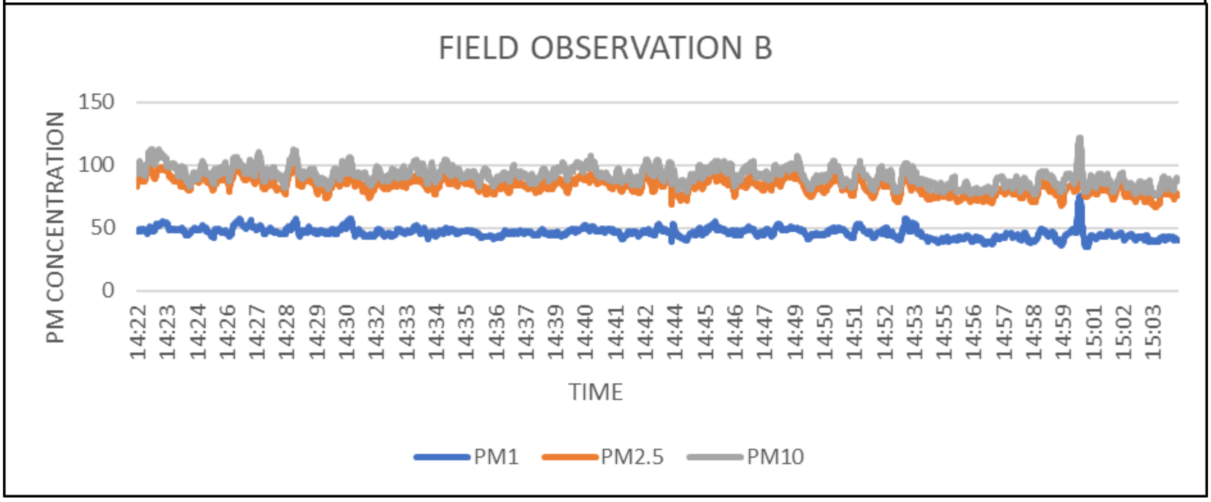

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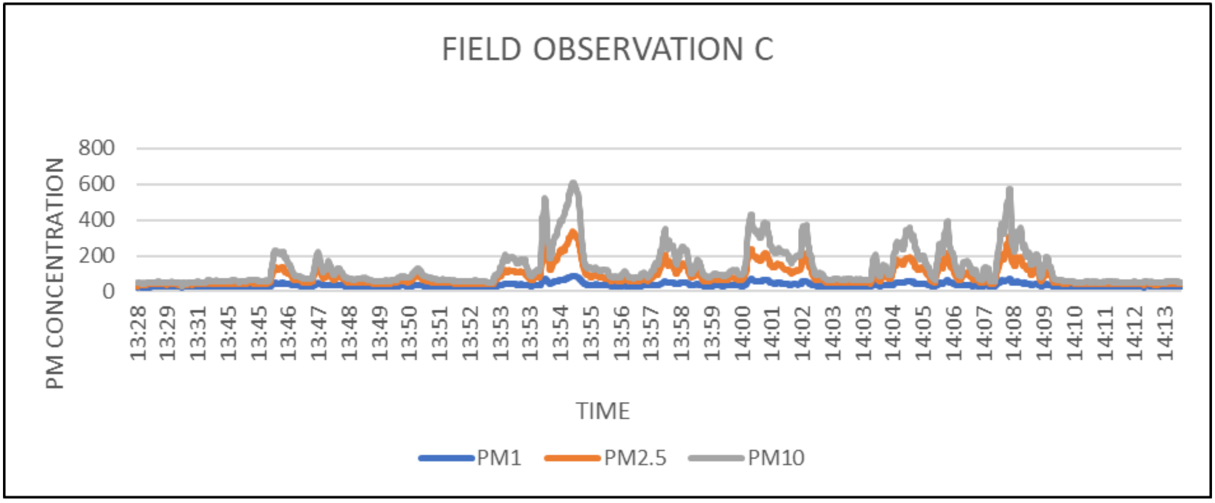

On the second day of our field observation at the residential construction site in Ambegaon Taluka, Haveli, Pune, we positioned monitoring stations A and B slightly away from the main construction activities. These stations were located approximately 5 meters apart from each other. However, there was another monitoring station, let's call it station C, situated closer to the active construction area. Station C exhibited higher fluctuations in PM concentration compared to stations A and B. This spatial distribution of monitoring stations provided insights into the spread of PM emissions from the construction activities, with station C capturing the immediate impact, while stations A and B depicted a broader dispersion pattern.

3.3 SITE PHOTOGRAPHS

GPS Map Camera
Google
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Long 73.837419°
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GPS Map Camera
Google
Pune, Maharashtra, India
54/28, Bhumkar Nagar, Khanapur Village, Pune, Maharashtra 411046, India
Lat 18.445813°
Long 73.837471°
29/03/24 01:38 PM GMT +05:30

GPS Map Camera
Google
Pune, Maharashtra, India
54/29, Ambegaon Budruk, Khanapur Village, Pune, Maharashtra 411046, India
Lat 18.445705°
Long 73.837662°
29/03/24 01:40 PM GMT +05:30

V. RESULT AND DISSCUSION

4.1 DAY 1 PARTICULATE MATTER CONCENTRATION

PM (µg)	Average Concentration (µg/m^3)	Minimum Concentration (µg/m^3)	Maximum Concentration (µg/m^3)	Permissible Concentration (µg/m^3)
PM1	19	8	31	25
PM2.5	32	14	89	50
PM10	40	25	149	100

Table no.1

On day 1 of our field observation at the residential construction site in Ambegaon Taluka, Haveli, Pune, we monitored particulate matter (PM) concentrations using three different metrics: PM1, PM2.5, and PM10. The average concentrations for PM1, PM2.5, and PM10 were 19 µg/m^3, 32 µg/m^3, and 40 µg/m^3, respectively. These values represent the typical levels of particulate matter present in the air during the observation period. Additionally, we recorded the minimum and maximum concentrations for each PM metric. For PM1, the minimum concentration was 8 µg/m^3, while the maximum concentration was 31 µg/m^3. Similarly, for PM2.5, the minimum concentration was 14 µg/m^3, and the maximum concentration was 89 µg/m^3. Finally, for PM10, the minimum concentration was 25 µg/m^3, and the maximum concentration was 149 µg/m^3.

Comparing these values to the permissible concentrations set by regulatory standards, we find that all three metrics—PM1, PM2.5, and PM10—remain below their respective permissible concentrations of 25 µg/m^3, 50 µg/m^3, and 100 µg/m^3. This indicates that, on day 1, the particulate matter levels at the construction site were within acceptable limits according to regulatory standards.

4.2 DAY 1 PARTICULATE MATTER CONCENTRATION

PM (µg)	Average Concentration (µg/m^3)	Minimum Concentration (µg/m^3)	Maximum Concentration (µg/m^3)	Permissible Concentration (µg/m^3)
PM1	30	25	95	25
PM2.5	57	41	350	50
PM10	115	40	615	100

Table no.2

On day 2 of our field observation at the residential construction site in Ambegaon Taluka, Haveli, Pune, we observed notable changes in particulate matter (PM) concentrations compared to day 1. Across all PM metrics—PM1, PM2.5, and PM10—we recorded higher average concentrations. For PM1, the average concentration increased to 30 µg/m^3, with a minimum concentration of 25 µg/m^3 and a maximum concentration of 95 µg/m^3. Similarly, for PM2.5, the average concentration rose to 57 µg/m^3, with a minimum concentration of 41 µg/m^3 and a striking maximum concentration of 350 µg/m^3. These values indicate a significant increase in fine particulate matter compared to day 1. Furthermore, for PM10, we observed a substantial increase in both average and maximum concentrations. The average concentration for PM10 on day 2 reached 115 µg/m^3, with a minimum concentration of 40 µg/m^3 and a remarkable maximum concentration of 615 µg/m^3.

Comparing these concentrations to the permissible levels set by regulatory standards, we find that all three PM metrics—PM1, PM2.5, and PM10—exceeded their respective permissible concentrations of 25 µg/m^3, 50 µg/m^3, and 100 µg/m^3. This indicates a concerning elevation in particulate matter levels on day 2, suggesting a potential impact on air quality and necessitating measures to mitigate emissions from construction activities.

VI. CONCLUSION

Day 1: The observations on day 1 revealed relatively stable particulate matter (PM) concentrations at the residential construction site in Ambegaon Taluka, Haveli, Pune. Despite minor fluctuations, the average PM levels for PM1, PM2.5, and PM10 remained below their respective permissible concentrations. These findings suggest that on day 1, the construction activities had a limited impact on air quality, with measures likely in place to control dust emissions effectively.

Day 2: In contrast, the observations on day 2 presented a stark contrast, with significant increases in PM concentrations across all metrics—PM1, PM2.5, and PM10. The elevated levels, particularly the striking maximum concentrations recorded for PM2.5 and PM10, indicate a substantial deterioration in air quality. These findings underscore the significant impact of construction activities on particulate matter emissions, highlighting the urgent need for stringent dust control measures to mitigate environmental and health risks.

In summary, while day 1 demonstrated relatively acceptable air quality conditions at the construction site, day 2 revealed concerning levels of particulate matter pollution, emphasizing the importance of proactive measures to minimize emissions and safeguard both the environment and public health. Evaluating the environmental impacts and health impacts of PM from construction sites is challenging because of the harsh environment of construction sites and the complex activities performed on-site. Although building construction dust has a significant adverse impact on the surrounding environment and health, its effect has not been thoroughly studied. This project is a systematic evaluation framework for evaluating the impact on health due to the generation of building dust from construction sites. The use of this framework will eliminate the difficulty of comparing and analyzing results from different studies due to the diversity of research methods and perspectives. Gathering primary information from different construction activities and calculating the PM concentration. In There are some limitations of the study while measuring construction dust on the surrounding environment, also it measures the presence of vehicle impact. In future work, it would be particularly desirable to use this method to suggest the health measures to take based on the generation of dust on the construction site. Also, the prevention measures on building construction dust emissions.

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Volume 11 Issue 2 May 2024, Date of Publication: 26-May-2024

PAPER ID : IJRAR24B3512

Registration ID : 291248

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Published In IJRAR (www.ijrar.org) UGC Approved (Journal No : 43602) & 7.17 Impact Factor

Volume 11 Issue 2 May 2024, Date of Publication: 26-May-2024

PAPER ID : IJRAR24B3512

Registration ID : 291248

E-ISSN 2348-1269,
P- ISSN 2349-5138
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Published In IJRAR (www.ijrar.org) UGC Approved (Journal No : 43602) & 7.17 Impact Factor

Volume 11 Issue 2 May 2024, Date of Publication: 26-May-2024

PAPER ID : IJRAR24B3512
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Published In IJRAR (www.ijrar.org) UGC Approved (Journal No : 43602) & 7.17 Impact Factor

Volume 11 Issue 2 May 2024, Date of Publication: 26-May-2024

PAPER ID : IJRAR24B3512
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Published In IJRAR (www.ijrar.org) UGC Approved (Journal No : 43602) & 7.17 Impact Factor

Volume 11 Issue 2 May 2024, Date of Publication: 26-May-2024

PAPER ID : IJRAR24B3512

Registration ID : 291248

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IJRAR | E-ISSN: 2348-1269, P-ISSN: 2349-5138

ISSN No. : 2321-9653

iJRASET

International Journal for Research in Applied Science & Engineering Technology

IJRASET is indexed with Crossref for DOI-DOI : 10.22214
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RESEARCH ARTICLE OPEN ACCESS

An Overview of Donation based Crowdfunding Platform using Smart Contracts

Avisha Mulchandani[1], Parnavi Shrawgi[1], Sai Shinde[1], Aparna Mote[2]

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Abstract:

In the rapidly evolving landscape of fundraising and investment, our project introduces a crowdfunding platform empowered by blockchain technology. This platform combines the advantages of transparency, security, and efficiency offered by blockchain with the flexibility and accessibility of crowdfunding. It enables project creators to reach a global audience and provides contributors with a trusted and secure environment to support their chosen initiatives. With robust identity verification, integrated cryptocurrency wallets, and transparent reporting, our platform ensures a seamless and trustworthy crowdfunding experience. As a symbol of the future of fundraising, our project aims to revolutionize the way innovators and supporters connect, fostering innovation, trust, and collaboration on a global scale.

Keywords — **Crowdfunding, Ethereum , Blockchain , Metamask**

I. INTRODUCTION

Raising money is a difficult process since it involves a lot of trust between a number of people, including funders, middlemen, and organizations that act as a place to hold cash until the recipient needs them. The primary asset that fundraising organizations use to entice donors to contribute their money to recipients of funding is trust. A large number of nonprofit organizations work as fundraisers. Their difficulty in getting people to give money to the organization is building trust. Few nonprofits make advantage of technology to make it simple for people to make financial contributions to them. The key to raising as much money as possible is trust, but technology also has a big part to play in this. In light of this, the blockchain is linked to an uncorrupt digital ledger used in nursing that keeps track of every transaction. Since the system is dispersed, every record is stored on every node in the localized network.

Sensible Contracts, which are apps that run on the blockchain, are supported by Ethereum. Every intelligent contract operates within the Ethereum Virtual Machine. The issue with these crowdsourcing companies is that numerous frauds are being detected, and they charge exorbitant fees. Using blockchain technology to implement a crowdfunding plan can help prevent these kinds of problems. Sensible contracts for crowdfunding eliminate typical trading and platform expenses associated with competing crowdfunding platforms by using blockchain technology.

II. MOTIVATION AND OBJECTIVE

In the evolving landscape of online crowdfunding, the burgeoning popularity of donation-based initiatives is accompanied by an increasing demand for secure, transparent, and user-friendly platforms. Existing solutions often grapple with issues related to transaction integrity, user identity verification, and regulatory compliance. Our motivation stems from a commitment to address these challenges comprehensively, fostering an ecosystem where contributors can engage confidently in philanthropic endeavors. By leveraging advanced technologies and incorporating robust security measures, we aim to instill trust, reliability, and efficiency in the crowdfunding process.

Objectives are

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ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
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Impact Factor: 7.53
Volume 4, Issue 7, May 2024

Depression Intensity Estimation via Social Media

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Abstract: *The advent of social media has transformed the way individuals communicate, express emotions, and share personal experiences. This has opened up new avenues for understanding and addressing mental health issues such as depression. The project aims to leverage machine learning and natural language processing techniques to assess the intensity of depression from social media posts. By analyzing textual content, user interactions, and behavioral patterns on platforms like Twitter, Facebook, and Instagram, the system seeks to identify linguistic and emotional markers indicative of depressive states. This project not only contributes to the early detection of depression but also aids in providing timely interventions. The ultimate goal is to create a tool that can assist mental health professionals in monitoring and understanding the mental well-being of individuals through their social media activities, potentially leading to more effective mental health support and resource allocation. The results indicate that the proposed system can accurately estimate depression intensity, offering a promising approach to addressing mental health issues in the digital age*

Keywords: Depression Intensity, Social Media Analysis, Mental Health, Machine Learning Natural Language Processing (NLP), Sentiment Analysis, Behavioral Patterns, Early Detection, Text Mining, Emotional Markers, etc.

I. INTRODUCTION

The rise of social media has significantly altered the landscape of personal communication and expression, providing a unique window into the daily lives and emotional states of individuals. Platforms such as Twitter, Facebook, and Instagram have become integral parts of modern society, where users freely share their thoughts, experiences, and emotions. This digital footprint offers an unprecedented opportunity to explore and understand mental health issues, particularly depression, which affects millions globally. Traditional methods of diagnosing and monitoring depression rely heavily on self-reported symptoms and clinical interviews, which can be time-consuming and subject to biases. In contrast, analyzing social media data can offer real-time insights into an individual's mental state, potentially leading to earlier detection and intervention. The project "Depression Intensity Estimation via Social Media" seeks to harness the power of machine learning and natural language processing to estimate the intensity of depression from social media activity. By identifying linguistic and behavioral markers associated with depression, this project aims to develop a tool that can assist mental health professionals in monitoring and supporting individuals more effectively. Through the analysis of textual content and user interactions, the project aspires to provide a complementary approach to traditional mental health assessment, ultimately contributing to better mental health outcomes.

II. RELATED WORK

The intersection of social media analysis and mental health research has garnered significant attention in recent years, with numerous studies highlighting the potential of digital platforms to offer insights into psychological well-being. Early research by De Choudhury et al. (2021) explored the feasibility of predicting depression levels using Twitter data. By examining linguistic patterns, tweet frequency, and social engagement, their work demonstrated that social media could be a valuable resource for identifying depressive symptoms. Similarly, Reece et al. (2020) conducted a study utilizing Instagram posts to detect markers of depression, focusing on image attributes and metadata alongside textual

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DOI: 10.48175/IJARSCT-18666
ISSN 2581-9429 IJARSCT

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue XI Nov 2023- Available at www.ijraset.com

A Systematic Exploration of Bug Bounty Platforms

Abhishek Bhosle[1], Chinmay Gokhale[2], Harsh Kumar[3], Yash Dubbalwar[4], Yogita N. Pore[5]
[1, 2, 3, 4]*Student,* [5]*Asst. Professor, Department of Computer Engineering, Zeal College of Engineering and Research, Pune, Maharashtra*

***Abstract:** This review explores the intersection of Bug Bounty Programs and Blockchain Security, aiming to address the evolving challenges and advancements in this critical domain. The rationale for this review is rooted in the escalating importance of securing blockchain networks, and the role bug bounty programs play in fortifying these digital ecosystems. Focusing on many seminal studies, including investigations into decentralized security bounty management, gas usage reduction in Ethereum smart contracts, and predictive models for the effectiveness of bug bounty programs, this paper systematically evaluates diverse methodologies and their implications. The conclusions drawn from these analyses provide valuable insights into the dynamics of bug bounty platforms, bug hunters' perspectives, and the potential scalability solutions offered by emerging blockchain technologies. This abstract encapsulates the essence of the comprehensive review, offering a glimpse into the multifaceted landscape of bug bounty programs in blockchain security. The findings presented underscore the critical need for adaptive security measures in blockchain environments, positioning bug bounty programs as instrumental tools in fortifying these digital infrastructures. As we navigate through the key studies, we uncover not only the current state of the field but also identify avenues for future research, thereby contributing to the ongoing discourse on securing the ever-expanding realm of blockchain technology.*

***Keywords:** decentralized, bug bounty, blockchain, Ethereum.*

I. INTRODUCTION

The convergence of Bug Bounty Programs (BBPs) and Blockchain Security has emerged as a pivotal domain amid the relentless expansion of digital ecosystems. The escalating significance of securing blockchain networks in the face of evolving threats has underscored the instrumental role played by BBPs in fortifying these intricate digital infrastructures. This comprehensive review embarks on a nuanced exploration of the dynamic landscape where cybersecurity, incentivized ethical hacking, and emerging blockchain technologies intersect. At the core of this inquiry lies the imperative to understand and evaluate the multifaceted nature of BBPs within the context of blockchain security. The symbiotic relationship between these programs and the secure functioning of blockchain networks forms the foundation of our investigation. Through a meticulous analysis of seminal studies, innovative methodologies, and critical insights offered by researchers and practitioners, this review seeks to dissect the various dimensions shaping the efficacy, challenges, and potential advancements in BBPs. Our endeavor is propelled by the increasing realization that as blockchain technology pervades diverse sectors, the robustness of these decentralized networks becomes an imperative. The allure of BBPs lies not only in their capacity to incentivize ethical hackers but also in their potential to uncover vulnerabilities crucial for safeguarding these distributed ledgers. As we embark on this exploration, we aim to unravel the intricacies of decentralized security bounty management, scalability solutions, bug hunters' perspectives, and the overall impact of BBPs on software reliability within the blockchain domain. This review serves as a compass navigating through the labyrinth of bug bounty platforms, envisioning a landscape fortified by collaborative cybersecurity measures while acknowledging and addressing the ethical, privacy, and scalability challenges entwined within this intricate nexus.

II. LITERATURE REVIEW

1) Bug bounty programs have undergone a transformation with the integration of blockchain technology, introducing novel ways to fortify cybersecurity measures. The amalgamation of blockchain and bug bounty programs, as exemplified by Bountychain introduced by Hoffman, Becerril-Blas, Moreno, and Kim (2020), represents a pivotal shift in security paradigms. Bountychain utilized Ethereum smart contracts and IPFS to establish a decentralized bug bounty platform, offering a transparent and automated compensation framework for testers. This innovation aimed to streamline bug reporting processes within a secure blockchain ecosystem (Hoffman et al., 2020).

④

A Survey on Graphical Password Strategy Authentication

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ABSTRACT

In an ever-evolving digital realm, ensuring the security and reliability of software applications has become increasingly crucial. The continuous advancement of technology also brings about more complex cyber threats, emphasizing the urgent need to identify and address vulnerabilities. In response to this growing imperative, we introduce "Graphical Password Authenticator: A Novel Approach to Secure User Authentication." The Graphical Password Authenticator reimagines the conventional user authentication process by utilizing graphical elements and innovative techniques. It provides a secure and user-friendly alternative to traditional text-based passwords, offering enhanced protection against unauthorized access. By incorporating graphical images, patterns, or other visual cues, users can create unique and memorable authentication credentials that are difficult for malicious actors to compromise. This approach offers a more intuitive and engaging way for users to access their accounts while significantly reducing the risk of password-related security breaches. The Graphical Password Authenticator system ensures robust security through a combination of graphical recognition and encryption technologies. It is designed to be resistant to common attack methods such as brute force and keyloggers, providing a higher level of protection for user accounts and sensitive information. This novel approach to user authentication fosters a secure and user-centric environment, making it a promising solution for the ever-evolving digital landscape. The Graphical Password Authenticator is a groundbreaking step at the intersection of user authentication and innovation. By redefining the way users prove their identity through memorable graphical elements, this approach empowers users with a more secure and intuitive means of accessing their digital resources. This paradigm shift in authentication methods showcases the potential of technology to enhance user security and create a safer digital future, ultimately bridging the gap between user convenience and robust cybersecurity.

Keywords: Graphical Password Authenticator, User Authentication, Cybersecurity, Digital Security, Encryption Technologies, User-Centric Approach, Brute Force Resistance, Keyloggers Protection.

I. INTRODUCTION

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Volume 9, Issue 4, April – 2024
ISSN No:-2456-2165

International Journal of Innovative Science and Research Technology
https://doi.org/10.38124/ijisrt/IJISRT24APR355

Music Recommendation Using Facial Emotion Recognition

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Abstract:- It can be very befuddling for people to choose which music to tune in to from a wide run of alternatives accessible. Different proposal frameworks have been made for particular spaces like music, feasting, and shopping, catering to the user's inclinations. Our essential objective is to supply music recommendations that adjust with the user's taste. By analyzing facial expressions and client feelings, ready to pick up experiences into their current mental or enthusiastic state. Music and recordings offer a extraordinary opportunity to show clients with a huge number of choices based on their slants and past data. It is well known that humans make use of facial expressions to express more clearly what they want to say and the context in which they meant their words. More than 60 percent of the users believe that at a certain point of time the number of songs present in their songs library is so large that they are unable to figure out the song which they have to play. By developing a recommendation system, it could assist a user to make a decision regarding which music one should listen to helping the user to reduce his/her stress levels. The user would not have to waste any time in searching or to look up for songs and the best track matching the user's mood is detected, and songs would be shown to the user according to his/her mood. The image of the user is captured with the help of a webcam. The user's picture is taken and then as per the mood/emotion of the user an appropriate song from the playlist of the user is shown matching the user's requirement.

Keywords:- *Music Recommendation System, Facial Emotion Recognition, Recommendation, User Preferences, Emotional States, UserEngagement.*

I. INTRODUCTION

A groundbreaking Music Recommendation System has been developed by our team using facial emotion analysis. By combiningemotional context with music preferences, this system offers personalized music suggestions that align with the users' feelings.

Through this innovative approach, we harness the immense potential of AI to establish an emotional connection, thereby enhancing user engagement and satisfaction. The core of our study revolves around a system that utilizes real-time facial expressions of users to gauge their mood. We employ an Emotion Detection Model, which analyzes facial expressions and generates outputs that are then integrated with a music dataset to create a customized music playlist recommendation model. Facial expressions are a primary means through which individuals express their emotions. Music, on the other hand, has long been recognized for its ability to influence one's mood. Our project aims to capture and recognize emotions conveyed through facial expressions and provide appropriate song recommendations that align with the user's mood, ultimately bringing a sense of calmness and satisfaction. The design incorporates a music player that employs the web camera interface available on computing systems to capture human emotions. The software captures the user's image and applies image segmentation and processing techniques to extract facial features and detect the expressed emotion. By capturing the user's image, our goal is to uplift their mood by playing songs that match their emotional state. Facial expression recognition has been a timeless and effective method of analyzing and interpreting human expressions. The analysis and interpretation of facial expressions have long been the most effective way for people to understand and interpret the emotions, thoughts, and feelings conveyed by others. In certain cases, altering one's mood can help overcome situations such as depression and sadness. By employing expression analysis, we can avoid many health risks and take necessary steps to improve a user's mood.

II. LITERATURE SURVEY

A. *Many studies in recent years have confirmed that people feel and respond to music, and that music has an effect on the human brain. In a study examining people's comments about listening to music, researchers found that music plays an important role in linking arousal and mood. Two of the most important roles of music are that it can help the listener understand andrealize himself. Music preferences have been shown to be associated with positive attitudes and mood .*

B. Kabani, Khan, Khan, and Tadvi (2015) introduced a new music player in an article on music and music published in the International Journal of Engineering Research. General Science. The system aims to create a personalized music experience by understanding and adapting to the user's emotional state. Research can delve deeper into the intersection of emotions and music preferences by exploring ways to increase user satisfaction through music recommendations.

IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

Web Scraping: Leveraging the Power of Python, APIs, and Automation

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ABSTRACT

In the digital age, web scraping has become a vital technique for acquiring data, providing researchers and students with never-before-seen access to enormous online information archives. In order to gather structured data from a variety of online sources, this research study examines the synergistic possibilities of Python, APIs, and automation in web scraping. Python, with its modules such as BeautifulSoup and Scrapy, makes it very easy and efficient to parse and extract data from HTML texts. By giving users immediate access to structured data and optimising the extraction pipeline, leveraging APIs improves the scraping process even more. In order to scale up scraping operations and allow students to quickly and methodically gather data from a variety of sources, automation mechanisms are essential. Nonetheless, one must carefully manage the ethical issues of online scraping activities, such as respecting website policies and terms of service. In order to promote ethical and responsible online scraping behaviour, this article looks at best practices and ethical norms. It demonstrates the many uses of web scraping in academic fields through case studies and real-world examples, enabling students to take full use of its potential for ethical and sustainable research, analysis, and innovation.

INTRODUCTION

The wealth of information available on the internet in the modern digital age has completely changed how we conduct research, evaluate trends, and come to wise judgements. Accessing and analysing massive amounts of data to support our studies and add to the body of knowledge in our various professions is a problem we confront on a daily basis as students navigating the complex academic landscape. This is where web scraping enters the picture as a game-changing weapon in our toolbox, providing a means of gaining access to the vast amount of data that is dispersed throughout the internet.

In its simplest form, web scraping is the automated process of obtaining data from websites. It includes gathering structured data sets for analysis and interpretation by methodically retrieving and parsing information from web sites. That is the power that web scraping offers: the capacity to collect data from hundreds, if not thousands, of online pages in a matter of minutes.

We go on an exploration of the complexities of web scraping in this research article, covering everything from its basic principles to its useful uses in academic research. We explore Python programming intricacies, API integration, and automation approaches that are the foundation of web scraping methodologies via the eyes of a student. We explore potential and problems in the search for ethical and efficient web scraping techniques, as well as the ethical and legal ramifications of data extraction from the internet.

Python is widely recognised for its ease of use and adaptability, making it the foundation for numerous data-related projects, such as web scraping. Students have access to libraries such as BeautifulSoup and Scrapy, which give them the ability to easily scan HTML texts, navigate intricate web topologies, and extract structured data. Python is a fantastic option for both novice and experienced researchers due to its simple syntax and large community assistance.

Web scraping becomes much more powerful with the addition of Application Programming Interfaces (APIs), which goes beyond Python. APIs provide as entry points to organised data, providing quick access to carefully chosen content from a variety of internet resources, including news websites, social networking platforms, and databases. Students have access to a multitude of data via APIs, which can enhance their research projects and provide more profound understanding of diverse phenomena.

International Journal of Scientific Research in Computer Science, Engineering and Information Technology
ISSN : 2456-3307
Available Online at : www.ijsrcseit.com
doi : https://doi.org/10.32628/CSEIT2410329

QML Powered Interface for Diffusion Imaging

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ARTICLEINFO

Article History:

Accepted: 10 May 2024
Published: 20 May 2024

Publication Issue
Volume 10, Issue 3
May-June-2024

Page Number
311-322

ABSTRACT

In the field of medical imaging, Diffusion Imaging (DI) has emerged as a powerful technique for investigating the microstructural properties of biological tissues. However, the complexity of DI analysis software often poses a significant barrier to its widespread adoption, as it typically requires proficiency in Python programming and command-line interactions. This technical barrier can limit the accessibility of DI technology to individuals without extensive technical expertise, hindering its potential impact in various medical and research applications To address this challenge, we propose a novel solution that leverages the capabilities of Query Markup Language (QML) to develop a user-friendly interface for Diffusion Imaging. By combining the power of Python technology, which forms the core of DI analysis, with the intuitive interface design capabilities of QML, our project aims to democratize DI analysis and make it accessible to a broader audience, including medical professionals, researchers, and students.

Our research focuses on bridging the gap between the technical complexities of DI analysis and user accessibility. The proposed QML-powered interface will feature modern UI elements with fluid animations, ensuring a seamless and engaging user experience. Crucially, it will abstract away the intricacies of Python programming and command-line interactions, allowing users to concentrate on the analysis and interpretation of DI data without the burden of technical hurdles.

Keywords: Diffusion Imaging, Query Markup Language (QML), Python technology, user-friendly interface, Medical Imaging, Accessibility, Technology Adoption.

I. INTRODUCTION

Within the domain of diffusion imaging analysis, a significant challenge arises due to the intricate complexities associated with navigating and utilizing the available software tools. The primary objective of this project revolves around developing an innovative solution that bridges the gap between the inherent intricacies of diffusion imaging analysis software and the accessibility requirements of non-programmers

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MUSIC RECOMMENDATION SYSTEM USNG FACIAL RECOGNITION

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Abstract -it could be exceptionally dumbfounding for individuals to pick which track to tune in to from a wide run of selections to be had. one-of-a-kind proposition systems were made for precise areas like track, devouring, and buying, catering to the consumer's slants. Our fundamental goal is to supply track proposals that adjust with the consumer's flavor. via analyzing facial expressions and customer sentiments, prepared to select up encounters into their contemporary mental or keen state. song and recordings provide a superb possibility to appear clients with a excellent variety of selections based totally on their inclines and beyond facts. it's far properly recognized that human beings make make use of of facial expressions to specific more without a doubt what they want to say and the putting wherein they implied their phrases. greater than 60 percentage of the customers be given that at a positive factor of time the wide variety of melodies show of their tunes library is so massive that they're incapable to figure out the tune which they got to play. through growing a suggestion framework, it appear assist a purchaser to form a preference with recognize to which tune one ought to track in to making a distinction the consumer to decrease his/her push tiers. The purchaser would now not were given to squander any time in searching or to peer up for melodies and the leading music coordinating the user's disposition is identified, and tunes would be regarded to the patron concurring to his/her disposition. The photo of the client is captured with the assistance of a webcam. The consumer's image is taken after which as per the temper/emotion of the customer an fitting melody from the playlist of the client is appeared coordinating the person's prerequisite.

Key Words: Music Recommendation System, Facial Emotion Recognition, Recommendation. User Preferences. Emotional States, User Engagement..

1.INTRODUCTION

A groundbreaking melody counsel framework has been advanced by utilizing our group the utilization of facial feeling investigation. by utilizing combining emotional setting with music conceivable outcomes, this gadget gives customized music tips that adjust with the customers' feelings. thru this imaginative method, we saddle the tremendous capacity of AI to set up an enthusiastic association, in this manner moving forward client engagement and pride. The center of our watch rotates around a contraption that utilizes actual-time facial expressions of clients to gage their mood. We utilize an Feeling Location adaptation, which analyzes facial expressions and produces yields which may be at that point included with a tune dataset to form a customized music playlist exhortation adaptation. Facial expressions are a essential way thru which individuals express their feelings. track, in any case, has long been analyzed for its potential to induce one's mood. Our undertaking points to capture and apprehend feelings passed on thru facial expressions and give reasonable music tips that adjust with the user's mood, within the long run bringing a sense of calmness and enchant. The plan incorporates a music member that utilizes the internet advanced camera interface accessible on computing structures to capture human sentiments. The program program captures the user's picture and applies photo division and handling strategies to extricate facial capacities and identify the communicated feeling. by capturing the person's picture, our reason is to elevate their disposition by utilizing playing melodies that fit their enthusiastic state. facial highlights notoriety has been a ageless and effective approach of perusing and deciphering human expressions. The evaluation and translation of facial expressions have long been the handiest way for people to secure and translate the emotions, considerations, and sentiments passed on by implies of others. In beyond any doubt cases, changing one's disposition can offer assistance triumph over circumstances such as

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue V May 2024- Available at www.ijraset.com

Student Placement Prediction Portal

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Abstract: We have acquired knowledge through articles and papers on the use of machine learning to anticipate student placement. In our understanding of the education field, it is evident that placement holds importance, for both students and educational institutions. For students it can provide insights into their likelihood of securing placements enabling them to make informed decisions regarding their career paths. Although we are still in the development phase and continuously gaining insights into this matter, we are confident in our potential as a tool, in creating an accurate, reliable and fair student placement prediction portal.

Using machine learning we can analyze data related to student performance placement outcomes and other factors. This analysis helps us identify patterns that can inform predictions, about placement success. To gain insights we employ logic techniques to uncover patterns and trends, within large datasets of student information. This valuable knowledge is then utilized in the development of models. Moreover, we used web development technologies to create a user portal where students can conveniently input their data and receive placement predictions.To analyze this data and predict student placement accurately implementing a machine learning algorithm within the portal is necessary. In my understanding of the education field, it is evident that placement holds importance, for both students and educational institutions.For students it can provide insights into their likelihood of securing placements enabling them to make informed decisions regarding their career paths. Ensuring the security of student data is of importance for the portal

I. INTRODUCTION

In the rapidly evolving landscape of education and industry, the process of matching qualified students with appropriate job opportunities has become a pivotal aspect of ensuring a successful transition from academia to the professional world. To streamline this process and enhance the prospects of both students and recruiters, we present the "Placement Selection Portal" – an innovative and comprehensive solution designed to revolutionize the way placements are conducted.

The institutions, in order to offer the best training to their students, follow a decision-making process. To back up the decision-making process, different techniques and methodologies involved in education data mining were used for identifying the knowledge by understanding the student databases. Accuracy of algorithms using Machine Learning.

Logistic regression Requires a large amount of data: Logistic regression requires a large amount of data to train the model. This can be a challenge for placement selection portals, which may not have access to a large dataset of student data. Support vector machine Can be computationally expensive: SVM can be computationally expensive, especially for large datasets. This can be a challenge for placement selection portals, which may need to process a large number of student applications'-nearest neighbors Sensitive to the value of k: The performance of KNN can be sensitive to the value of k, which is the number of neighbors that are used to make a prediction. This means that it is important to carefully select the value of k for the specific placement selection portal.

Use a combination of machine learning algorithms This can help to mitigate the weaknesses of individual algorithms. For example, logistic regression can be used to identify the most important features, while SVM can be used to make the predictions. Use ensemble learning: This is a technique that combines the predictions of multiple machine learning algorithms to make a more accurate prediction.

Use active learning This is a technique that allows the placement selection portal to select the most informative data points to collect. This can help to improve the accuracy of the model by ensuring that the data that is collected is relevant to the task at hand. Use domain knowledge: This is the knowledge of the specific domain that the placement selection portal is operating in. This knowledge can be used to improve the accuracy of the model by helping to select the right features and interpret the results of the model.

Optimizing Online Shopping: Leveraging Llama for Product Review Summarization

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Abstract - This article highlights a unique "Customer Satisfaction Analysis" module and presents an innovative online commodity search system. The system's goal is to rapidly retrieve product data such as search results, product details, and reviews—through e-commerce API endpoints and display it in an intuitive user interface. The "Customer Satisfaction Analysis" section is particularly noteworthy as it utilizes sophisticated algorithms to examine customer feedback and produce detailed summaries that accentuate the salient features of user opinion. This methodology endows prospective purchasers with a more profound and perceptive comprehension of product attributes and client contentment. Sentiment analysis is integrated into the search process, allowing consumers to make well-informed buying selections. Our approach improves consumers' capacity to make decisions by synthesizing product features and user feedback. This allows consumers to make better educated choices and ultimately have a more fulfilling online shopping experience.

Key Words: API, Large Language Model , Llama, Search System

1. INTRODUCTION

How we shop has changed dramatically as a result of e-commerce's exponential rise. But conventional online shopping experiences frequently fall short, which reduces user pleasure and influences consumers' decisions to buy. Customers struggle to identify the proper products on static product pages with limited search functionality, and they miss important user information that may help them make wise decisions. In order to overcome these obstacles, this study presents a brand-new ReactJS-built commodity search system.

This innovative technology empowers consumers and gets over the limitations of traditional e-commerce platforms with its dynamic and user-friendly design. By combining modern web building methods with sentiment analysis, the system provides a comprehensive purchasing experience.

Imagine searching for a new camera not just using keywords but also utilizing filters for features like megapixels or lens type. Thorough product information, combined with top-notch images and interactive features, provide a meticulous evaluation of potential purchases. In addition, the system uses user insights to do more than just list products.

Our "Customer Satisfaction Analysis" tool generates summaries that highlight significant aspects of user mood by examining customer reviews. This enables you, the customer, to understand not only the technical specifications of the product but also real-world user experiences and complete customer satisfaction. An online buying experience that is more effective and fulfilling is ultimately the result of this data-driven approach, which promotes informed decision-making.

2. LITERATURE REVIEW

The ever-growing world of e-commerce demands innovative solutions to improve user experience and address the limitations of traditional online shopping platforms. This literature review explores relevant research that sheds light on these challenges and potential solutions.

[1] One key area for improvement lies in the structure and functionality of traditional e-commerce systems. A study by Alistair Barros, Chun Ouyang , and Fuguo Wei emphasizes the need for improved modularity in web application programming interfaces (APIs). This resonates with the limitations of traditional platforms, where functionalities like search and product details might be tightly coupled, hindering flexibility and scalability.

[2] Research by Cesar Gonz ´ alez-Mora ´, Irene Garrigos, Jose Zubcoff and ´ Jose-Norberto Mazon explores the concept of model-driven API generation. This aligns with the need for well-defined data models in e-commerce platforms to ensure consistent and efficient access to product information through APIs. These papers highlight the importance of well-designed APIs and data models to overcome limitations associated with static and monolithic web application structures in traditional systems.

© 2024, IJSREM DOI: 10.55041/IJSREM34150

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue V May 2024- Available at www.ijraset.com

Zeal Nexus - Student Abode

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***Abstract:** Effective and thorough processes are critical to the successful operation and management of hostel facilities in the field of hostel management. An effective hostel administration system called Zeal Nexus was created.*

to use the MERN stack technology to meet these goals. Scalability, usability, and integration possibilities are frequently hampered by the complexity of the current hostel administration systems. These difficulties may make it more difficult to manage hostel operations effectively, which could have an impact on both resident satisfaction and administrative effectiveness.

We suggest building the Zeal Nexus, a cutting-edge, comprehensive hostel management system that makes use of the MERN stack—MongoDB, Express.js, React, and Node.js—in order to address these problems. This potent technology stack will be used in our project to create a scalable, responsive, and intuitive Platform.

It simplifies the administration of hostels. A wide range of tools for handling resident data, room assignments, maintenance requests, and financial transactions will be available through the Zeal Nexus, all inside a single, easily navigable interface.

***Keywords:** scalability, user experience, real-time data synchronization, Express.js, React, Node.js, MERN stack, Hostel Management System.*

I. INTRODUCTION

The difficulties in accessing and using standard management software tools provide serious hurdles in the field of hostel administration. The main goal of this project is to create Zeal Nexus, a cutting-edge hostel management system that connects the complex features of current software programs and the needs of both administrators and residents in terms of accessibility.

One major challenge in the existing environment is the lack of an integrated, user-friendly interface designed with hostel management in mind. In order to handle various software systems, users must not only have a thorough awareness of hostel operations but also possess superior technical abilities. Administrators are prevented from effectively utilizing the advantages of digital hostel management by this twofold need, which creates an exclusionary barrier and prevents them from having to deal with the intricacies of several disjointed systems.

Building a comprehensive hostel management system with the help of the MERN stack—MongoDB, Express.js, React, and Node.js—is the ambitious task at hand. Starting from scratch is required for this project, unlike building upon an existing foundation. Although starting from scratch might seem intimidating at first, it also offers a rare chance to carefully customize the system to the particular requirements of both hostel managers and residents. This proactive strategy makes it easier to create a system that seamlessly complements the intended user experience and provides a smooth and efficient interaction. In order to make an informed strategic decision regarding this project, it is essential to examine current research and technology frameworks, drawing conclusions and knowledge from previous efforts. In order to accomplish this, we have thoroughly examined important research papers and case studies that touch on the areas of hostel user interface design, software development, and management. Zeal Nexus hopes to solve the current issues, provide a unified and intuitive interface, and improve the general effectiveness of hotel management operations by incorporating these insights.

II. MOTIVATION

Recent technological developments have changed many facets of the education industry, including the administration of student housing. Systems for managing hostels are essential for facilitating seamless operations, effective use of available resources, and improved quality of life for residents of educational institutions. However, there are a number of drawbacks to traditional hostel management systems, including laborious manual procedures, a lack of real-time data availability, and a lack of scalability to accommodate changing needs.The realization of these difficulties and the urgent necessity for a cutting-edge, all-inclusive solution to expedite hostel management operations is what inspired us to develop the Zeal Nexus Hostel Management System. By providing a strong, user-friendly platform for administrators, staff, and residents alike, our solution seeks to transform hostel management by utilizing the strength of MERN stack technology, which includes MongoDB, Express.js, React.js, and Node.js.

International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 02 | February - 2024 SJIF Rating: 8.176 ISSN: 2582-3930

Enhancing the Shopping Experience: Leveraging API's for Intelligent Product Search

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Abstract - In response to the increasing demands of online shopping, this project introduces a "Smart Search" system using APIs from RapidAPI Hub. The system aggregates real-time data from various online retailers. With a three-tier architecture, it ensures accurate and up-to-date product information retrieval, intelligent processing for categorization, and an intuitive user interface. Preliminary tests demonstrate improved search efficiency and user satisfaction, emphasizing the system's potential to streamline and personalize the online shopping experience.

Keywords*—E-Commerce, Product Recommendation, Recommendation, Web Scraping.*

1. Introduction:

The rapid evolution of e-commerce has revolutionized the way consumers engage in online shopping, presenting an extensive array of products across diverse platforms. However, this abundance often results in information overload, making it challenging for users to efficiently locate specific commodities. To address this issue, our project focuses on the development of a Commodity Search System for Online Shopping. Our system aims to streamline the online shopping experience by providing an intelligent and efficient commodity search mechanism. By harnessing the power of APIs from platforms like RapidAPI Hub, we aim to aggregate and present relevant product information cohesively. This not only enhances user satisfaction but also contributes to the optimization of the online retail landscape. This project contributes to the field of e-commerce by addressing the challenges associated with information overload during online shopping. The development of an effective Commodity Search System not only improves user experience but also opens avenues for further research in optimizing online retail interfaces. Through the utilization of APIs, our work exemplifies a practical solution for enhancing the efficiency and usability of online shopping platforms.

2. Need of Project:

The need of a commodity search system in online shopping arises from the sheer volume and diversity of products available on e-commerce platforms. With countless options to choose from across various categories, users often face challenges in locating specific items efficiently. A commodity search system addresses this need by providing a streamlined and intuitive way for users to search for products based on their preferences, specifications, and requirements. By offering robust search functionality, including filters, sorting options, and advanced search algorithms, the system enables users to quickly narrow down their choices and find exactly what they're looking for amidst the vast array of offerings. Additionally, a well-designed search system enhances the overall user experience, saving time and effort while increasing satisfaction and likelihood of completing a purchase. Moreover, it can contribute to customer retention and loyalty by fostering trust and reliability in the platform's ability to consistently deliver relevant and satisfactory results. In

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"CONVOLINKSPHERE: A CROSS PLATFORM APPLICATION FOR PARENT TEACHER COMMUNICATION"

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Abstract- There are various challenges related to parent-teacher communication. These challenges are often discussed in educational literature, news articles, forums, and other online resources. Parent-teacher communication issues can arise from factors such as busy schedules, language barriers, differing communication preferences, and the need for timely and effective information sharing. Schools and educators often seek solutions to improve communication with parents and guardians to enhance student support and overall educational experience.

Several available technologies can address parent-teacher communication challenges, such as dedicated communication apps providing messaging, event notifications, and progress sharing. Learning Management Systems offer centralized platforms for resource sharing and progress updates. Email, text messaging, and social media platforms can facilitate quick updates and engagement. Video conferencing tools enable virtual meetings, and student information systems provide parent portals for attendance and grade tracking. Enable real-time updates on student progress to complement multimedia content sharing and increase engagement. In addition, addressing potential issues related to technology training for teachers and parents will improve its implementation.

IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH
AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

Survey Paper on Cyber Attack Detection Model (CADM) Using Machine Learning

Network Attack Detection

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Abstract: In this survey study, the Cyber Attack Detection Model (CADM) is specifically highlighted as it examines the field of machine learning applications in Cyber Attack detection. In a time where technology is king, strong defenses are required due to the growing threat of Cyber Attacks. The study examines the literature on Cyber Attack detection, highlighting the development of machine learning approaches and the function of intrusion detection systems (IDS). As an extensive case study, the CADM project demonstrates the complexities of its design, feature selection, preprocessing, data gathering, and ensemble integration techniques. Metrics for performance assessment, including as recall, accuracy, precision, and AUROC, are examined along with comparisons to alternative systems. The report sheds light on the difficulties in detecting Cyber Attacks and suggests future paths for the field's advancement. In the end, the CADM project proves to be a noteworthy addition to the improvement of Cybersecurity by means of inventive machine learning techniques.

Keywords – Cyber Attack, LASSO, Random Forest, Gradient Boosting

INTRODUCTION

Cybersecurity stands as a paramount concern in today's technologically driven landscape, with the proliferation of networked devices intensifying the need for robust defense mechanisms. Intrusion Detection Systems (IDS) play a pivotal role in safeguarding against Cyber threats, and the integration of machine learning has emerged as a promising avenue for bolstering their capabilities. This survey paper delves into the realm of machine learning applications in Cyber Attack detection, focusing on the Cyber Attack Detection Model (CADM) as an exemplar. As Cyber adversaries become increasingly sophisticated, a comprehensive understanding of the methodologies employed in modern detection systems becomes imperative. The survey commences with an exploration of the broader context of Cybersecurity, highlighting the challenges posed by Cyber Attacks. It then transitions to an overview of existing research in the field, emphasizing the evolution of machine learning techniques in Intrusion Detection Systems. The CADM project, a noteworthy contribution to this domain, is introduced as a case study, offering insights into its architecture, data collection strategies, preprocessing methodologies, feature selection techniques, and ensemble integration methods. The paper aims to provide a holistic understanding of the intricacies involved in utilizing machine learning for Cyber Attack detection, with CADM serving as an illustrative example of innovative advancements in this critical domain.

The rising frequency and sophistication of Cyber Attacks have fueled the development of sophisticated detection systems in the everchanging field of Cybersecurity. The Cyber Attack Detection Model (CADM) is the focal point of this survey paper's investigation into the field of machine learning applications for Cyber Attack detection. Cybersecurity is a critical component of contemporary technology that is essential for protecting networks from harmful activity. In this environment, intrusion detection systems (IDS) have become essential tools, and machine learning approaches are becoming essential to maximize their effectiveness.

The CADM project offers a comprehensive method for detecting Cyber Attacks, making it an insightful case study. This survey walks you through the architecture of the project, explaining its nuances in terms of feature selection, data collection, preprocessing, and ensemble integration techniques. In training and testing the CADM model, the importance of datasets like NSL-KDD, KDD Cup 99, UNSW-NB15, URL 2016, and CICIDS 2017 is examined. The importance of pertinent features in building an effective machine learning model is highlighted through the discussion of feature selection approaches, such as LASSO regularization. Metrics for performance evaluation, including recall, accuracy, precision, and AUROC, are carefully studied to give a thorough picture of CADM's capabilities. Analyses conducted in comparison with current systems highlight the model's superior accuracy and precision. In-depth discussion of the difficulties in detecting Cyber Attacks is provided by the survey, which also opens the door to possible future research directions.

International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 11 Issue: 02 | Feb 2024 www.irjet.net p-ISSN: 2395-0072

Exploring Various Techniques for Video Summarization

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Abstract - *Video summarization is a critical task in multimedia analysis, especially in today's digital world, where the volume of video data is vast. Deep learning methods have been widely explored for this purpose, but they often suffer from inefficiencies in processing long-duration videos. This paper addresses the challenge of unsupervised video summarization by proposing a novel approach that selects a sparse subset of video frames to optimally represent the input video. The key idea is to train a deep summarizer network using a generative adversarial framework, comprising an autoencoder LSTM network as the summarizer and another LSTM network as the discriminator. The summarizer LSTM is trained to select video frames and decode the obtained summarization to reconstruct the input video. At the same time, the discriminator LSTM aims to distinguish between the original video and its reconstruction. The adversarial training between the summarizer and discriminator, along with regularization for sparsity, enables the network to learn to generate optimal video summaries without the need for labeled data. Evaluation of multiple benchmark datasets demonstrates competitive performance compared to fully supervised state-of-the-art approaches, showcasing the effectiveness of the proposed method in unsupervised video summarization.*

Key Words: **Event summarization · Critical information in videos · Surveillance systems · Video analysis · Multimedia analysis · Deep learning · Unsupervised learning · Autoencoder LSTM · Long short-term memory network (LSTM)**

1. INTRODUCTION

In today's digital age, videos have become one of the most influential and prevalent forms of multimedia, connecting with users quickly and effectively. The widespread availability of high-speed internet and affordable storage has led to an explosion of video data generation, with platforms like YouTube, Netflix, and social media hosting vast amounts of visual content. However, this abundance of video data presents challenges in terms of storage, bandwidth, and human resources required for analysis.

Video summarization (VS) has emerged as a crucial technique to address these challenges by condensing lengthy videos into concise representations while preserving key information. The primary objective of VS is to analyze videos by removing unnecessary frames and preserving keyframes, thus facilitating efficient browsing and structured access to video content. Automatic VS (AVS) powered by Artificial Intelligence (AI) is a rapidly growing research area, enabling the automatic summarization of lengthy videos without human intervention.

The applications of VS span various domains, including surveillance, education, entertainment, and medical diagnostics. From monitoring and tracking to creating movie trailers and enabling video search engines, the practical use cases of video summaries are diverse and far-reaching. Additionally, VS plays a vital role in reducing frame redundancy, thereby optimizing storage requirements and computational time.

This paper focuses on the problem of unsupervised video summarization, where the goal is to select a sparse subset of frames that minimizes the representation error between the original video and its summary. We propose a novel approach based on a generative adversarial framework, combining an autoencoder LSTM network as the summarizer and another LSTM network as the discriminator. By training these networks adversarially, we aim to produce optimal video summarizations without the need for labeled data.

In this paper, we present an overview of our proposed approach to unsupervised video summarization and discuss its application in various domains. We also delve into the technical details of our methodology, including the use of deep learning architectures such as CNNs and LSTMs for feature extraction and the implementation of a generative adversarial network for optimization. Through experimental evaluation of benchmark datasets, we demonstrate the effectiveness of our approach in generating high-quality video summaries.

Overall, this paper contributes to the ongoing research in video summarization by presenting a novel unsupervised approach that leverages deep learning and generative adversarial techniques to produce compact and informative video summaries across diverse domains.

JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

KRUSHI MITRA: AN APPLICATION FOR FARMERS

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Abstract : The research aims to develop a mobile application catering to farmers, intending to enhance farming profitability. Despite numerous agricultural techniques and information available online, many farmers struggle to access valuable resources, hindering their productivity. The user-friendly app consolidates essential farming information, including plant needs, weather updates, and tips, to aid farmers in managing and monitoring their farms effectively. The "Buying and Selling Crops and Fertilizers" feature of the app enables direct transactions between farmers and customers, allowing farmers to showcase their produce and connect with buyers without intermediaries. This promotes transparency and efficiency in agricultural trade, benefiting both parties. The feature also provides real-time market prices and trends to support informed selling decisions. The research underscores the significance of mobile apps in revolutionizing agricultural practices and emphasizes the potential for further innovation in agricultural services through mobile platforms.

IndexTerms – **Flutter, Firebase, Dart, Bottom navigation**

I. INTRODUCTION

Agriculture serves as the primary livelihood for a significant portion of India's population, accounting for 60-70% of its workforce. However, farmers encounter challenges in accessing and managing precise farming information due to the vast array of data sources and formats available, ranging from traditional print media to modern digital platforms. This complexity often leads to difficulties in obtaining accurate information necessary for effective precision farming practices.

In India, the agricultural sector faces challenges with the profitability of buying and selling crops, often due to intermediary involvement leading to reduced returns for farmers. To address this issue, this research paper proposes a solution that empowers farmers to directly sell their crops to customers through an innovative mobile application. The proposed application includes a feature called "Buying and Selling Crops and Fertilizers," which facilitates direct transactions between farmers and customers. This feature allows farmers to showcase their agricultural produce, such as crops and fertilizers, to a wide customer base, enabling them to set fair prices and connect with potential buyers without intermediaries. By eliminating the need for middlemen, farmers can ensure better returns on their produce. Additionally, the application supports informed selling decisions by providing real-time market prices and trends, further enhancing its value to users in the agricultural sector.

In our research paper, we outline the development of an agriculture app using Flutter, Dart, and VS Code. Flutter's cross-platform framework allows for code that runs on both Android and iOS devices. For the backend, we utilize Firebase, offering robust features such as data storage and authentication. This combination ensures efficient development and seamless functionality across platforms. This paper explores existing Android-based applications beneficial for farmers and delves into the design and development of comprehensive agriculture app offering diverse services tailored to farmers' needs. Crop monitoring plays a pivotal role in meeting consumer demand and averting potential food shortages.

Additionally, Agri app offers valuable information on various aspects of farming, including seeds, soils, fertilizers, pesticides, and crop selection. By providing insights into soil characteristics and optimal crop choices, Agri app empower farmers to maximize profits and minimize environmental impact. Furthermore, Agri app plays a crucial role in promoting sustainable farming practices by educating users about the potential risks associated with excessive use of chemicals and the importance of soil health.

II. PROBLEM DEFINITION

Farmers encounter numerous challenges, including difficulties in connecting with buyers, efficiently managing crops, accessing weather forecasts, procuring quality fertilizers, and expanding their income opportunities. To address these issues, we propose the development of "Krushi Mitra," a mobile app. Krushi Mitra will empower farmers by enabling them to directly connect with buyers, access real-time weather forecasts, receive crop management guidance, and purchase fertilizers. This app aims to provide comprehensive solutions to the challenges faced by farmers, ultimately enhancing their productivity and income prospects.

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Video summarization using attention mechanisms and CNN

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Abstract - This Video summarization is a vital task in multimedia analysis, especially given the vast volume of video data in the digital age. Although deep learning methods have been extensively studied for this purpose, they often face challenges in efficiently processing long-duration videos. This paper tackles the issue of unsupervised video summarization by introducing a novel approach that selects a sparse subset of video frames to optimally represent the original video. The core concept involves training a deep summarizer network within a generative adversarial framework, which includes an autoencoder LSTM network as the summarizer and another LSTM network as the discriminator. The summarizer LSTM is designed to select key video frames and reconstruct the input video from these selected frames. Concurrently, the discriminator LSTM's role is to differentiate between the original video and its reconstruction. Through adversarial training between the summarizer and discriminator, combined with sparsity regularization, the network learns to produce optimal video summaries without requiring labeled data. Evaluations on several benchmark datasets indicate that this method delivers competitive performance compared to fully supervised state-of-the-art techniques, highlighting its effectiveness in unsupervised video summarization.

Key Words: Event summarization, Critical information in videos, Surveillance systems ,Video analysis, Multimedia analysis, Deep learning, Unsupervised learning, Autoencoder LSTM, Long short-term memory network (LSTM)

1. INTRODUCTION

Video summarization (VS) has emerged as a crucial technique to address these challenges by condensing lengthy videos into concise representations while preserving key information. The main goal of VS is to streamline video analysis by eliminating unnecessary frames and retaining keyframes, thus facilitating efficient browsing and structured access to video content. Automatic VS (AVS) powered by Artificial Intelligence (AI) is a rapidly growing research area, enabling the summarization of lengthy videos without human intervention.

VS has applications in various domains, including surveillance, education, entertainment, and medical diagnostics. Its practical uses range from monitoring and tracking to creating movie trailers and enabling video search engines. Additionally, VS significantly reduces frame redundancy, optimizing storage requirements and computational time.

This paper addresses the problem of unsupervised video summarization, focusing on selecting a sparse subset of frames that minimizes the representation error between the original video and its summary. We propose a novel approach using a generative adversarial framework, which combines an autoencoder LSTM network as the summarizer and another LSTM network as the discriminator. By training these networks adversarially, our aim is to produce optimal video summaries without the need for labeled data.

We provide an overview of our proposed approach to unsupervised video summarization and discuss its applications in various domains. Additionally, we delve into the technical details of our methodology, including the use of deep learning architectures such as CNNs and LSTMs for feature extraction and the implementation of a generative adversarial network for optimization. Through experimental evaluation on benchmark datasets, we demonstrate the effectiveness of our approach in generating high-quality video summaries.

Overall, this paper contributes to ongoing research in video summarization by introducing a novel unsupervised approach that leverages deep learning and generative adversarial techniques to produce compact and informative video summaries across diverse domains.

2. Related work

The body of the paper consists of numbered sections that present the main findings. These sections should be organized to best present the material.

(i) Problem Formulations

Traditional video summarization methods such as video synopsis and montages compress video content by tracking moving objects or merging keyframes into summary images. However, these methods often fail to maintain the temporal motion layouts. Alternative techniques like hyper-lapses focus on temporal manipulation. Recent advancements have been directed toward storyboard generation, which extracts

International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 05 | May - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

HAND GESTURE CONTROLLER

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Abstract: In this paper we present an interaction between humans and computer, gesture recognition does play a critical role. While technology has developed to such a level it made possible to communicate with computers with the Gesture Recognition system. Having reached all the best possible ways for data acquisition like cameras, hand Movement now these are of less concern. The desire for human-machine interaction is rapidly growing due to advancements in computer vision technology. Gesture recognition is used extensively in many different types of fields. It indicates that research into vision-based hand gesture recognition is an expanding field, with many studies and papers appearing on a regular basis in research publications and conference papers. Our study further assesses the accuracy with which vision-based recognition of hand gestures systems work. The three primary phases are hand shape recognition, hand tracing, and data transformation to the required command.

Keywords— Deep Learning, CNN-Convolutional Neural Networks, Hand Gesture Controller, Human-Computer interaction

I. INTRODUCTION

Gesture Recognition is the mathematical Interpretation of a human motion by a computing device. As, in today's world we have seen technology increasing day by day. Human-computer interaction has greatly increased, and the field is always developing as new strategies and methodologies are developed.. The field of human-computer interaction has witnessed a notable advancement with the development of hand gesture recognition technology, which has the potential to improve user engagement and provide more intuitive interaction. Making use of a range of sensors and algorithms, this new technology gets hand motions into instructions that computers and other devices are able to execute. These sensors use a variety of technologies, including as wearable's, infrared, ultrasonic, and camera-based systems, to record hand motion and spatial orientation. To identify certain motions, the gathered data is subjected to complex processing that makes use of cutting-edge algorithms, frequently combining machine learning and artificial intelligence approaches. On the other hand, computer vision techniques are used by camera-based systems to precisely capture and interpret hand movements. These systems frequently utilize depth-sensing cameras to generate a hand representation, allowing for enhanced gesture recognition.

International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN - 2395-1990
Online ISSN : 2394-4099
Available Online at : www.ijsrset.com
doi : https://doi.org/10.32628/IJSRSET24113120

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A Research on Graphical Password Strategy Authentication

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ARTICLEINFO

Article History:

Accepted: 15 May 2024
Published: 28 May 2024

Publication Issue :
Volume 11, Issue 3
May-June-2024
Page Number :
237-248

ABSTRACT

In an ever-evolving digital realm, ensuring the security and reliability of software applications has become increasingly crucial. The continuous advancement of technology also brings about more complex cyber threats, emphasizing the urgent need to identify and address vulnerabilities. In response to this growing imperative, we introduce "Graphical Password Authenticator: A Novel Approach to Secure User Authentication." The Graphical Password Authenticator reimagines the conventional user authentication process by utilizing graphical elements and innovative techniques. It provides a secure and user-friendly alternative to traditional text-based passwords, offering enhanced protection against unauthorized access. By incorporating graphical images, patterns, or other visual cues, users can create unique and memorable authentication credentials that are difficult for malicious actors to compromise. This approach offers a more intuitive and engaging way for users to access their accounts while significantly reducing the risk of password-related security breaches. The Graphical Password Authenticator system ensures robust security through a combination of graphical recognition and encryption technologies. It is designed to be resistant to common attack methods such as brute force and keyloggers, providing a higher level of protection for user accounts and sensitive information. This novel approach to user authentication fosters a secure and user-centric environment, making it a promising solution for the ever-evolving digital landscape. The Graphical Password Authenticator is a groundbreaking step at the intersection of user authentication and innovation. By redefining the way users prove their identity through memorable graphical elements, this approach empowers users with a more secure and intuitive means of accessing their digital resources. This paradigm shift in authentication methods showcases the potential of technology to enhance user security and create a safer digital

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IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 7, May 2024

Text Summarization Using NLP

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Abstract: *In the This research introduces a groundbreaking text summarization approach by combining BERT for extractive summarization and GPT for abstractive summarization. The synergy of these models results in a hybrid system that leverages the precision of extraction and the linguistic fluency of abstraction. Experimental results demonstrate the model's efficacy in producing high-quality summaries, showcasing its potential impact on information synthesis across diverse domains.*

Keywords: GPT, BERT

I. INTRODUCTION

In today's information age, we are inundated with an ever-expanding volume of textual data. From news articles and research papers to social media posts and legal documents, the sheer quantity of text available can be overwhelming. Amid this data deluge, the need for efficient methods to distill, condense, and extract meaningful information from text has become increasingly critical. This is where Text Summarization using Natural Language Processing (NLP) emerges as a transformative technology.

Text summarization is the process of automatically generating a concise and coherent summary of a longer text, while retaining its essential information and meaning. This technology is a cornerstone of NLP, a field at the intersection of artificial intelligence and linguistics that focuses on enabling computers to understand, interpret, and generate human language. The goal of text summarization is to make large volumes of text more manageable and accessible, catering tothe time constraints and information overload faced by individuals, researchers, and organizations.

Text summarization can be broadly categorized into two main approaches: extractive and abstractive summarization. Extractive summarization involves selecting sentences or phrases directly from the source text that are deemed most important or representative of its content. Abstractive summarization, on the other hand, goes a step further by generating summaries that may not be verbatim extracts but convey the same ideas using different words and structures, often resembling a human-authored summary.

For text summary, there are essentially two different methods:

- Extractive Summarization
- Abstractive Summarization

Extractive summarization is a technique in Natural Language Processing (NLP) that involves selecting and combining key sentences or passages directly from the source text to create a concise summary.Unlike abstractive summarization, which generates new sentences to capture the essential meaning, extractive summarization relies on identifying and extracting the most important information already present in the original content.

Abstractive summarization is a Natural Language Processing (NLP) technique that involves generating a summary of a document by paraphrasing and rephrasing the content in a way that captures the essential meaning while often introducing new language constructs. Unlike extractive summarization, which selects and combines existing sentences from the source text.

II. LITERATURE REVIEW

In the paper [1], Angel Hernandez-Castaneda , Rene Arnulfo Garcia-Hernandez By automatically generating the summarization process could become more adaptable and applicable to a wider range of domains and languages.

In the paper [2], Jiawen Jiang, Haiyang Zhang , Chenxu Dai1 has The benefits of a hybrid summarization approach, potential technical innovations, and experimental validation of their proposed enhancements.

DOI: 10.48175/IJARSCT-18650

ISSN 2581-9429 IJARSCT

IJARCCE
ISSN (O) 2278-1021, ISSN (P) 2319-5940
International Journal of Advanced Research in Computer and Communication Engineering
Impact Factor 8.102 ⁝⁝ Peer-reviewed & Refereed journal ⁝⁝ Vol. 13, Issue 5, May 2024
DOI: 10.17148/IJARCCE.2024.13588

3D FACE RECONSTRUCTION AND DEEP FAKE DETECTION

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Abstract: In today's rapidly evolving digital landscape, the security and integrity of software applications are paramount. As technology progresses, so do the intricacies of cyber threats, highlighting the critical importance of identifying and resolving vulnerabilities. Addressing this need, we present "3D Face Reconstruction and Deepfake Detection," a project marking a significant advancement in the fields of computer vision and deep learning. We employ Volumetric Convolutional Neural Networks (CNNs) to reconstruct 3D facial models with precision and accuracy, leveraging the feed-forward properties of CNNs to ensure stability and efficiency. This innovative approach enhances the quality of 3D reconstructions, showcasing the potential of deep learning in solving complex real-world problems. Equally important, our project integrates an advanced deepfake detection system using MesoNet, which efficiently identifies synthetic facial images and ensures the authenticity of the reconstructed 3D models. By leveraging a custom dataset that combines various standard datasets, our deepfake detection model achieves high accuracy and robustness, minimizing false positives and negatives. The dual focus on 3D face reconstruction and deepfake detection exemplifies the power of machine learning in capturing intricate facial features and structures while simultaneously safeguarding against digital threats. "3D Face Reconstruction and Deepfake Detection" represents a pivotal step at the intersection of technology and innovation, redefining the processes of 3D face reconstruction and deepfake detection, and making a significant contribution to the fields of computer vision, digital security, and 3D modeling.

I. INTRODUCTION

In the face of an escalating threat posed by facial Deepfakes, this research introduces a pioneering approach centered around the application of Volumetric Regression Networks (VRN) for robust and efficient deepfake detection. As the digital era progresses, the sophistication of facial manipulation techniques like Deepfakes poses significant challenges to the security and integrity of digital identities. The paramount objective of this project is to elevate the accuracy and dependability of authentication processes by harnessing the transformative capabilities of 3D facial reconstruction. By converting 2D facial images into comprehensive volumetric models, this project transcends the limitations inherent in conventional methods, providing a more accurate and detailed analysis of facial
features.

A critical component of our approach is the use of MesoNet for deepfake detection, chosen over other technologies due to its effectiveness in capturing mesoscopic properties of images and its relatively low computational requirements. While techniques like GANs and 3DMM fitting offer robust solutions, MesoNet stands out for its balance of efficiency and performance in detecting subtle manipulations in facial imagery. This research aims to establish a cutting-edge solution that mitigates contemporary challenges in facial manipulation and lays the groundwork for a secure, adaptive, and forward-looking paradigm in digital identity verification. By addressing the intricacies of facial Deepfakes, this project seeks to redefine authentication standards, counteracting the dynamic landscape of emerging threats and setting a new benchmark for security in the digital age.

II. 3DMM

Advanced statistical methods called 3D Morphable Models (3DMM) are used to represent 3D facial forms and textures. They allow for point-to-point correspondence between facial reconstructions and make it easier to convert between different types of faces. In order to align the generated face with a photograph, the conventional method uses inverse rendering and optimizes factors like as shape, texture, posture, and lighting. This approach uses 2D and 3D picture datasets along with dimensionality reduction techniques like Principal Component Analysis (PCA). Nevertheless, tiny datasets of about 200 people constrained the diversity and detail that early models, such as the Basel Face Model (BFM), could represent. By building a large-scale 3DMM with scans from 10,000 people, Booth et al. solved this drawback and improved the model's capacity to represent a variety of facial traits.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue XI Nov 2023- Available at www.ijraset.com

A Review on Smart Canteen Management System

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***Abstract:** The Smart Canteen App is a cutting-edge digital solution designed to revolutionize the traditional canteen experience in educational institutions, corporate offices, and other food service environments. This innovative mobile application leverages technology to streamline the entire process of ordering, payment, and food pickup, enhancing convenience and efficiency for both customers and canteen operators. By integrating modern technology, the Smart Canteen App offers an efficient, convenient, and user-centric dining experience, benefiting both customers and canteen operators. In today's fast-moving world, there is a need of quick and efficient service in every sector of life for public in general. There are many employees and students use canteen and food facilities in their workplace and institutions on daily basis, there is a need to provide quick service at billing counters. This work is focused at developing an efficient smart canteen management system. As canteen in colleges get extremely crowded nowadays, so in this project, concentrate on fast service of food to the users to reduce paper work and save the time of the student by avoiding long queue and to keep things organized. This will satisfy all the customers need and overall sale of the canteen will increase. This application program reduces the manual work for managing the Canteen. Students can place their order through the emenu available on the mobile application which would be further transferred to the canteen. The student can therefore know their order details and the order progress through the mobile application. The canteen manages the students order and keeps updating the progress of the order through their web application. The admin manages the student and canteen through the web application. The app boasts an intuitive user interface that enables users to browse through menus, select food items, and customize their orders with ease. The app facilitates online ordering, enabling customers to place their orders remotely, reducing waiting times, and ensuring their meals are ready when they arrive. Users can customize their orders to accommodate dietary restrictions, allergies, and personal preferences, ensuring a personalized dining experience. Secure payment options are integrated into the app, allowing users to make cashless.*

***Keywords:** Android, canteen app, dining, food, table reservation, notification, recommendation system.*

I. INTRODUCTION

Smart Canteen App is a revolutionary digital solution designed to enhance the dining experience within canteens, cafeterias, and food service establishments. This innovative application leverages cutting edge technology to streamline the process of ordering, payment, and food management, making it a gamechanger for both customers and canteen operators. In today's fast-paced world, traditional canteen systems often lead to long queues, inefficiencies in food preparation, and challenges in managing inventory. The Smart Canteen App addresses these issues by providing a seamless and convenient platform for customers to access and enjoy their favorite meals while empowering canteen operators to optimize their operations. The Smart Canteen App is not just a convenience tool but also a powerful tool for canteen operators to enhance their efficiency and profitability. It represents the fusion of technology and gastronomy, offering a smarter, more convenient, and enjoyable way to dine. Whether you're a hungry student on a college campus, a busy professional at work, or a canteen operator seeking to modernize your establishment, the Smart Canteen App is poised to revolutionize the way you experience and manage canteen dining. Traditional canteen systems often suffer from long queues, limited menu options, and inefficient payment processes, causing frustration and wasted time for both customers and canteen staff. The Smart Canteen App addresses these challenges by integrating technology into every aspect of the dining experience. In today's fast-paced world, traditional canteen ordering and payment processes in educational institutions, corporate offices, and various food service establishments are plagued by inefficiencies, inconvenience,and a lack of transparency. Customers often face long queues, limited menu visibility, and cash handling issues, while canteen operators struggle with order management and accurate financial tracking. There is a pressing need for a modern and user-friendly mobile application that revolutionizes the canteen experience. This app should enable customers to conveniently browse menus, place orders, make payments, and provide real-time information on order status. Simultaneously, it should empower canteen operators with efficient order management tools, inventory control, and financial tracking capabilities. This 'Smart Canteen App' aims to enhance the overall dining experience, reduce waiting times, and promote transparency and accountability in canteen operations.

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International Journal of
INTELLIGENT SYSTEMS AND APPLICATIONS IN
ENGINEERING

ISSN:2147-6799
www.ijisae.org
Original Research Paper

Enhancement in Real Time Deep Learning Object Detection and Direction Prediction for Visually Impaired using YOLO and OpenCV

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Submitted: 28/01/2024 **Revised:** 06/03/2024 **Accepted:** 14/03/2024

Abstract: Millions of individuals around the globe have permanent visual impairment, underscoring the importance of facilitating their understanding of people and the identification of essential daily-use products. To address this need, we propose the system to recognize such items within their daily routines. Numerous initiatives are underway in this field to aid the visually impaired without end to end deployment. The objective is to identify objects and translate them into auditory cues to inform individuals with visual impairment about these items with the system comprises a camera, a speaker, and an image processing system. The primary focus of this study is the amalgamation of real-time object detection and recognition using advanced deep learning techniques. The aim is to detect and label the position and names of multiple objects captured by the camera through an object detection algorithm.

Keywords: Object Detection, Deep Learning, Visually Impaired, YOLO, OpenCV, Image Processing.

1. Introduction

Vision stands as a pivotal sense through which individuals effortlessly engage with their environment, recognizing objects and people in real-time. The visual context aids in determining the proximity and interaction strategies with the surrounding objects, enabling smooth communication for individuals with typical sight. As per the WHO survey more than 1 million people across the globe suffer with permanent visual impairment [1]. Conversely, the visually impaired encounter significant challenges in their daily tasks due to the absence of visual cues. Hence, it becomes imperative for individuals with visual impairments to gain insights into their environment and acquire object-related information. Employing object recognition algorithms founded on the You Only Look Once (YOLO) architecture—a deep learning model—allows for object detection via camera-based systems. This study focuses on analysing precise object information and locating those using advanced deep learning techniques in object recognition.

Object detection techniques are categorized into two primary groups. The first involves classification-based algorithms, such as Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN), which necessitate region selection and individual prediction, resulting in slower processing. The second category involves regression-based algorithms, where YOLO is a notable example. Here, predictions encompass classes and bounding boxes in a single algorithm run, enabling the detection of multiple objects using a unified neural network.

YOLO excels in speed compared to other classification algorithms, despite potential localization errors, presenting fewer false positives in the background. The proposed web application integrates the system's camera to capture environmental objects and continually retrieve video frames. These frames undergo analysis using the YOLO algorithm to identify and categorize objects by creating bounding boxes. The application then generates an audio output based on the most reliably detected object in a frame. To minimize audio output interference, specific frames are selected at predetermined intervals, reducing noise in the output.

2. Literature Review

The system to detect real time images using two distinct algorithms, Yolo and Yolo_v3 is proposed [2] which aims to detect multiple everyday objects and provide voice prompts to alert individuals about nearby and distant objects. The system is evaluated under similar criteria to assess accuracy and performance. Yolo employs TensorFlow's SSD Mobile Net model, while Yolo_v3 uses the Darknet model. To generate audio feedback, the gTTS Python library, which converts text to speech, is employed. The audio is played through the pygame Python module. Testing involves both algorithms using the MS-COCO Dataset comprising over 200K images, employing a webcam in various scenarios to evaluate the algorithms' accuracy in diverse situations.

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International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 5, May 2024 ||

| DOI: 10.15680/IJIRCCE.2024.1205287 |

Revolutionizing Recycling: The Impact of the Recycle App on Sustainable Practices

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ABSTRACT: Smart cities integrate multiple mobile or web solutions to build a comfy human habitation. The rapid growth of urbanization and consumption has led to an unprecedented surge in waste production, posing a significant threat to our environment and natural resources. To address this global challenge, we introduce a mobile application designed to empower individuals and communities to embrace sustainable recycling practices. It offers users a comprehensive database of nearby recycling centers, collection points, and waste management facilities, making it easier than ever to find convenient recycling options. The app provides a rich resource of articles, videos, and tips on recycling best practices, waste reduction, and environmental conservation, aiming to raise awareness and knowledge among users. It incorporates gamification elements, encouraging users to participate in recycling challenges, earn badges, and receive rewards from local businesses, thus making recycling an engaging and rewarding experience. Users can join a vibrant recycling community where they can share their achievements, experiences, and ideas, fostering a sense of belonging and collective action. It allows users to monitor their recycling efforts, tracking the number of items recycled, waste diverted from landfills, and the environmental impact of their actions. The main objective of this research is to develop and evaluate the effectiveness of the "Recycle app" in promoting sustainable recycling practices among users.

In response to the growing environmental challenges posed by waste management, this research paper explores the development and implementation of a mobile application, "Recycle app," designed to promote and facilitate recycling practices among users. The Recycle app aims to enhance user engagement in recycling through a combination of educational resources, user-friendly interfaces, and gamification techniques. The app features a comprehensive database of recyclable materials, location-based services to identify nearby recycling centers, and a tracking system to monitor users' recycling habits and provide feedback. By leveraging modern technology, the Recycle app seeks to address the barriers to effective recycling, such as lack of knowledge, convenience, and motivation. Preliminary user studies indicate a positive impact on recycling behaviors, suggesting the potential of the app to contribute significantly to environmental sustainability efforts. This paper discusses the app's design, functionality, and initial user feedback, highlighting its potential role in fostering a more sustainable future.

KEYWORDS: Recycling practices, Community engagement, Smart Cities, Sustainable development

I. INTRODUCTION

The rapid pace of urbanization and increased consumption patterns have significantly contributed to the surge in waste production, posing severe threats to our environment and depleting natural resources. As cities continue to expand, the challenge of managing waste effectively becomes increasingly critical. Smart cities, which integrate advanced technologies and innovative solutions to enhance the quality of urban life, present an opportunity to address these challenges through sustainable practices. One promising solution within this framework is the "Recycle app," a mobile application designed to empower individuals and communities to adopt and maintain sustainable recycling practices. The Recycle app aims to tackle the barriers to effective recycling by offering a comprehensive and user-friendly platform that combines education, convenience, and motivation. The app provides users with a detailed database of nearby recycling centers, collection points, and waste management facilities, simplifying the process of finding convenient recycling options. It also includes a wealth of educational resources such as articles, videos, and tips on recycling best practices, waste reduction, and environmental conservation, aimed at raising awareness and knowledge among users. To further encourage user engagement, the Recycle app incorporates gamification elements.

Users can participate in recycling challenges, earn badges, and receive rewards from local businesses, making recycling an engaging and rewarding experience. The app also fosters a sense of community by allowing users to share their achievements, experiences, and ideas, thus promoting collective action and support. Moreover, the Recycle app features

International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 11 | November - 2023 SJIF Rating: 8.176 ISSN: 2582-3930

An Overview on Osteoporosis Risk Assessment and AI-Backed Treatment Advice

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Abstract:
Bone diseases are often a "silent" disorder until they cause fractures. One such disease is osteoporosis. Osteoporosis is a chronic bone disease that causes bones to become weak and brittle, increasing risk of fractures. It's a major public health problem, affecting millions of people worldwide. It impacts the lives of more than 1 crore people in India every year. Early detection and intervention can help to prevent fractures and improve quality of life for people with osteoporosis as they are essential for preventing osteoporotic fractures, which can lead to significant morbidity, mortality, and disability. This project aims to develop and implement an osteoporosis risk assessment program by using validated risk assessment tools to identify individuals at high risk of osteoporosis or osteopenia. Patients identified as high risk will be referred for bone mineral density (BMD) testing, and will be provided with information about the disease and fracture prevention, and will be connected with resources for diagnosis, treatment, and support. The system will also recommend orthopedic specialists, orthopedic surgeons, and chiropractors to the individuals based on their location. It will further help them keep track of their treatment, including their medication, reports, nutrition and appointments with their orthopedist using personalized reminders.

Keywords: Osteoporosis, Bones, Fractures, Assessment, Detection, Prediction, Treatment, Convolutional Neural Networks (CNN), X-Ray, Bone Mineral Density (BMD), Dual-Energy X-Ray Absorption, Support Vector Machine (SVM).

I. INTRODUCTION

Osteoporosis is a common metabolic systemic bone disease characterized by increased bone fragility, low bone mass, and a high risk of fractures leading to falls and decreased bone mineral density (BMD). Osteoporosis is considered a great public health problem and the most common metabolic bone disease as it causes more than 8.9 million fractures per year, resulting in one fracture every three seconds and affecting more than 200 million people worldwide. For physicians to be aware and to identify at-risk patients, understanding the risk factors and appropriately diagnose the disease is crucial. Several factors such as gender, age, body mass index (BMI), height, body weight, levels of physical activity, nutritional status, family history, calcium, and vitamin D intake, back pain, and other endocrine and cardiometabolic factors are associated with osteoporosis and very important in diagnosing it during lifetime. Although the most widely used clinical tool for measuring BMD and assessing bone strength is laboratory dual-energy X-ray absorption (DXA), the availability of DXA is very limited and does not indicate bone quality. Therefore, we need appropriate methods for screening, diagnosis and monitoring these patients. Many researchers have also aimed to develop predictive models using risk factors for the screening of osteoporosis.[1] In recent years, other than traditional modelling, classification algorithms have gained popularity because of their ability to detect more complex relationships between input and output features and flexible modelling. Classification algorithms, use large volumes of data, and infer and learn new patterns and relationships. This new information and relationships embedded in large and complex datasets are then made visible. At present, the machine learning approach is not sufficient to predict osteoporosis and requires further study. Hence, the first goal is to determine osteoporosis risk factors in clinical data comprising of physical characteristics, personal and medical history of the subjects. By using classification algorithms in clinical practice as a screening tool, both physicians and patients would be more aware of osteoporosis risk factors and take more preventive measures in the early stages of the disease to avoid adverse outcomes.[4] Drug treatments, fall precautions, and lifestyle changes suggested to patients with osteoporosis have led to a 21–66 percent reduction in fracture risk. Despite the availability of effective anabolic and anti-absorption drugs, osteoporosis and related fractures remain an unsolvable problem. Exaggerated concerns regarding the side effects of some medications have resulted in the use of exercise to prevent osteoporosis.[2] Physical activity (PA) is recommended as a safe and low-cost non- pharmacological intervention strategy to change bone risk factors and maintain musculoskeletal health. It has been shown that the mechanical load resulting from PA increases muscle mass, creates mechanical stress on the skeleton, and increases osteoblast activity. Due to the beneficial effects of PA in the prevention of osteoporosis, physician and patient accessibility to appropriate and effective sports activities is essential. The second goal is to develop artificial intelligence to propose appropriate exercise protocols and diet for health improvement.[5]

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IJARCCE
ISSN (O) 2278-1021, ISSN (P) 2319-5940
International Journal of Advanced Research in Computer and Communication Engineering
Impact Factor 8.102 ⸾ Peer-reviewed & Refereed journal ⸾ Vol. 13, Issue 5, May 2024
DOI: 10.17148/IJARCCE.2024.13584

Infant Cry Analysis

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Abstract: In this research, we have proposed a machine learning model that works on Random Forest Classifier, which extracts the MFCCs(Mel-Frequency Cepstral Coefficients) from baby cries and utilizes these features for predictions such as hungry, belly-pain, burping, tired and discomfort. This research can help the parents, caregivers to determine the exact reason behind the crying baby and suggesting the necessary actions to be taken further depending upon the baby cry.

Keywords: MFCCs(Mel-Frequency Cepstral Coefficients), FFT(Fast Fourier Transform), ML(Machine Learning), DL(Deep Learning), LSTM(Long Short Term Memory).

I. INTRODUCTION

As humans have their language of communication similarly babies try to express their feelings or needs by their cries. Different types of cries convey different needs or has different meaning. According to our research the five basic cries in Dunstan language are Neh (Hungry), Eh (Needs to burp), Heh (Discomfort), Eairh or Eargghh (Belly-Pain), Owh or Oah (Tired). Usually parents predict\ the reason behind baby crying using their experiences which is not always correct and can result in waste of time and improper care to the infant. Advanced machine learning models like Random Forest Classifier extracts the features of baby cries using MFCC and predicts the actual reason behind baby crying. This is far more better than general traditional approach which relies on trial and error based techniques. Baby cries can be identified in real time on real audio data which can be recorded using devices microphone to predict the main reason behind baby crying. This can become beneficial for the caregivers, parents, babysitters, siblings to assist babies as well as the infant as they will get required care.

II. LITERATURE RIVIEW

A. Yun-Chia Liang, Iven Wijaya, Ming-Tao Yang "Deep Learning for Infant Cry Recognition"[2022].In this research authors used deep learning algorithms like CNN and LSTM to recognize the needs of the infant. ANN was used for the comparison between the developed and pre existing models. Features were extracted using this algorithms using MFCC to detect the reason behind the baby cry .

B. Xuewen Yao, Megan Micheletti, Mckensey Johnson, Edison Thomaz and Kaya de Barbaro,"Infant Cry Detection in Real World Environments"[2022].Several machine learning algorithms ,were used by authors for classification of data generated in inlab and real-world environments.CNN model was developed with SVM as a classifier which provided the accuracy of 0.613.

C. Chunyan Ji, Thosini Bamunu Mudiyanselage, Yutong Gao and Yi Pan "A review of infant cry analysis and classification"[2021].In this research authors provided their research on infant cries and their crying patterns which could be further used by scientists, developers and researches to continue their work or make further improvements as dataset used in this research was not precise to provide accurate predictions

D. Sweta Bhattacharya, P.M. Durai Raj, Kathiravan "An Efficient classification of Neonates cry using extreme gradient boosting assisted Grouped vector network"[2021]. Authors of the above paper used the the extreme gradient boosting-powered grouped-support-vector networkto classify the baby cries and predict the exact reason behind baby crying. The model also provide better accuracy but was limited for only three classes of crying.

E. Kathleen Wermke, Michael P Robb, Philip J Schluter, "Melody complexity of infants' cry and non-cry vocalisations increases across the first six months" [2021]. This research aim to analyze the cry and non-cry vocalizations using various different approaches such as frequency analysis, pitch analysis and pattern recognition. Also various techniques from musical field of engineering are considered for further feature extraction.

F. K. S. Alishamol; T. T. Fousiya; K. Jasmin Babu; M. Sooryadas "System for Infant Cry Emotion Recognition using DNN"(2020). The proposed research by these authors identify the emotions and feelings of the infant with the help of extracting MFCC from the audio and using deep neural network(DNN).

International Journal of Scientific Research in Engineering and Management (IJSREM)
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CNN-based Osteoporosis Risk Assessment and AI-Backed Treatment Advice

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Abstract:
Osteoporosis, a progressive bone disease, significantly increases fracture risk. Early detection is vital for preventative measures. This study investigates the application of Convolutional Neural Networks (CNNs) for automated osteoporosis detection using medical images. We propose a CNN model trained on a labelled dataset of knee x-ray images to classify normal and osteoporotic bone structures. The paper talks about the model development, training process, and evaluation for accuracy in osteoporosis detection. The patients using the proposed model will be connected with resources for diagnosis, treatment, and support.

Keywords: Osteoporosis, Bones, Fractures, Assessment, Detection, Prediction, Treatment, Convolutional Neural Networks (CNN), X-Ray, Bone Mineral Density (BMD), Dual-Energy X-Ray Absorption (DXA), Machine learning, Medical Image Data, Image labelling.

I. INTRODUCTION

Osteoporosis stands as an unsolvable issue in the realm of metabolic bone pathologies. It weakens the skeletal framework, rendering it susceptible to fractures upon minimal trauma. This disease has turned into a global health crisis, afflicting a staggering number exceeding 200 million individuals worldwide. The osteoporotic fractures occur every three seconds, with a bone-chilling statistic of 8.9 million annually. For physicians to be aware and to identify at-risk patients, understanding the risk factors and appropriately diagnose the disease is crucial. Several factors such as gender, age, body mass index (BMI), height, body weight, levels of physical activity, nutritional status, family history, calcium, and vitamin D intake, back pain, and other endocrine and cardiometabolic factors are associated with osteoporosis and very important in diagnosing it during lifetime.

Traditional methods such as laboratory dual-energy X-ray absorption (DXA) are widely used metric for BMD and bone strength. But they are expensive, limited, and time consuming. Therefore, the quest for more robust and readily available methods for screening, diagnosis, and ongoing monitoring of patients with osteoporosis remains an imperative.

This paper explores the potential of Convolutional Neural Networks (CNNs) for automated osteoporosis detection using medical images. CNNs are a powerful deep learning technique adept at extracting salient features from imagery data and performing image classification tasks with high accuracy. By leveraging CNNs, we aim to develop a non-invasive, cost-effective, and accurate method for osteoporosis detection. This research investigates the efficacy of CNNs in classifying osteoporosis based on knee X-rays. The paper details the development of a CNN model, its training process on a labelled medical image dataset, and its evaluation for osteoporosis detection accuracy.

This study has a two-pronged approach to tackling osteoporosis. The first goal is to pinpoint risk factors within clinical data, including physical attributes, personal history, and past medical conditions. By leveraging classification algorithms as screening tools, healthcare professionals and patients can gain a heightened awareness of individual susceptibility to osteoporosis.[4] This early detection allows for preventative measures to be implemented before the disease progresses and leads to complications. The effectiveness of interventions like medications, fall prevention strategies, and lifestyle modifications has been well-documented. Studies have shown a

ISSN NO: 1434-9728

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Renewable Energy trading using Blockchain

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***Abstract*—The problem we are facing is how to efficiently use renewable energy sources like solar and wind, which are sometimes unpredictable. Current energy systems struggle to handle this unpredictability, which can lead to wasted energy and more pollution. There is also a lack of trust and transparency in the energy market. The effective tracking and management of renewable energy present complex challenges. Traditional energy tracking systems often lack transparency, security and trust among stakeholders, hindering the realization of a fully sustainable energy ecosystem. To fix these issues, we are looking at using blockchain technology. Blockchain is like a secure and transparent digital ledger. It can help automate energy trading and make it more trustworthy. By using smart contracts, we can make sure energy transactions happen quickly and with fewer costs. We will also use data analytics and devices that connect to the internet to better predict when we will have energy and how to use it efficiently. Our solution is to create a platform for renewable energy trading using blockchain. We will use technologies like Hyperledger Fabric and Ethereum to make sure everything works securely. Smart contracts will help with automatic energy trading, and AI will help us predict when we will have energy. Devices connected to the internet will give us real-time data to manage the energy grid better. With this plan, we want to make renewable energy trading easy and help the world switch to cleaner energy sources faster.**

***Keywords*— Decentralized, Blockchain, Smart contracts, Escrow system, Fair payouts, Security algorithms, Transparency, Security, Stakeholders, Cybersecurity, Ethical hackers**

I. INTRODUCTION

Decentralized energy trading encourages active customer participation resulting in customer empowerment in the energy sector and promotes energy self-sufficiency. A Blockchain can be defined as a dispersed log of all affairs that have taken place digitally and allocated among the engaging candidates. The system not only contains the information regarding all the events of the present but also of the past. The Blockchain will not mandate a change in the public log without the concession of most of the candidates within the system. The Blockchain can be classified into three groups, public, consortium, and private. As the name suggests, in public blockchain all the candidates can contribute and access, as for consortium, a cluster of candidates will be able to participate, whereas, for private blockchain, the access will be confined within the central organization itself. The first exploitation of Blockchain was done by Satoshi Nakamoto with the introduction of the infamous cryptocurrency Bitcoin, and up till now, it has the adequate utilization of the technology. Despite the prestige of blockchain in cryptocurrencies, it has found its exploitations in many other fields, such as digital transactions without the interpretations of any third-party agent as Bank, or in IoT (Internet of Things), Smart Contract or any general services. Motivated by environmental concerns related to climate change and associated financial incentives, homeowners in residential communities are shifting towards procuring locally deployed distributed energy resources (DERs) that seek to maximally utilize clean, renewable energy to accomplish their respective tasks. Within residential communities, these DERs typically include: rooftop photovoltaic arrays (PV), plug-in electric vehicles (EV), smart thermostats (ST), as well as battery energy storage systems (BESS). These DERs offer many tangible benefits to the community, including increased energy efficiency, reduction of peak demand, increased resiliency from outages in the main grid, as well as a decreased carbon footprint. However, these DERs can have unintended negative consequences if left uncontrolled. Previous work has investigated the negative impact of uncontrolled EV charging leading to overloading of local transformers, as well as uncontrolled PV generation leading to overvoltage violations. The addition of DERs to a home has indeed resulted in the vision of smart homes, however, there is a fundamental need for additional mechanisms that will coordinate and align the operation of smart home DERs to mitigate the aforementioned issues.

II. PROBLEM WITH EXISTING SYSTEM

Centralized Current energy trading systems suffer from several issues that limit their effectiveness in creating a transparent, fair, and efficient energy market. Firstly, centralized energy trading platforms place significant control in the hands of a few operators, leading to a lack of transparency and potential biases in energy pricing and transaction approvals. This centralization can result in arbitrary decisions and unfair practices, discouraging participation and undermining trust among energy producers and consumers. Additionally, the absence of an automated and standardized mechanism for energy trading often leads to inefficiencies, delays, and disputes regarding energy prices and transaction settlements. Without a transparent and accountable process, stakeholders may feel marginalized and disenchanted with the platform, significantly reducing its effectiveness in facilitating a fair and efficient energy market. Furthermore, centralized platforms are more vulnerable to cyber-attacks and data breaches, posing significant risks to the security and privacy of users' data and transactions. These issues collectively hinder the potential of energy trading platforms to optimize energy distribution and contribute to a more sustainable and equitable energy ecosystem. vulnerabilities.

International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 05 | May - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

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DizBoard: A Monitoring Dashboard Using Python Library Streamlit

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***Abstract:** In the era of data-driven decision-making, monitoring dashboards have become indispensable tools across various industries, facilitating the real-time visualization of metrics and data analytics. "DizBoard" introduces an innovative approach to dashboard development, leveraging the Python library Streamlit, known for its simplicity and efficiency in creating interactive web applications. This paper presents the design, implementation, and functionality of DizBoard, a comprehensive monitoring dashboard aimed at providing users with intuitive access to real-time data and insights.*

Keywords: Monitoring Dashboard, Streamlit, Python.

1. INTRODUCTION

In the era of rapid technological advancements, the need for efficient monitoring tools for IT systems has become paramount. To address this need, we present "Dizboard: A monitoring dashboard using the Python library Streamlit." Proposed system provides user centric application which simplifies monitoring of complex software ecosystems. This reduces the need of human effort and time to monitor web services. Due to the use of this application a non-technical person will also be able to monitor and get updates of different types of services. It provides a centralized platform for users to monitor the status of systems, add new environments, and receive notifications for any downtime. The dashboard leverages the simplicity of Streamlit to offer a seamless user experience with minimal coding effort. In this paper, we outline the design, features, and implementation details of Dizboard, emphasizing its usefulness in system administration and network monitoring tasks. We demonstrate how Streamlit's intuitive interface and integrated data visualization capabilities contribute to a dynamic and responsive monitoring experience. As this application can be used by any organization, here we demonstrated implementation of this dashboard in a computer lab at college campus to monitor web services.

1.1 PROBLEM STATEMENT

To address the challenges posed by the increasing complexity and scale of modern software applications, there is a critical need for a user-centric monitoring solution that simplifies the process of web services. Current tools often require extensive technical expertise, leading to inefficiencies in issue identification and resolution. Manual monitoring methods and reactive approaches to issue resolution result in extended downtimes and service disruptions. Additionally, the lack of accessible notification systems further compounds the problem. Therefore, the development of DizBoard, a Streamlit-based application, aims to provide a comprehensive and intuitive platform that empowers both technical and non-technical users to monitor application health effectively and proactively.

2. RELATED WORKS

Alessandro Tundo, Chiara Castelnovo et.al "Declarative Dashboard Generation" [2020], Complex software systems, known as systems of systems, demand adaptable monitoring solutions for effective control. Current dashboard systems are often challenging to configure and adjust as indicators change. This paper presents our initial work on an automated dashboard generation process that utilizes

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue V May 2024- Available at www.ijraset.com

A Privacy Focused Chat Application Build Using Flutter

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***Abstract:** In contemporary virtual age, privateness issues have grow to be more and more frequent, mainly in communique platforms where touchy statistics is exchanged. This research paper presents the development of a privacy-focused chat application built using Flutter and Firebase. The utility prioritizes person privateness by means of implementing give up-to-give up encryption, making sure that handiest the supposed recipients can get entry to the messages exchanged. Additionally, the platform consists of robust authentication mechanisms to protect consumer debts and prevent unauthorized access. Through the usage of Firebase as the backend infrastructure, the chat software guarantees scalability, reliability, and actual-time synchronization of data across gadgets. The paper discusses the technical implementation details, such as the encryption algorithms employed, authentication techniques utilized, and the mixing of Firebase offerings. Furthermore, it evaluates the effectiveness of the privacy measures carried out and explores capability regions for similarly enhancement. This studies contributes to the developing body of understanding surrounding privacy-centric software development and gives insights into growing stable verbal exchange platforms in the virtual technology.*

***Keywords:** flutter, firebase, privacy, virtual reality, augmented, synchronization.*

I. INTRODUCTION

In recent years, the swift advancement of digital technology has revolutionized the way people communicate, allowing for seamless interactions across vast distances and diverse demographics. Chat applications have become essential tools for real-time communication, bridging gaps in time and space to connect individuals, organizations, and communities globally. However, this extensive connectivity also brings significant privacy concerns, as sensitive personal and professional information is frequently exchanged in these digital environments. Issues such as privacy breaches, data leaks, and surveillance threats have become prevalent, leading to a growing awareness of the need to protect personal data and communication channels. Users increasingly demand secure options that prioritize their privacy and ensure the confidentiality and integrity of their digital interactions. In response to these concerns, this research paper focuses on developing a privacy-centric chat application designed to mitigate the vulnerabilities present in many mainstream communication platforms. Utilizing Flutter, a cross-platform framework known for its flexibility and efficiency in mobile application development, along with Firebase, a comprehensive backend service that offers real-time data synchronization, robust authentication, and scalable infrastructure, this application aims to provide a secure and seamless communication experience. A key feature of this application is the implementation of end-to-end encryption, a vital cryptographic technique that ensures messages are encrypted on the sender's device and decrypted only on the recipient's device, thereby preventing unauthorized access or interception during transmission. This method guarantees that user messages remain private and protected against eavesdropping, even when facing potential security threats. Additionally, incorporating Firebase as the backend infrastructure enhances the application with advanced security features such as secure user authentication mechanisms, data validation, and access control, further bolstering the platform's overall privacy and integrity. By integrating client-side encryption with server-side security measures, the chat application offers users a comprehensive privacy solution without sacrificing usability or functionality. This paper explores the technical aspects of developing a privacy-focused chat application, detailing the implementation of encryption algorithms, authentication protocols, and data management strategies. It also assesses the effectiveness of these privacy measures through rigorous testing and analysis, evaluating their ability to resist potential security threats and vulnerabilities. Through this research, we aim to contribute to the ongoing conversation about privacy in digital communication and provide practical insights into developing secure communication systems in an increasingly connected world. Our findings highlight the challenges and opportunities in privacy-focused application development and offer guidance and recommendations for developers and users who prioritize privacy in their digital interactions.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 7, May 2024

RFID Based Smart E-Ticketing System

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Abstract: *In the digital era, public transportation systems are evolving to embrace technological advancements to enhance efficiency and passenger convenience. The Eco-Pass project aims to implement an RFID-based smart ticketing system for public buses, replacing traditional paper tickets with a more streamlined and user-friendly approach. This system utilizes RFID technology to automate fare collection, reduce boarding times, and provide real-time data analytics for transit operators. By integrating a mobile application and a robust backend system, Eco-Pass ensures seamless user interaction, easy account management, and secure transactions. The project focuses on creating a scalable, efficient, and secure ticketing solution that can significantly improve the overall passenger experience and operational efficiency of public transportation systems. Through this innovative approach, Eco-Pass addresses common issues such as ticket fraud, manual fare collection errors, and passenger inconvenience, paving the way for a smarter, more connected urban transit infrastructure. This report outlines the system design, implementation plan, and expected outcomes of the Eco-Pass project.*

Keywords: RFID Technology, Smart Ticketing, Transportation, Fare collection

I. INTRODUCTION

The Eco-Pass program is a cutting-edge initiative designed to enhance urban mobility by providing a cost-effective and environmentally friendly transit solution. Developed by Regional Transportation District (RTD), the program offers unlimited access to buses and trains through an annual prepaid transit pass. This pass can be tailored to meet the needs of both employers and employees, fostering a sustainable commuting culture within urban areas. By reducing the reliance on personal vehicles, the Eco-Pass helps to mitigate traffic congestion and lower greenhouse gas emissions, contributing significantly to environmental sustainability (Regional Transportation District) (City of Boulder).

The Eco-Pass program has proven to be particularly beneficial for businesses and their employees. Employers can leverage this program as a tool for recruitment and retention, offering a reliable and safe commuting option that operates year-round. The convenience of unlimited rides not only enhances employee productivity and morale but also reduces the financial burden associated with commuting, including costs related to parking and vehicle maintenance. Moreover, businesses can benefit from various tax incentives, making the Eco-Pass an economically attractive option (Regional Transportation District).

For employees, the Eco-Pass provides numerous advantages, including the flexibility to use public transit for both work and personal travel. This not only saves time and money but also allows employees to reclaim their commute time for more productive activities such as reading or catching up on work. Additionally, the program supports healthier lifestyles by encouraging the use of public transit over personal vehicles, thus reducing stress associated with driving and parking (City of Boulder).

Overall, the Eco-Pass program represents a forward-thinking approach to urban transit, aligning with broader goals of sustainability and community well-being. By promoting the use of public transportation, the program helps to create more livable cities with reduced environmental impact. The success of the EcoPass underscores the importance of innovative transit solutions in addressing contemporary urban challenges and enhancing the quality of life for city dwellers.

Debountify: Decentralized bug bounty platform using blockchain

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Abstract— **Traditional bug bounty programs face challenges such as unfair rewards and lack of transparency. To address these issues, we propose a decentralized bug bounty platform leveraging blockchain technology. By employing smart contracts and an escrow system, we ensure fair payouts based on bug severity. This system prevents unfair situations where bounty hunters may not receive adequate compensation for their efforts. By using escrow, the platform can guarantee that payment is only released once the severity of the bug is assessed and agreed upon by both parties. This ensures that bounty hunters are fairly compensated based on the significance of the vulnerabilities they uncover. Additionally, we Debountify: Decentralized bug-bounty platform using blockchain 2 integrate machine learning algorithms into the platform for various tasks such as fraud detection, prioritizing bug reports, and detecting fraudulent reward claims. This enhances the efficiency and effectiveness of the bug bounty platform. Integration of InterPlanetary File System (IPFS) for storing bug submissions enhances the transparency and security of the bug bounty platform. IPFS offers a decentralized and distributed approach to file storage, ensuring that bug reports are securely stored and readily accessible to authorized parties. Blockchain's transparent ledger enhances visibility, allowing stakeholders to track bug handling and reward distribution. This research explores the potential of this decentralized approach to empower ethical hackers, bolster cybersecurity, and foster a safer digital environment.**

***Keywords*—** **Bug, Decentralized, Blockchain, Smart contracts, Escrow system, Fair payouts, Bounty hunters, Bug severity, Machine learning algorithms, Transparency, Security, Stakeholders, Cybersecurity, Ethical hackers**

I. INTRODUCTION

In an age of rapid technological advancement and increasing digital interconnection, ensuring the security and integrity of software programmes has become a major responsibility. The advancement of digital platforms, services, and systems has brought new opportunities for creativity, but it has also generated flaws that can be exploited by malicious actors. In response to these issues, traditional bug bounty programmes have faced significant obstacles, including unjust awards and opaque mechanisms. To address these issues, we propose a transformative solution: "DeBountify: A Decentralised Bug Bounty Platform using Blockchain." DeBountify represents a paradigm shift in bug bounty programmes, relying on blockchain technology to ensure fairness, transparency, and efficiency. DeBountify employs smart contracts and an escrow system to give equal payouts based on bug severity, lowering the risk of undercompensation for devoted bounty hunters. Furthermore, the incorporation of the InterPlanetary File System (IPFS) enhances platform transparency and security by storing bug submissions in a decentralized and distributed manner. The blockchain's transparent ledger increases visibility, allowing stakeholders to track issue resolution and incentive distribution with unprecedented clarity. This study will look into the huge potential of DeBountify's decentralized method for empowering ethical hackers, boosting cybersecurity, and creating a safer digital world. DeBountify transforms bug bounty programmes into collaborative, transparent platforms by seamlessly combining blockchain, IPFS, and machine learning. Machine learning algorithms are critical in improving the platform's efficiency and efficacy, notably in tasks like fraud detection, prioritizing bug reporting, and detecting fraudulent reward claims. DeBountify promotes trust, empowerment, and creativity in order to achieve a more robust digital future. It stands out as a beacon of progress, uniting various parties behind a shared goal: to defend the integrity of digital ecosystems.

II. PROBLEM WITH EXISTING SYSTEM

Centralized bug bounty platforms suffer from several shortcomings that hinder their effectiveness in fostering a collaborative and fair bug-hunting environment. Firstly, the centralized nature of these platforms places significant power in the hands of platform operators, who have sole discretion over bug assessment and reward distribution. This lack of transparency can lead to arbitrary decisions and unfair treatment of bounty hunters, discouraging participation and undermining the trust of the bug hunting community. Additionally, the absence of a standardized and automated mechanism for bug assessment often results in delays and disputes regarding the severity of reported bugs and corresponding rewards. Without a transparent and accountable process in place, bounty hunters may feel disenfranchised and disengaged from the bug bounty platform, hampering its overall effectiveness in identifying and mitigating security vulnerabilities.

International Journal of Scientific Research in Science and Technology
Available online at : www.ijsrst.com
Print ISSN: 2395-6011 | Online ISSN: 2395-602X
doi : https://doi.org/10.32628/IJSRST52411141

Adviser Automation Express: CSV-Powered Multi-Recipient Messaging System

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ARTICLEINFO

Article History:

Accepted: 01 March 2024
Published: 09 March 2024

Publication Issue :
Volume 11, Issue 2
March-April-2024
Page Number :
75-82

ABSTRACT

In the ever-evolving realm of digital advertising, the ability to effectively communicate with target audiences is a pivotal determinant of success. Advertisers continually seek innovative solutions to streamline their campaigns, reduce operational overhead, and enhance the personalization of messages to engage consumers more effectively. Manual communication methods, while functional, often fall short in meeting these demands, leading to the exploration automation as a compelling alternative. Adviser automation as a transformative tool for advertisers. Specifically, it focuses on the development and implementation of a CSV integrated message sender, a solution aimed at simplifying the intricate process of reaching audiences at scale.

Keywords : Python, Selenium, Automation, Testing, Chrome WebDriver

I. INTRODUCTION

In the rapidly evolving landscape of communication technologies, the demand for efficient and scalable messaging systems has become paramount. In response to this need, the "Adviser Automation Express" emerges as a noteworthy solution, leveraging the power of CSV (Comma-Separated Values) to drive a Multi-Recipient Messaging System. This research paper aims to delve into the intricacies of this inn
While manual communication methods have been the bedrock of advertising for generations, they are often ill-suited to the demands of contemporary digital marketing. The sheer scale of modern advertising campaigns, with diverse audience segments and the need for real-time responsiveness, has outpaced the capabilities of traditional approaches. The result is a growing chasm between what advertisers aspire to achieve and what traditional methods can deliver.

Recognizing these limitations, the advertising industry has embarked on a journey of transformation, seeking refuge in automation as an attractive and compelling alternative. This research paper delves deep into this paradigm shift, exploring the transformative potential of Python automation as an invaluable tool for advertisers. More specifically, it focuses on the development and practical

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International Journal of All Research Education and Scientific Methods (IJARESM),
ISSN: 2455-6211, Volume 12, Issue 5, May-2024, Available online at: www.ijaresm.com

Machine Learning Approaches on Polycystic Ovary Syndrome

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ABSTRACT

Abstract: Polycystic Ovary Condition (PCOS) is a typical endocrine problem influencing conceptive matured ladies, portrayed by unpredictable feminine cycles, hyperandrogenism, and polycystic ovaries. The heterogeneous nature of PCOS presents difficulties in precise determination and individualized treatment. As of late, AI (ML) strategies have arisen as promising apparatuses for tending to these difficulties. This paper gives an outline of the use of ML approaches in the setting of PCOS, zeroing in on analytic, prognostic, and remedial aspects. Different ML calculations, including yet not restricted to choice trees, support vector machines, brain organizations, and troupe techniques, are investigated with regards to include determination, design acknowledgment, and prescient demonstrating utilizing different datasets. The reconciliation of clinical, biochemical, and imaging information improves the accuracy of PCOS analysis, empowering more customized treatment methodologies. ML calculations are utilized to recognize pertinent biomarkers, foresee the gamble of related comorbidities, and advance restorative mediations. Moreover, the paper examines difficulties like information heterogeneity, interpretability, and moral contemplations in the use of ML to PCOS.

Keywords: Polycystic Ovary Syndrome (PCOS), Machine Learning, Support Vector Machines, Logistic, Decision Trees, Neural Networks.

INTRODUCTION

Polycystic Ovary Condition (PCOS) is a major endocrine problem influencing a large number of ladies universally and described by hormonally lopsided characteristics, unpredictable monthly cycles, and the presence of ovarian inflammations. It is a complex condition with different clinical signs, including anovulation, hyperandrogenism, and feminine inconsistencies. PCOS influences regenerative well being as well as poses huge dangers for metabolic confusions, for example, corpulence, insulin opposition, type 2 diabetes mellitus, and cardiovascular sicknesses. In addition, it has been related with an expanded chance of gynecological tumors and pregnancy-related confusions, featuring the complicated idea of this condition and the requirement for exact and convenient finding. Customary techniques for diagnosing PCOS depend on a balance of clinical assessments, hormonal tests, and imaging concentrates, for example, ultrasound examines. Nevertheless, these methodologies can be abstract, monotonous, and may not necessarily in all cases produce outcomes because of the heterogeneous idea of PCOS introductions. A while later, there is a creating revenue in examining state of the art developments like computer based intelligence (ML) conspiring to update PCOS revelation and portrayal.

Artificial intelligence, totally plans like Assistance Vector Machines (SVM) and Convolutional Cerebrum Associations (CNN), has uncovered great capacities in isolating complex datasets, unmistakable models, and making careful assumptions. Support Vector Machines (SVM) have the capacity of advancing past customary strategies since they can distinguish the best hyperplanes for class partition in datasets. SVMs are especially viable at double order issues like recognizing Polycystic Ovary Condition (PCOS) in light of this element.. Convolutional Brain Organizations (CNNs) are without a doubt a sort of AI calculation that is motivated by the mind's inherent capacities for handling visual data. This plan makes CNNs generally excellent at design acknowledgment and picture examination, which is extremely useful when deciphering complex clinical imaging information in clinical settings. The execution of SVM and CNN calculations in PCOS ID contains a significant obligation regarding changing the way this ailment is recognized and treated.

MOTIVATION

Customary demonstrative techniques frequently battle to catch the full range of this complexity. PCOS conclusion generally depends on clinical measures, which might need accuracy and responsiveness. AI empowers the improvement of customized models that take into account individual attributes, foreseeing reactions to explicit intercessions. PCOS the executives frequently includes way of life alterations, pharmacological mediations, and helped conceptive advances.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue V May 2024- Available at www.ijraset.com

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Dialearner: Predicting Diabetes with Machine Learning

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***Abstract:** In the medical field, it is essential to predict diseases early to prevent them. Diabetes is one of the mostdangerous diseases all over the world. In modern lifestyles, sugar and fat are typically present in our dietary habits, which have increased the risk of diabetes. To predict the disease, it is extremely important to understandits symptoms. Currently, machine-learning (ML) algorithms are valuable for disease detection. Diabetes, in all its types, costs countries of all income levels unacceptably enormous personal, societal, and economic expenses. The proposed system can help doctors to make data-driven decisions and enhance patients' treatment. Several machine learning algorithms that are Decision Tree, Support Vector Machine, Random Forest, Artificial NeuralNetwork, k-Nearest Neighbors, Logistic Regression, and Naive Bayes are used. Evaluation metrics such as accuracy, precision, recall, and F1-score are utilized to assess the model's predictive capability. Cross-validationtechniques are employed to ensure robustness and generalizability. The proposed model holds significant promisein facilitating early detection and intervention for individuals at risk of developing diabetes, thereby improving patient outcomes, and reducing healthcare burden. Future research directions may include incorporating additional features and exploring ensemble learning techniques to further enhance predictive accuracy and reliability.*

***Keywords:** K-Nearest Neighbors, Decision Tree, Random Forest.*

I. INTRODUCTION

In the world of growing data, hospitals are deliberately adopting big data technologies. Early detection of diabetes isvital so that patients can take necessary actions at an early stage and potentially prevent or delay health complicationssuch as cardiovascular disease, neuropathy, nephropathy, and eye disease arise from diabetes. Early diagnosis of Diabetes diseases helps to minimize the risk of patients having more complex health issues and medical costs. To apply machine learning algorithms for diabetes prediction, a significant amount of medical and patient data is collected and preprocessed. This data may include patient demographics, medical history, genetic information, lifestyle Factors. The collected data is then split into training and testing sets. Machine learning models, such as SVM, KNN, Naive Bayes, and Random Forest, are trained on the training data and evaluated on the testing data using appropriate performance metrics like accuracy, precision, recall, and F1-score. Once the machine learning models are trained and evaluated, they can be used to predict an individual's risk of developing diabetes based on their uniqueset of features. Machine learning has emerged as a powerful tool in healthcare, offering the potential to transform the way we approach diabetes risk assessment. Dialearner aims to accurately classify individuals at risk of developing diabetes based on their clinical profiles. Evaluate the performance of Dialearner against existing methods and assessits potential impact on improving patient outcomes and healthcare efficiency. we present the methodology employedin developing Dialearner, including dataset selection, model training, evaluation, and deployment. Early detection and symptomatic treatment are essential to ensure the healthy life and well-being of prediabetic patients. An intelligent medical diagnosis system based on symptoms, signs.

II. MOTIVATION

By Improving prediction and management there is motivation to reduce the economic burden on healthcare systemand individuals. With the growth of electronic health records, wearable devices and patient generated data, there is wealth of health information available. Motivation comes from desire to harness this data for improved diabetes prediction and care.

III. OBJECTIVE

1) To classify individuals into one of two categories - diabetic or non-diabetic.
2) To assess the risk and enable early intervention, medical management to prevent or better manage the condition.

© May 2024 | IJIRT | Volume 10 Issue 12 | ISSN: 2349-6002

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Adviser Automation Express: CSV-Powered Multi-Recipient Messaging System

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***Abstract*— In the fast-paced world of digital advertising, the ability to connect with target audiences is crucial for success. Advertisers are always on the lookout for new ways to make their campaigns more efficient, reduce costs, and create personalized messages that resonate with consumers. While traditional methods work, they often can't keep up with the demands of modern advertising. This has led to a growing interest in automation as a solution. Adviser automation as a transformative tool for advertisers. Specifically, it focuses on the development and implementation of a CSV integrated message sender, a solution aimed at simplifying the intricate process of reaching audiences at scale.**

***Index Terms*— Python, Selenium, Automation, Testing, Chrome WebDriver, Search Engine Optimization (SEO), Social Media Optimization (SMO).**

I. INTRODUCTION

In today's ever-evolving world of communication technologies, there's a pressing need for messaging systems that are both efficient and scalable. Enter "Adviser Automation Express," a notable solution that leverages CSV (Comma-Separated Values) to power a Multi-Recipient Messaging System. This research paper aims to explore the intricacies of this innovative approach.

While manual communication methods have long been the backbone of advertising, they often struggle to keep up with the demands of modern digital marketing. With today's sprawling advertising campaigns targeting diverse audience segments and requiring real-time responsiveness, traditional methods fall short. This has created a gap between advertisers' goals and what traditional approaches can deliver.

In response, the advertising industry is undergoing a transformation, turning to automation as an appealing alternative. This research paper dives deep into this shift, highlighting the transformative potential of Python automation as a crucial tool for advertisers. Specifically, it zeroes in on the development and implementation of a CSV integrated message sender, meticulously crafted to simplify the process of engaging audiences at scale.

By harnessing the power of Python, advertisers can revolutionize their communication strategies, making campaigns more efficient, targeted, and ultimately, more successful. The introductory section of the paper outlines the core challenges faced by advertisers today, stressing the need for streamlined communication channels. It emphasizes the limitations of manual methods and showcases the rising demand for automation to overcome these hurdles. Furthermore, it presents Python as the perfect programming language for automation tasks due to its versatility, robust libraries, and user-friendly nature.

As the paper progresses, it will provide a comprehensive breakdown of how to construct a CSV integrated message sender using Python. It will delve into its capabilities, technical aspects, and practical applications in real-world scenarios. By the end of this research, advertisers will gain valuable insights into how Python automation can enhance their advertising efforts, leading to more efficient and effective campaigns

International Journal of Innovative Research in Computer and Communication Engineering
| e-ISSN: 2320-9801, p-ISSN: 2320-9798 www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |
|| Volume 12, Issue 5, May 2024 ||
| DOI: 10.15680/IJIRCCE.2024.1205328 |

Visitor Vehicle Monitoring System

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ABSTRACT: In a community dealing with issues, like vehicles, excessive paperwork and ineffective visitor management a new approach is proposed using a combination of cameras and smart technology to identify and monitor vehicles. Here's how it functions; A camera positioned at the entrance captures vehicle images. Through algorithms the system scans their license plates eliminating the need for data input. This data is then stored in a database along with entry and exit timestamps providing real time insights into visitor traffic. It doesn't stop there! Visitors now have the option to request access in advance. Upon arrival their license plate triggers an alert to the hosting resident, who can then decide whether to grant entry. This process simplifies operations. Enhances security measures. This innovative system represents an improvement over methods by ensuring precise record keeping bolstering security protocols and offering a 'more efficient way to oversee vehicle movements, within the community.

KEYWORDS: Character Recognition, Convolutional Neural Network (CNN), Camera, Character Segmentation.

I. INTRODUCTION

Organizations are facing critical difficulties due to a rising number of automobiles such as traffic congestion, lack of security, and poor parking system. Security personnel sometimes have to use conventional verification methods to authenticate vehicles because these systems have been done manually in many cases This is laborious and may lead to errors. Besides, performing records in books and spreadsheets can be undependable which makes the accessibility of important information during emergencies impossible.

The effectiveness and complexity of current vehicle management systems differ whereby some require a great deal of setting up while some others are not reliable enough. In this study, a new approach is proposed that overcomes these limitations by proposing an improved vehicle registration system that is secure and efficient.
This paper describes a new type of car registration and management system for communities that uses Convolutional Neural Networks (CNNs) to detect and recognize license plates. The entry point of the system is equipped with a camera that can capture images of vehicles. Consequently, a CNN-based algorithm can determine promptly the presence of license plates in order to avoid wastage arising from manual data entries. Timestamps for entrance and exit as well as the extracted details on number plates are stored in a database. Additionally, it allows for monitoring real-time vehicle count within a community, which facilitates efficient administration.
Furthermore, this system encompasses visitor management capabilities so that prior access may be granted by visitors whose arrival would automatically trigger an alert through his/her vehicle's number plate to a resident. With residence consent being left or not given depending on who you are, whoever resides at the gate post may grant or refuse permission before one comes in simplifying procedure in case there is a need for letting guests inside. This innovative structure is a significant improvement over manual methods, providing accurate information, improved safety and refined vehicle management among the people. The system increases efficiency and reduces risks of unauthorized entry by automating vehicle tracking and visitor access while providing relevant information useful for better management.

International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 01 | January - 2024 SJIF Rating: 8.176 ISSN: 2582-3930

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"Decoding Bird Species Diversity through Image Analysis"

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Abstract - Bird species diversity plays an integral role in maintaining ecosystem equilibrium and serves as a significant indicator of environmental health. However, the meticulous monitoring and cataloging of bird species within specific regions pose considerable challenges, often requiring extensive time and expertise from ornithologists. In today's rapidly advancing technological landscape, the integration of image analysis and machine learning presents a promising avenue to streamline bird species identification and diversity assessment processes. Nonetheless, the increasing rarity of certain bird species presents a formidable obstacle, complicating their classification. Birds encountered across diverse environments present varying sizes, shapes, colors, and orientations, adding complexity to accurate identification via image analysis. Moreover, image-based classification exhibits more pronounced variations compared to audio classification, although human perception of birds through images remains intuitively comprehensible. Leveraging the deep convolutional neural network (DCNN) algorithm, images undergo conversion into grayscale format to generate autographs using TensorFlow, resulting in the creation of multiple comparison nodes. Subsequently, these nodes undergo comparison with the testing dataset, generating a score sheet for analysis. Interpretation of this score sheet facilitates the prediction of the target bird species based on the highest score achieved. Experimental analysis conducted on datasets such as Caltech-UCSD Birds demonstrates the algorithm's efficacy, with bird identification accuracy ranging between 80% and 90%.

1. INTRODUCTION

Bird behavior and population trends have emerged as significant concerns in recent times. Birds play a crucial role in environmental monitoring, aiding in the detection of other organisms such as insects, as they are highly responsive to environmental changes. However, gathering information about birds often demands extensive human effort and can be costly. In such circumstances, a reliable system capable of processing bird-related information on a large scale becomes imperative, serving as a valuable tool for researchers, governmental agencies, and other stakeholders. Bird species identification is central to this endeavor, enabling the classification of bird images into specific species categories.

While bird identification can be conducted through various means such as image, audio, or video, audio processing techniques face challenges due to the complexity of environmental sounds, including those from insects and other objects. In contrast, images are often perceived as more effective by humans, making image-based classification preferable over audio or video methods. However, bird species identification remains a challenging task for both humans and computational systems.

Ornithologists have grappled with bird species identification for many decades, requiring a comprehensive understanding of various aspects of birds, including their biology, distribution, and ecological impact. Traditionally, bird identification has relied on the classification framework proposed by Linnaeus, encompassing categories such as Kingdom, Phylum, Class, Order, Family, and Species. With the advancement of image-based classification systems, the scope has expanded to datasets with a more extensive range of categories, such as the well-known Caltech-UCSD Birds 200 (CUB-200-2011) dataset. This dataset comprises images of birds primarily found in Northern America,,providing valuable resources for research and analysis in bird species identification and ecological studies.

2. NEED OF THE STUDY

The study on "Decoding Bird Species Diversity Through Image Analysis" addresses crucial needs in biodiversity conservation, ecological research, and technological advancement. Traditional methods of bird species identification are slow and require specialized expertise, limiting the scope and speed of biodiversity monitoring. Automated image analysis offers a faster, more accurate, and scalable solution, facilitating timely conservation efforts and enhancing ecosystem health assessments. For ecological research, image analysis complements traditional data collection methods, enabling more extensive and accurate data gathering. This supports large-scale studies, providing detailed insights into ecological patterns and trends. Technologically, the study advances machine learning and computer vision for species identification, with broader applications in biodiversity research and public engagement. Integrating image analysis into citizen science platforms empowers public participation, increasing data collection and raising conservation awareness. Additionally, this study helps document under-studied species, particularly in remote areas, and provides real-time data for adaptive management strategies. Economically, automated image analysis offers a cost-effective alternative to traditional surveys, reducing resource requirements.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue IV Apr 2024- Available at www.ijraset.com

Online Auction System Using Python, Blockchain and Cloud Computing

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***Abstract:** The "Advanced Online Auction System Using Python, Cloud Computing, and Block chain Integration" is a pioneering project designed to transform the landscape of online auctions. This project leverages the synergistic power of Python programming, cloud computing infrastructure, and Block chain technology to create an innovative online auction platform. Our system offers a secure and transparent environment for auction participants, ensuring trust and credibility throughout the auction process. Through the integration of cutting-edge technologies, it addresses the evolving needs and challenges of online auctions, providing an efficient and user- friendly experience. With a focus on security, transparency, scalability, and user engagement, this project aims to revolutionize the online auction industry, setting new standards for efficiency and trustworthiness. By combining these technologies, it represents a significant step forward in the world of online auctions and promise store shape the way auctions are conducted and experienced.*

***Keywords:** Transparency, auctions, Block chain, Python.*

I. INTRODUCTION

The future of online auctions with our innovative platform, blending the power of python, blockchain, and cloud computing. our user-friendly interface, crafted in python's versatile language, ensures a seamless experience for both bidders and sellers. the integration of blockchain technology brings unparalleled transparency and trust to every auction, recording bid histories and transactions securely. smart contracts automate processes, from bid acceptance to fund transfers, guaranteeing efficiency and reliability. real-time updates keep users in the loop, providing instant notifications on bidding activities and auction status. cloud computing ensures scalability, adapting effortlessly to varying demands and ensuring a consistent user experience. security is a top priority, with robust encryption safeguarding user credentials and financial transactions. sellers and administrators benefit from comprehensive analytics, gaining valuable insights into auction performance and user behavior. regulatory compliance is embedded in our system, creating a legally sound and trustworthy platform. bid with confidence in this fusion of innovation and tradition, where every transaction is secure, transparent, and backed by cutting-edge technology.

II. LITERATURE REVIEW

1) The research paper authored by Ning Xie and Xuijie Zhang, titled " An online auction mechanism for cloud computing resource allocation and pricing based on user evaluation and cost." [2020] aims to Investigate methods for pricing cloud resources based on user evaluations and cost considerations, aiming to strike a balance between affordability and quality.

2) Yutao Jiao, Ping Wang, Dusit Niyato authored the research paper titled " Auction Mechanisms in Cloud Computing Resource Allocation for Public Blockchain Networks" [2020]. The paper aims to design auction mechanisms that efficiently allocate cloud computing resources in the context of public blockchain networks to ensure optimal utilization. As an emerging decentralized secure data management platform, blockchain has gained much popularity recently. To maintain a canonical state of blockchain data record, proof-of-work based consensus protocols provide the nodes, referred to as miners, in the network with incentives for confirming new block of transactions through a process of "blockmining" by solving a cryptographic puzzle.

3) Nikitha KB, Nalin KS, Kalayselvi R , presents " E-auction using Blockchain Mechanism" [2023]. The paper introduces a secure file-sharing system that enhances security, trust, immutability, and transparency using blockchain, IPFS, and PKI technologies. Online auction system has experienced significant growth in recent years due to its convenience, accessibility, and wider reach.

4) Prashant Kumbharkar, Vaibhav More discusses " Secure Online E-Auction System using Blockchain Technology" [2023]. This paper explores the evolution of enterprise adoption issues in blockchain technologies, focusing on Bitcoin, Ethereum, and Solana, from their inception to recent developments.

International Journal of Scientific Research in Engineering and Management (IJSREM)

4A

IOT Vigilant Guard Your Watchful Robot Companion For Video Surveillance

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Abstract - An innovative monitoring system combines robots, Internet of Things (IoT) tech, and artificial intelligence (AI) for secure surveillance across industries and hazardous environments. The system features a robot with cameras, sensors, and connectivity modules for remote- monitoring and control, boosting security. Through IoT, it provides live video access and uses face recognition for identity verification. Moreover, AI and machine learning detect and track motion, improving intruder detection and prompt response to threats. This comprehe-nsive approach offers valuable applications in home- security monitoring and industrial surveillance.

Key Words *– IOT, Surveillance, AI, Remote Monitoring, Security.*

1.INTRODUCTION

Smart surveillance refers to an advanced security monitoring system that integrates modern technologies, such as the Internet of Things (IoT), artificial intelligence (AI), and machine learning (ML), to enhance surveillance capabilities. This system combines various hardware components, software applications, and network infrastructure to provide more efficient and effective monitoring and response to security threats.

Video Surveillance Robots leverage IoT technology to enhance their functionality and effectiveness. Through internet connectivity, these robots can transmit video streams and other sensor data to a centralized control center, enabling real-time monitoring and analysis.

IoT integration allows for seamless communication between the robot and other connected devices, such as smartphones or security systems. This enables security personnel to have remote access to the robot's video feed and control its movements, making it easier to respond to potential security threats or incidents promptly.

A Video Surveillance Robot is a robotic device equipped with advanced video capture capabilities, designed to enhance security and monitoring systems. It combines elements of robotics, real-time video streaming, and IoT (Internet of Things) technology to provide efficient and effective surveillance in various environments.

The robot is typically equipped with a camera or multiple cameras that can capture high-quality video footage in real-time. It is remotely controlled or operates autonomously, allowing it to navigate through different terrains and locations, making it an ideal choice for monitoring large areas or hard-to-reach areas.

2.ALGORITHM

1] **Step 1:** The surveillance robot patrols the border, capturing video footage using onboard cameras.

2] **Step 2:** Face detection algorithm is applied to the captured video input to detect faces along the border.

3] **Step 3:** The detected faces are preprocessed to enhance image quality and uniformity, using techniques like Histogram equalization to adjust for lighting conditions.

4] **Step 4:** The preprocessed images are resized to a specific output size to optimize processing.

5] **Step 5:** Feature extraction is performed on the resized images to extract relevant facial features using methods like Eigenface-based approach or discrete cosine transform.

6] **Step 6:** Extracted features are compared with the database of known criminals and suspects stored in the data-center.

7] **Step 7:** If a match is found between the extracted features and the database, an alert message is generated and sent to the nearest border patrol authorities or concerned agencies.

8] **Step 8:** The surveillance robot continues its patrol along the border, repeating the process to identify and alert authorities of any potential threats.

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International Journal of Scientific Research in Computer Science, Engineering and Information Technology

ISSN : 2456-3307

Available Online at : www.ijsrcseit.com
doi : https://doi.org/10.32628/CSEIT24103117

Smart HygineMate Hub: A Smart Vending Machine

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ARTICLEINFO

Article History:

Accepted: 10 May 2024
Published: 28 May 2024

Publication Issue
Volume 10, Issue 3
May-June-2024

Page Number
354-364

ABSTRACT

Activists and groups concerned with women's health and hygiene as well as news articles, social media, and discussions have brought attention to the issue of sanitary pads selling machines. The need of convenient access to sanitary pads through vending machines particularly in public locations like schools, colleges, airports, hotels and public restrooms, was made more widely known through the efforts of Women's Rights Organization, Non-Governmental Organizations (NGOs) and Government Initiatives. As a part of larger discussion surrounding menstrual hygiene and women's empowerment this topic attracted attention. By automating inventory management, providing touchless interactions, various payment modes and enhancing security, the model provides a streamlined user experience. This technology also yields a valuable data insight, reduced maintenance efforts and facilitates personalized user profiles. Ultimately it contributes in improving menstrual hygiene and accessibility. The lack of scanner which makes it difficult for people in need of sanitary pads in emergencies, the difficulty of promptly monitoring and replenishing the machines, sanitary pads supply are the two of the main issues with the existing sanitary pad vending machines. Additionally consistent resources and work are needed to maintain and keep sanitary pad vending machines operational. Further issue still exists of affordability of the vending machines particularly in the rural areas due to limited resources. These issues mainly attracted to work and research on making a vending machine which will be cost effective, simplified and user-friendly machines with the use of edge cutting technologies.

Keywords : Arduino Uno, Coin Acceptor, LCD Display, GSM 900 Module, ESP32, IR Sensor

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(4-2)

An Overview of Innovative Approaches to Healthy Living: The Role of a State-of-the-Art Diet App

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Abstract: A user-friendly tool to help people manage their dietary choices and optimize their health is a mobile diet app for human nutrition. Features including meal planning, goal-setting, calorie counting, nutritional analysis, food monitoring, and progress tracking are included in these applications. Users can tailor their experience to dietary requirements, special diets, or preferences. These applications also frequently offer helpful educational materials and a sense of community for inspiration and support. Mobile diet applications are quite important for assisting individuals in making wise and healthy food decisions, which eventually improve nutrition and general well- being. Pregnancy-specific mobile applications are a priceless resource for enhancing the nutritional requirements of both the mother and the fetus. These specialist applications include functions including tracking nutritional intake, keeping an eye on weight gain, and giving advice on nutrition throughout pregnancy. They support expectant mothers in making knowledgeable dietary decisions and guarantee they get the vitamins and minerals they need for a successful pregnancy. These applications frequently have dietitian features, offer guidance on pregnancy-related issues, and incorporate yoga and a healthy diet. These smartphone applications, which have intuitive interfaces and evidence-based content, are vital tools for pregnant mothers, supporting them in maintaining appropriate nutrition throughout their pregnancies.

Key Words: Diet app, Nutrition Management, Meal Planning, Calorie Counting, Progress Tracking, Special Diets, Pregnancy Nutrition, Weight Gain Tracking, Dietitian Guidance, Yoga During Pregnancy.

I.INTRODUCTION

Mobile applications have emerged as effective partners in the search for improved health and nutrition in an age where digital technology plays an increasingly important role in our everyday lives. Among the numerous applications available, those devoted to human nutrition and food have gained importance, providing users with an easy and quick way to monitor their nutritional choices. These smartphone applications are all-in-one tools that allow users to track their food consumption, calculate calorie intake, check nutritional content, and plan meals that are in line with their health and wellness objectives. Furthermore, these applications may adjust to different dietary preferences and limits, making them adaptable partners for those who follow certain diets or face specific nutritional issues.

These smartphone apps for human nutrition are leading the way in helping people of all ages and backgrounds make healthier lifestyle choices and promote

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue XI Nov 2023- Available at www.ijraset.com

A Comprehensive Review on Renewable Energy Trading

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***Abstract:** The problem we are facing is how to efficiently use renewable energy sources like solar and wind, which are sometimes unpredictable. Current energy systems struggle to handle this unpredictability, which can lead to wasted energy and more pollution. There is also a lack of trust and transparency in the energy market. The effective tracking and management of renewable energy present complex challenges. Traditional energy tracking systems often lack transparency, security and trust among stakeholders, hindering the realization of a fully sustainable energy ecosystem. To fix these issues, we are looking at using blockchain technology. Blockchain is like a secure and transparent digital ledger. It can help automate energy trading and make it more trustworthy. By using smart contracts, we can make sure energy transactions happen quickly and with fewer costs. We will also use data analytics and devices that connect to the internet to better predict when we will have energy and how to use it efficiently. Our solution is to create a platform for renewable energy trading using blockchain. We will use technologies like Hyperledger Fabric and Ethereum to make sure everything works securely. Smart contracts will help with automatic energy trading, and AI will help us predict when we will have energy. Devices connected to the internet will give us real-time data to manage the energy grid better. With this plan, we want to make renewable energy trading easy and help the world switch to cleaner energy sources faster*

Keywords: decentralized, bug bounty, blockchain, Ethereum.

I. INTRODUCTION

Renewable energy sources are considered as a potential solution to achieve energy sustainability. They can be integrated on a large scale at the generation level or on a small scale at the distribution level of the grid. More and more countries are aiming to increase the installed capacity of these sources at the generation level. For example, India has set a target to achieve 175 GW and 450 GW of renewable energy capacity by 2022 and 2030. However, generation level integration requires a significant amount of upfront investment. That leads to the alternative option of installing renewable energy sources at the distribution level, as the localized energy generation and consumption minimize the requirement for expensive network upgrades. The integration of renewable generation at the distribution level faces challenges due to the lack of motivation in the energy users. The users receive less price for feeding excess power to the grid compared to the price paid for power consumption. Some of the feed-in-tariff schemes have been discontinued because of that reason, leading to the need for consumer-centric markets. In this scenario, decentralized energy trading can play a pivotal role as it allows the prosumers to trade surplus power at the desired rate, with the consumers willing to purchase off-grid power.

They receive benefits for investing in the generation and storage facilities. On the other side, consumers get the freedom to choose from multiple energy suppliers. They can choose based on the rate and source of energy, which leads to energy affordability and transparency. Decentralized energy trading encourages active customer participation resulting in customer empowerment in the energy sector and promotes energy self-sufficiency. A Blockchain can be defined as a dispersed log of all affairs that have taken place digitally and allocated among the engaging candidates. The system not only contains the information regarding all the events of the present but also of the past. The Blockchain will not mandate a change in the public log without the concession of most of the candidates within the system. The Blockchain can be classified into three groups, public, consortium, and private. As the name suggests, in public blockchain all the candidates can contribute and access, as for consortium, a cluster of candidates will be able to participate, whereas, for private blockchain, the access will be confined within the central organization itself. The first exploitation of Blockchain was done by Satoshi Nakamoto with the introduction of the infamous cryptocurrency Bitcoin, and up till now, it has the adequate utilization of the technology. Despite the prestige of blockchain in cryptocurrencies, it has found its exploitations in many other fields, such as digital transactions without the interpretations of any third-party agent as Bank, or in IoT (Internet of Things), Smart Contract or any general services.

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IJSRST

© 2018 IJSRST | Volume 4 | Issue 5 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X
Themed Section: Science and Technology

Revolutionizing Application Monitoring: A Review of DizBoard's Unified Dashboard Approach

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ABSTRACT

In today's software landscape, the continuous and flawless operation of applications stands as a pivotal requirement. The genesis of the "DizBoard: Server and Database Manager" project stemmed from a pressing necessity to guarantee the seamless functionality and resilience of client-server applications. This imperative emerged from firsthand encounters with the escalating intricacies inherent in modern application ecosystems.

An exploration of the existing technological milieu unveiled a diverse array of tools and solutions dedicated to application monitoring. However, the discerned need for a unified dashboard catering to databases, web services, and application servers became increasingly apparent. Current fragmented solutions often resulted in monitoring gaps and an absence of holistic insights into overall application health.

The implementation of the "DizBoard: Server and Database Manager" project is geared towards bridging these gaps, addressing limitations highlighted in the literature review. Through a fusion of frontend technologies, Python-backed backend logic, and the automation prowess of shell scripting, this endeavor endeavors to craft a unified dashboard offering real-time visibility into critical components' statuses.

This review paper embarks on a journey to expound upon the aspirations and methodologies driving the "DizBoard" project. It aims not only to present a comprehensive view of application health but also to delineate the voids that prevailing technologies leave. Envisioned as a user-friendly and automated monitoring dashboard, "DizBoard: Server and Database Manager" aspires to redefine the paradigm of application health management. Its ultimate goal is to elevate reliability, proactively address issues, and ultimately augment user satisfaction in the realm of application management.

Keywords: Application Monitoring, Unified Dashboard, Real-time Visibility

I. INTRODUCTION

In the rapidly evolving digital landscape, the operational seamlessness of software applications stands as a linchpin for modern technological advancements. At the forefront of this paradigm shift lies "DizBoard: Server and Database Manager," a pioneering solution designed to revolutionize application health monitoring. This project emerges as a trailblazer, marking the inception of an era where the primacy of software reliability and performance takes center stage. "DizBoard" signifies a monumental stride toward

e-ISSN: 2319-8753 | p-ISSN: 2347-6710

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Volume 13, Issue 4, April 2024

ISSN
INTERNATIONAL
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Impact Factor: 8.423

9940 572 462 6381 907 438 ijirset@gmail.com www.ijirset.com

International Journal of Innovative Research in Science, Engineering and Technology IJIRSET)

|e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 8.423| A Monthly Peer Reviewed & Referred Journal |

|| Volume 13, Issue 4, April 2024 ||

| DOI:10.15680/IJIRSET.2024.1304155 |

Surveillance Robot Using Remote Control

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ABSTRACT – The ESP32-CAM surveillance robot system is an innovative solution that combines the ESP32-CAM board and a robot chassis to create a versatile mobile surveillance device. Featuring the ESP32-CAM, a low-cost development board renowned for its integration of a compact camera module and seamless Wi-Fi connectivity, this system offers a comprehensive surveillance solution. The robot chassis, an integral component of the setup, empowers the device to effortlessly navigate diverse environments and capture video footage from varying perspectives. Through the convenience of a web interface hosted directly on the ESP32-CAM board, users gain complete control over the surveillance robot. This user-friendly interface allows for precise management of the robot's movements, real-time viewing of video streams, and the capability to capture snapshots from the live feed. The applications for this surveillance robot using ESP32-CAM are vast and diverse. It serves as a reliable solution for home security, offering homeowners peace of mind by providing remote monitoring capabilities. In addition, its potential extends to monitoring remote locations where traditional surveillance systems may be impractical. Moreover, industries can benefit from its use in surveillance applications, enhancing security protocols in various settings. The system's low cost and intuitive interface make it an accessible option for anyone seeking to monitor their surroundings remotely with ease and efficiency.

KEYWORDS: (ESP32 CAM, Motor Driver, Camera, Wi-Fi, Surveillance, Robot, Remote Control)

I. INTRODUCTION

The Surveillance Robot Using Remote Control project aims to create an advanced surveillance system by blending robotics technology with remote control capabilities. This innovative system is tailored to improve surveillance operations across various environments. Another primary goal is to optimize the surveillance robot's design for mobility, durability, and adaptability to different terrains and environmental conditions. This optimization ensures the robot's effectiveness in a wide range of surveillance applications. The project also includes thorough testing and evaluation of the surveillance system to guarantee its reliability, performance, and ability to enhance situational awareness and operational efficiency during surveillance tasks. The project envisions offering a valuable solution for surveillance operations in sectors like security, military, and industrial domains.

The project scope entails designing and developing a surveillance robot with navigation and remote control functionalities. Furthermore, emphasis will be placed on optimizing the surveillance robot's design to navigate different terrains effectively. The testing and evaluation phase is pivotal to validate the system's reliability and performance. Documenting the project, including design specifications, development processes, testing results, and operational procedures, will provide a comprehensive overview of the project's outcomes and methods. Overall, the project will emphasize surveillance applications in security, military, and industrial sectors, with potential for future scalability and customization to meet specific surveillance needs.

II. PROPOSED METHOD

The ESP32-CAM surveillance robot system combines the ESP32-CAM board and robot chassis to create a versatile mobile surveillance device. It integrates the ESP32-CAM's camera module and Wi-Fi connectivity into the robot chassis for seamless navigation and video streaming. A user-friendly web interface on the ESP32-CAM board allows precise control, including managing movements, real-time video streaming. This system serves as a reliable home security solution with remote monitoring capabilities and extends to remote and industrial surveillance. Its low cost and intuitive interface make it accessible for efficient remote monitoring.

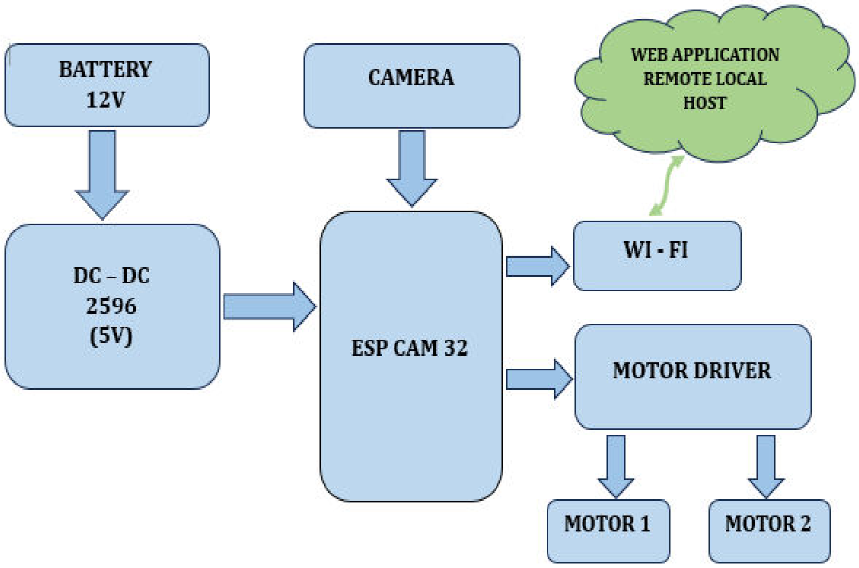

Fig. 2.1: System Block Diagram

III. LITERATURE SURVEY

The ESP32-CAM surveillance robot system represents a promising advancement in the field of mobile surveillance devices, combining the ESP32-CAM board with a robot chassis. This integration of hardware offers a comprehensive solution for surveillance tasks, leveraging the unique features of the ESP32-CAM board. The ESP32-CAM is recognized for its cost-effectiveness and integration of a compact camera module with Wi-Fi connectivity [1]. This combination provides the surveillance robot system with the ability to capture high-quality video footage and transmit it wirelessly, enhancing its versatility in various environments. The integration of the ESP32-CAM board with the robot chassis allows the surveillance robot to navigate diverse environments effortlessly. This aspect is crucial for surveillance applications, as it enables the robot to capture video from varying perspectives, enhancing its surveillance capabilities [2]. The seamless integration of the ESP32-CAM board and the robot chassis is a significant contribution to the field of mobile surveillance devices, offering users a versatile and efficient solution.

The web interface hosted directly on the ESP32-CAM board is another notable feature of this surveillance system. This interface provides users with complete control over the robot's movements, real-time video streaming, and the ability to capture snapshots from the live feed [3]. Such user-friendly interfaces are essential for effective operation in surveillance tasks, as they enable operators to manage the robot's actions remotely with precision and ease. In terms of applications, the ESP32-CAM surveillance robot system offers a wide range of potential uses. Home security is a primary application, as the system provides homeowners with remote monitoring capabilities, enhancing peace of mind [4]. Additionally, the system's potential extends to monitoring remote locations where traditional surveillance systems may not be feasible or practical [5]. The system also holds promise for industrial surveillance applications, where it can enhance security protocols in various settings [6].

Overall, the ESP32-CAM surveillance robot system presents a valuable and accessible solution for remote monitoring needs. Its low cost, integration of advanced features, and intuitive interface make it an attractive option for users seeking efficient surveillance capabilities [7]. This system represents a significant advancement in the field of mobile surveillance devices, offering versatility, efficiency, and ease of use.

IV. EXPERIMENTAL SETUP

4.1 Hardware Requirements

ESP 32 & Cam Module:

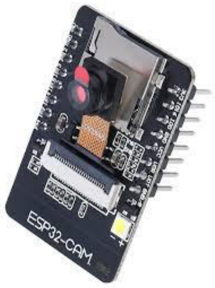

Fig. 4.1.1: ESP32 - CAM Module

The ESP32-CAM is a small size, low power consumption camera module based on ESP32. It comes with an OV2640 camera and an ESP32-CAM-MB micro-USB to serial port adapter. The ESP32-CAM can be widely used in intelligent IoT applications such as wireless video monitoring, Wi-Fi image upload, QR identification, and so on.

L293D Motor Driver IC:

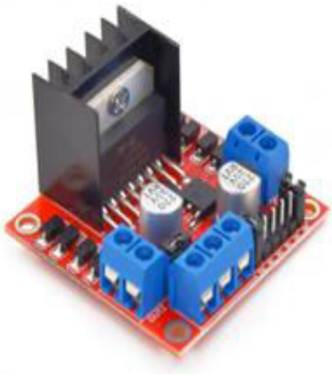

Fig. 4.1.2: L293D Motor Driver IC

The L293D is a popular motor driver IC (Integrated Circuit) that is widely used in robotics and other electronic projects. It is designed to drive small DC motors, typically in the range of low to moderate power applications. The L293D IC is known for its simplicity and ease of use in controlling the direction and speed of DC motors.

DC – DC Converter:

Fig. 4.1.3: DC – DC Converter

A DC-DC converter uses a switching element, like a transistor, and an energy storage component to efficiently convert one DC voltage to another. By rapidly switching on and off, it transfers energy from input to output, minimizing loss. This makes DC-DC converters essential for power supplies, batteries, and renewable energy systems.

Battery Li-ion:

Fig. 4.1.4: Battery Li-ion

A Li-ion battery is a high-energy-density rechargeable device used widely in smartphones and electric vehicles. It operates by lithium ions moving between the anode and cathode during discharge and charging. The electrolyte enables this movement. Li-ion batteries provide lightweight, long-lasting power without much memory effect, making them suitable for portable electronics and electric vehicles.

4.2 Software Requirements

Arduino IDE:

The Arduino Software (IDE) makes it easy to write code and upload it to the board offline. We recommend it for users with poor or no internet connection. This software can be used with any Arduino board. Arduino Software (IDE) - connects to the Arduino boards to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension. ino.

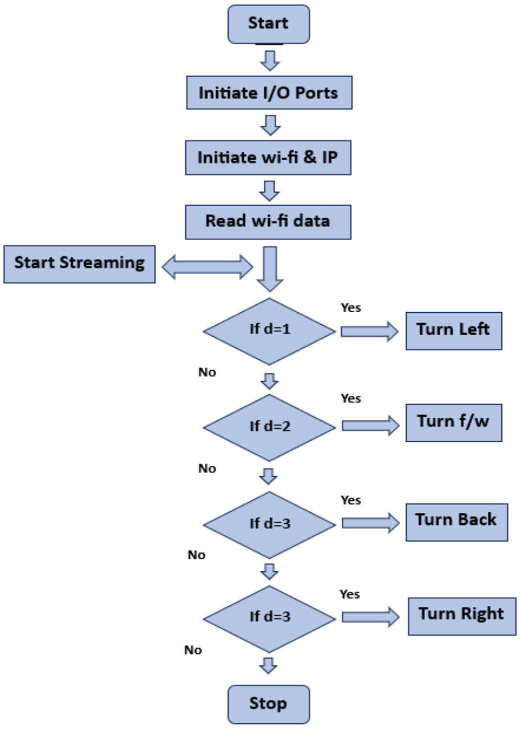

Fig. 4.2.1: Software Flowchart

Express PCB:
Express PCB is a software tool used for designing printed circuit boards (PCBs) quickly and efficiently. It offers a user-friendly interface with a simplified design process, making it accessible for beginners and professionals alike. Users can create PCB layouts by placing components, routing traces, and generating manufacturing files. Express PCB provides a straightforward way to design and prototype PCBs for various electronic projects, making it a valuable tool for electronics enthusiasts and engineers.

V. EXPECTED RESULT

The ESP32-CAM surveillance robot system is expected to provide a highly functional and versatile mobile surveillance solution by integrating the ESP32-CAM board with a robot chassis. With features like a compact camera module and Wi-Fi connectivity, users can control the robot through a user-friendly web interface, managing movements and capturing real-time video streams. This system is anticipated to offer reliable home security and has potential applications in monitoring remote locations and enhancing industrial security. Its accessibility and efficiency make it an attractive option for remote surveillance needs.

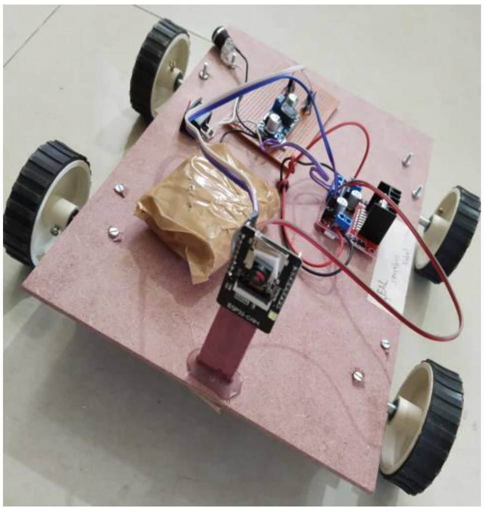

Fig. 5.1: Hardware Setup

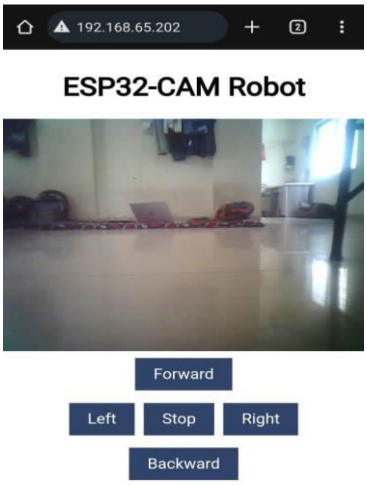

Fig. 5.2: Software Output of the Live Stream

VI. CONCLUSION

In conclusion, the ESP32-CAM surveillance robot system is an innovative solution for modern surveillance needs, offering enhanced capabilities and efficient remote monitoring. Its user-friendly web interface allows for seamless interaction, providing reliable home security and potential applications in industrial settings. This system's versatility and potential to improve operational efficiency make it a valuable contribution to surveillance technology, promising ease of use and effectiveness for remote surveillance requirements.

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Volume: 12 **Issue:** IV **Month of publication:** April 2024

DOI: https://doi.org/10.22214/ijraset.2024.60365

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue IV Apr 2024- Available at www.ijraset.com

Campus Parking Availability System

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Abstract: In past decades, IoT was not clearly visible to people, but nowadays - IoT has increasingly organizations in a variety of industries are using IoT to operate more efficiently delivered enhanced customer services, improve decision making and increases the value of businesses.

It consists of smart devices which are used to collect, send and act on data which is required for the system. Nowadays IoT plays an important role in the parking systems. IoT is a heart of embedded systems due to which every embedded system is more efficient and user-friendly. This IoT application we are using in our project to enhance the nowadays parking systems by using different components such as sensors, scanners, web-services, motors, authentication components etc which will be interfaced with each other by using IoT.

Keywords: IoT, Smart parking, Cloud, RFID, ESP32

I. INTRODUCTION

In the previous years, we have seen that in many college campuses, we have noticed that the parking slots provided by the campus management is not utilized properly which leads to congested parking due to which parking in the campus is more complex. To resolve those problems, we have built this project – Campus Parking Availability System.

Throughout this project, we have concluded that parking system should be in a constant way, the available parking slots will be displayed throughout the mobile application which should be installed in our mobile devices. Only students from the same college are allowed by scanning the authorized ID card provided by the college.

II. RELATED WORK

The present parking systems in urban areas can be frustrating and time consuming hence we proposed smart parking system which will work efficiently with the help of technological advancement. The evolution of parking systems is from simple sensors to complex data driven solutions. There are many different parking systems which were previously established, so we are concluding all the previous parking systems and improve the pitfalls of the systems.

Alirezahassani et.al has proposed the parking system which was implemented using the mobile application that is connected to the cloud. In this system, the user is able to set the time to allocate the slot. If he didn’t use that the slot, the alarm will be given to the user.

This all functioning is shown by the mobile application which includes the number of used and empty spaces in the parking slots. The disadvantage is that if another user try to use the slot, he’s unable to use that slot. Therefore, that slot is a waste of space if the first user cancels the slot which leads to waste of time and money. [1]

DharminiKanteti et.al has developed a smart parking in which IP cameras were used to capture the vehicle registration number. These components were used for pre-registration of the user for slot booking and the amount will be deducted by the e-wallets. The disadvantage of the system is that if the parking request is more than 80 slots, it couldn’t accommodate more vehicles as parking is full. [2]

Rosario Salpietro et.al implements automatic detection of parking system through smartphone embedded sensor and blue tooth connectivity. In this system once the parking event is completed the detection of adaptive strategy allows the disseminating the information of the user using the combination of remote server and device-to-device connection through wi-fi links. [3]

III. BLOCK DIAGRAM OF SYSTEM

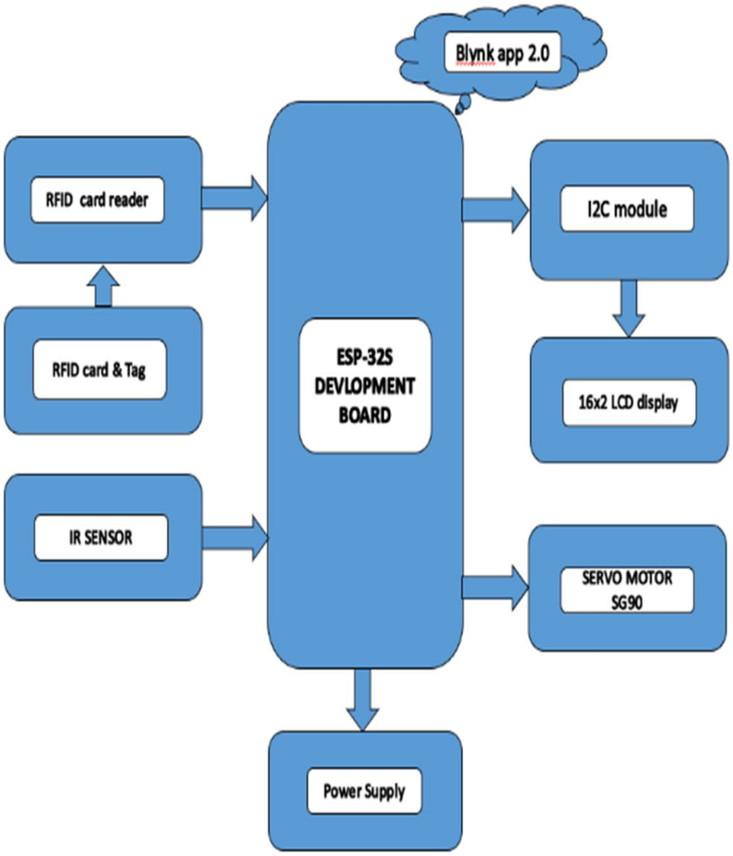


Fig. I Proposed block diagram

A. RFID Card Reader

As shown in fig.1 RFID Card reader is connected to the ESP-325 development board. This technology uses radio waves to identify people or objects. It has one or more antennas that emit radio waves and receive signals from the RFID tag.

B. RFID Card and tag

RFID tag uses the radio frequencies for searching, identifying and tracking and also communicate with people and specific components.

C. IR Sensor

The IR sensor is a device that can measure the heat of an object as well as detect the motion. It operates in the infrared spectrum.

D. Servo motor

The servo motor allows precise control of angular position. It is mainly used on angular or linear position and for specific velocity and acceleration.

E. 16x2 LCD Display

The 16x2 Liquid Crystal Display that can show 16 characters in 2 rows. So, total of 32 characters are shown on the display.

F. I2C module

It is a useful module to interface serial connection to parallel data, specially used for LCD display.

IV. SYSTEM DESCRIPTION

The following figure shows the typical layout of the system in which IR sensors are shown in limitations but we can increase the number of IR sensors as per system requirement or user requirements.

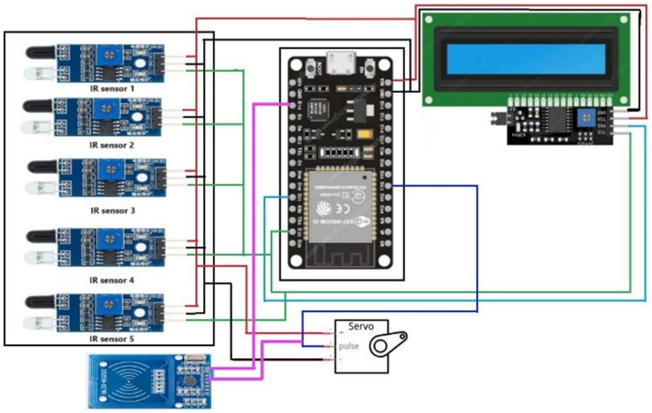


Fig. II System layout

In the above layout, we have shown five IR sensors which indicate that the system has five parking slots, the number of parking slots is limited in this system for clear understanding of the system. When the vehicle is on the campus gate, the user is responsible for scanning the RFID tag present in the ID card with the help of RFID reader. If the student is from the college the, ESP32 will check for that student in the database. If student details are present the ESP32 will allow the student to enter in the campus through the servo motor. The rotation of motor is 180˚. Now the vehicle is going to arrive on the parking locations, in our system. We have shown five IR sensors which indicate five parking slots. The slots are recognized as it is vacant or not is shown with the help of LCD Display. This display is placed on the campus gate. For communication between LCD Display and ESP32 is controlled by I2C module which provide serial communication path.

ESP32 is the heart of our project which is responsible for each and every function of the components. In this we have used two RFID Tags, in which one is authorized and another is unauthorized. This is because to show that the authorized tag is with student ID card and unauthorized tag is with unauthorized person. If the unauthorized person tries to enter in the campus by using fake tag, then he/she will not be allowed to enter campus as gate will not open. This makes system reliable and more secure. This whole operation can be controlled through the internet via Blynk 2.0 application. For that each and every authorized person is required to download Blynk 2.0 application. Through this application the user is able to see available parking slots, intime, out time etc. For that user is required to register his/her details with campus database and this database is fetched with ESP32.

V. EXPERIMENTAL SETUP

The following figure shows the complete experimental setup: -

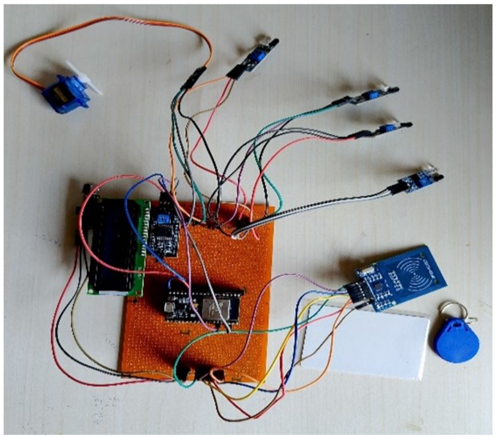


Fig. III Complete Experimental Setup

Fig. III shows all the connections of components with ESP32.

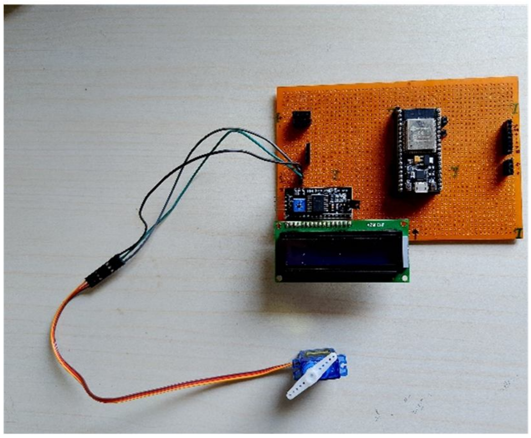


Fig. IV Interfacing with Servo motor

Fig. IV shows the interfacing of servo motor with ESP32.

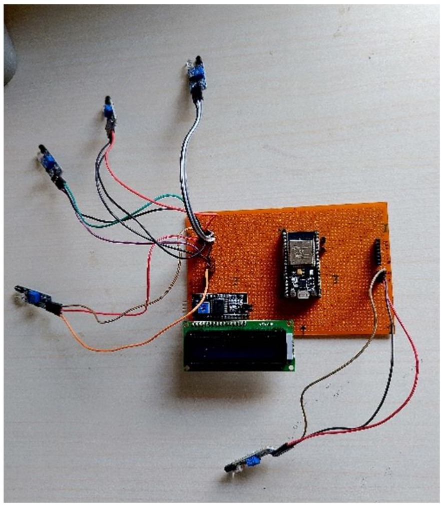


Fig. V Interfacing with IR sensor

Fig. V shows the interfacing of IR sensor with ESP32.

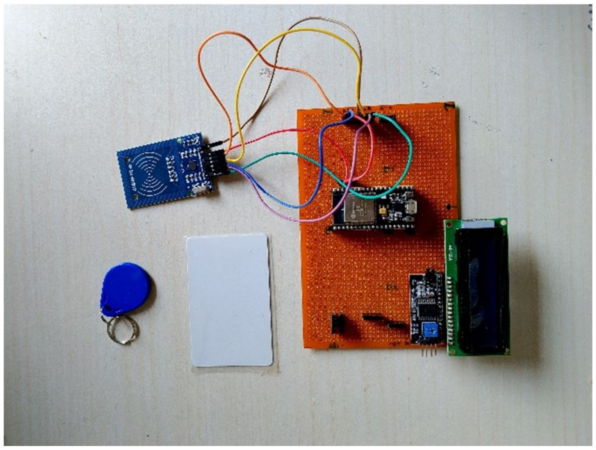


Fig. VI Interfacing with RFID tag and Reader

Fig. VI shows the interfacing of RFID tag and Reader ESP32.

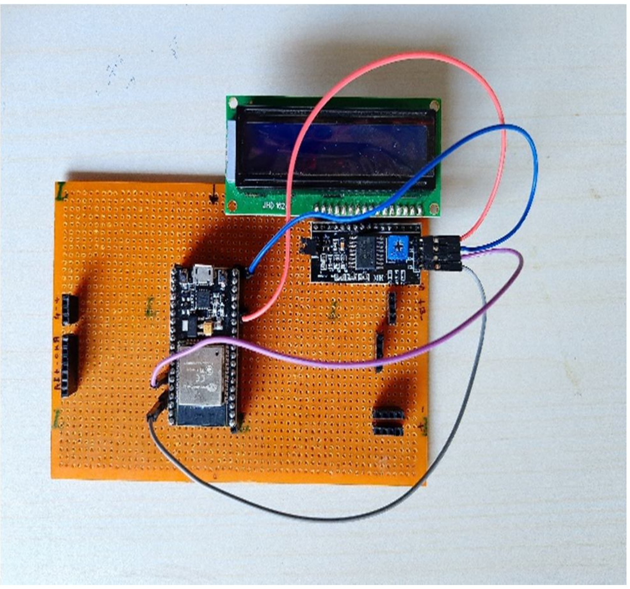
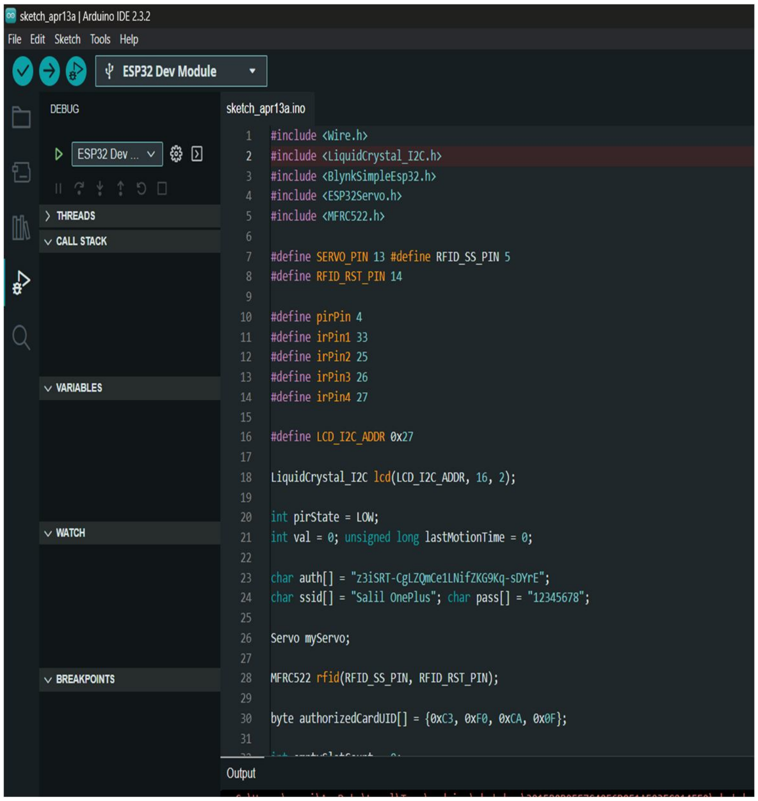


Fig. VII Interfacing with I2C module

Fig. VII shows the interfacing of I2C module with ESP32.

VI. SOFTWARE TESTING

The following figure shows the software testing details in which first we have to install Arduino IDE environment using official website of Arduino boards. After downloading the software, we have to follow some essential installation steps in which we have to manage libraries and other tools for complete setup of software. After installation of software, when we open it, we have to check code declaration with respect to boards. We have to select accurate board for debugging the program.


sketch_apr13a | Arduino IDE 2.3.2
File Edit Sketch Tools Help
ESP32 Dev Module
DEBUG
ESP32 Dev ...
THREADS
CALL STACK
VARIABLES
WATCH
BREAKPOINTS
sketch_apr13a.ino
Output

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#include <BlynkSimpleEsp32.h>
#include <ESP32Servo.h>
#include <MFRC522.h>

#define SERVO_PIN 13 #define RFID_SS_PIN 5
#define RFID_RST_PIN 14

#define pirPin 4
#define irPin1 33
#define irPin2 25
#define irPin3 26
#define irPin4 27

#define LCD_I2C_ADDR 0x27

LiquidCrystal_I2C lcd(LCD_I2C_ADDR, 16, 2);

int pirState = LOW;
int val = 0; unsigned long lastMotionTime = 0;

char auth[] = "z3iSRT-CgLZQmCe1LNifZKG9Kq-sDYrE";
char ssid[] = "Salil OnePlus"; char pass[] = "12345678";

Servo myServo;

MFRC522 rfid(RFID_SS_PIN, RFID_RST_PIN);

byte authorizedCardUID[] = {0xC3, 0xF0, 0xCA, 0x0F};

```

Fig. VIII Code on Arduino IDE

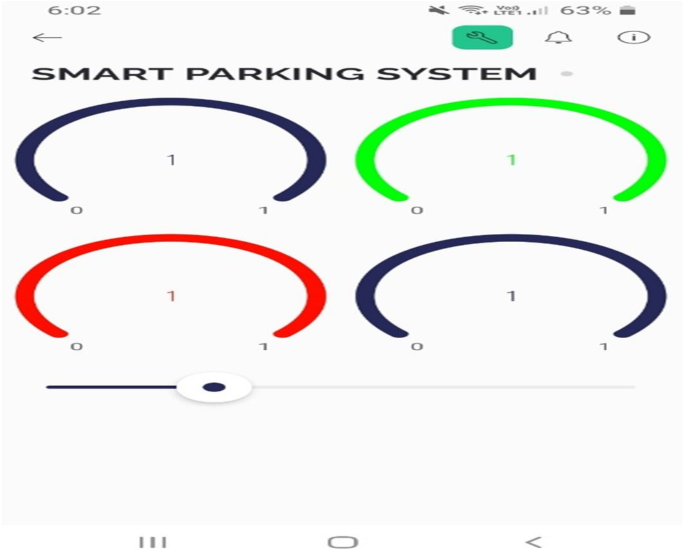


Fig. IX Blynk 2.0 Application UI

Fig. IX shows the UI of the Blynk 2.0 app which shows the 4 parking slots and if they are empty or not.

VII. ADVANTAGES AND DISADVANTAGES

A. Advantages

1) Reduce the traffic in college campus
2) Security
3) Optimized parking spaces
4) Users save a lot of time in finding available parking slots
5) Shows available and non-available parking slots

B. Disadvantages

1) Cost of implementation is high
2) It is fully automatic and does not require any manual operation
3) Internet availability is required
4) Increased throughput

VIII. CONCLUSION

The Campus Parking Availability System provides us smart parking in the campus. It shows available and non-available parking slots and identifies students using the RFID card. It reduces traffic and congestion in the college campus. It gives us an organized parking system that allows constant parking method.

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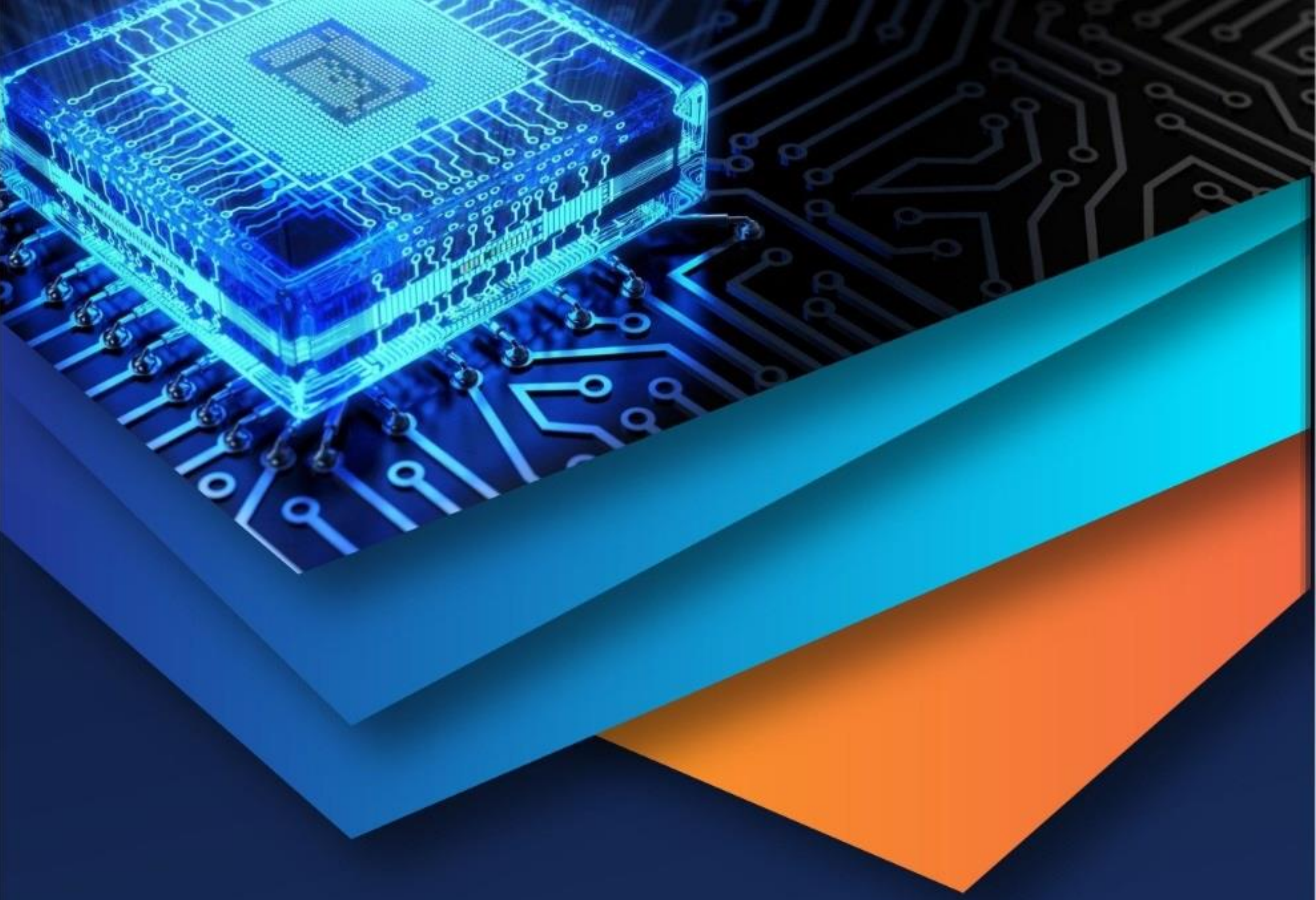

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International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 3, pp 367-373, March-2024

https://doi.org/10.47001/IRJIET/2024.803057

IOT Based Pen Vending Machine

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***Abstract* - Vending machines have been a convenient and easy method for buying products, offering quick and easy access to a different kind of products. However, with the integration of smart technologies, vending machines are transforming drastically. These brilliant, interactive and intelligent machines are enhancing user experience and operational efficiency. In this research paper, we are going to take a look at the latest advancements in smart vending machines, focusing on the impact across several industries. Key technologies and innovation, including the Internet of Things (IoT), different modes of payment, and machine learning are discussed. Real-world examples and case studies describe the advantages and challenges for implementing smart vending machines. Also, we provide insights into the evolution of future trends and potential development and expansion in this field.**

Keywords: Vending machines, Smart technologies, Internet of Things (IoT), Real-world examples, Future Development.

I. INTRODUCTION

Continuous efforts have been made to advance innovation in order to simplify life. Everyone in today's fast-paced world is embracing innovation's advantages. This project aims to provide one such smart pen vending machine that accepts the coins as payment mode and dispense the pen accordingly and the vending machine is connected to the cloud for product details, management and monitoring. A microcontroller specifically Arduino serves as the vending machine's central processing unit (CPU), managing the rest of the components which is coin acceptor, pen dispensing mechanism, and Wi-Fi module.

In order to guarantee precise and accurate payment for the dispensed pen, the coin acceptor system is currently set for 5 rupees coin. The pen dispensing mechanism is activated by the Arduino when a coin is inserted in coin acceptor. A pen is released into the allotted collection area by the dispensing mechanism of the vending machine which is controlled by the Arduino microcontroller.

The vending machine also has a Wi-Fi module that connects to a cloud server specifically Blynk server to allow for remote monitoring. Data is sent to the cloud by the Wi-Fi module, including the overall amount of pen dispensed, the amount of money collected, and any updates on the state of operations happening in the machine. Which is a real time operation.

The major components of our pen vending machine are:

1) Coin Acceptor

A coin acceptor is a device used in vending machines to validate and accept coins inserted by customers as the mode of payment for getting the products. The coin acceptor can check the value or amount of the coin based on its size, weight, and metal composition, and then communicates this information to the vending machines microcontroller specifically Arduino.

Coin acceptors are the critical components of vending machines, as they make sure that only valid coins are accepted when the payment is done and prevent the machine from being fooled or tricked by fake coins or tokens. Also, coin acceptors are designed to be highly efficient and it requires minimal maintenance, ensuring that the vending machine operates smoothly and also it is user friendly.

2) Arduino

The Arduino microcontroller can be used by interfacing with the coin acceptor and validate the coins inserted by the customer. The board can be programmed to illustrate the pulses from the coin acceptor and determine the value of the coins. The use of an Arduino board in a vending machine using a coin acceptor can be used to simplify the designing process and reduce the overall cost of the system. The flexibility and ease of programming provided by the Arduino IDE platform makes it an ideal choice for programming the custom vending machine systems.

3) WIFI Module

The ESP8266 is a popular and functional Wi-Fi module which enables microcontroller to connect to Wi-Fi network and communicate over the internet. It is extensively used in the field of Internet of Things (IoT) for connecting devices.

4) Pen Dispensing Mechanism

The Dispensing Mechanism used in this project is unique and consist of two rollers to store pens and is operated by DC motor and is controlled by Arduino to dispense the pen.

II. LITERATURE REVIEW

2.1) W. Alam, F. Sultana, J. B. Saba and A. C. Kofi, "IOT Based Smart Vending Machine for Bangladesh," 2019 IEEE International Conference on Robotics, Automation, Artificial-intelligence and Internet-of-Things (RAAICON), Dhaka, Bangladesh, 2019.

This paper proposes the concept of “Vending Machine” in the prospect of Bangladesh. In this approach we put forward the design a IoT enabled service of a vending machine which will be operated through a mobile application and bKash (digital payment system of Bangladesh) with the incorporation of cloud computing which aims to be cost effective and less time consuming and yet user friendly. The ultimate goal is to introduce a cost effective vending machine solution for Bangladesh enhancing the customer purchasing experience, driving up the demand for mass adoption of the IoT based smart vending machines.

2.2) C. H. Patil, N. Lightwala, M. Sherdiwala, A. D. Vibhute, S. A. Naik and S. M. Mali, "An IoT based Smart Medicine Dispenser Model for Healthcare," 2022 IEEE World Conference on Applied Intelligence and Computing (AIC), Sonbhadra, India, 2022.

Healthcare and medical endeavor are advancing rapidly, and it is rather tricky for technology to support its pace. This paper presents an IoT-based innovative medicine dispenser prototype model. The primary goal of the proposed system is to assist the patients and dependent senior citizens in taking their medications on time without fail, quickly, and more importantly, without the possibility of missing pills, and to eliminate a random chance of over or under dosing. Inaccurate medications can have severe effects such as late recovery, severe disease, also even deceased. The medicine dispenser could resolve such difficulties by alarming the patients to correctly and accurately take suitable meditation. Additionally, it delivers instant communication between the caretakers and patients as it will instantaneously ring the alarm signal when the patient's medication is due. It has evolved vital to take care of the aged and those with poor health conditions in today's era. Hence, the medicine dispenser solves this issue by making the patient self-dependent and reducing contrary situations.

2.3) A. V. Sai, K. D. Reddy, N. S. Ruthvik, A. Rohith, G. P. Reddy and N. S. Rao, "IoT based Quotidian Grocery Supply by Vending Machines," 2021 2nd International Conference on Advances in Computing, Communication, Embedded and Secure Systems (ACCESS), Ernakulam, India, 2021.

Urban localities face the problem of having grocery stores far from the residential areas. This poses a problem in procuring groceries in emergencies and time complex situations. Individual vending machines near households can act as a buffer between the actual market and home, reducing the time and effort required to acquire the same quantity of products. This also improves customer convenience and satisfaction. A Cloud-Based wireless mesh network among vending machines can help in the optimal allocation of its stock. With this intent, this paper proposes an Internet of Things (IoT) based integrated vending machines network that acts as a platform to sell quotidian groceries to its nearby households. When compared with the existing system, the implemented system has a 46.4 percent decrease in its delivery time in the monsoon and a decrease of 14.5 percent in the rest of the year. And also, there is a 5.01 percent decrease in the cost of the products.

2.4) P. Kumar, S. Singh, M. Choudhary and K. Singh, "Solar Powered Medic Vending Machine," 2020 2nd International Conference on Advances in Computing, Communication Control and Networking (ICACCCN), Greater Noida, India, 2020.

In past couple of years, many vending machines have been made which provides different types of products within different number selections. They can be divided into food vending machines, chocolate vending machines, snack vending machine, glucose water dispensing and many other forms of liquid dispensing vending machines. In concern with the medical field, up till this 21st century, we are not able to provide first - aid kits at all over places like schools, stations, and many more areas which are still under up-gradation. This product is used to dispense first-aid items as well as all the necessary medicines, for the persons who need immediate attention where reaching to a doctor might not be the first step for curing the person. The central point of the concept is to deliver alteration usage in the eyes of the people at places where there is no pharmacy nearby.

2.5) D. Wibowo and F. Fahmi, "Contactless and Cashless Smart Vending Machine Integrated with Mobile Device," 2021 5th International Conference on Electrical, Telecommunication and Computer Engineering (ELTICOM), Medan, Indonesia, 2021.

Vending machines are in great demand nowadays, especially in developed countries which are used as a tool for selling product to provide what people needs. The pandemic and the trend of cashless payment demand more innovative vending machine to be used. In this study a contactless and cashless smart vending machine integrated with mobile device were proposed to answer those challenges. The developed system run as expected. The time needed to connect between the Mobile Vending application and the vending machine is around 2,925 seconds and the time required for sending data on / off the LED on the vending machine is around 0.574 seconds.

III. PROBLEM STATEMENT

A 24/7 available machine that is used to sell and buy products without any human interaction with proper security, beneficial for both customer and machine owner as customer can get their product any time in contactless manner and machine owner can keep track of the revenue earned and produced dispensed by the smart vending machine.

IV. OBJECTIVE

The objective of introducing a vending machine with a coin acceptor is to provide a convenient and easy way for customers to purchase products while also benefiting the owner in their business. By providing customers with a quick and easy way to purchase products, business owner can increase their revenue and also get customer satisfaction. Also, vending machines with coin acceptors require very small maintenance and can be operated 24/7, providing a cost-effective solution for businesses. Furthermore, the main objective of introducing a vending machine with a coin acceptor and doing it IOT based is to benefit both user and owner. In a public space, the objective may be to provide visitors with the access to essential or hygiene products.

V. SYSTEM DESIGN

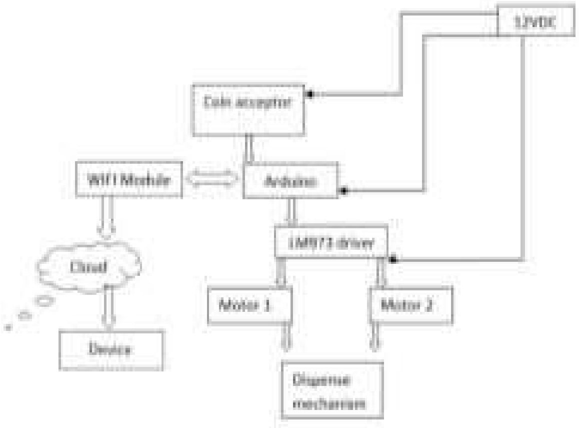


Figure 1: Block Diagram

The block diagram represents the components and connections of a smart vending machine system.

1. Coin Acceptor: This component accepts the coin from user. It detects the value of the inserted coin on the basis of size weight and metal composition and connect with other components.
2. Arduino: The Arduino board serves as the central processor unit for vending machine. It receives input from various components and controls the operation of smart vending machine.
3. Motor: The motor is attached to the dispensing mechanism which is responsible for dispensing pens. When a valid coin is detected, with the help of Arduino microcontroller the appropriate motor gets activated to release the well-suited product.
4. WiFi Module (ESP8266): It is device that can be integrated with different types of sensors (such as IR sensor in our case). It helps in data communication between device and network with the help of internet access. It plays an important role in connecting and communication.
5. Display: The display (such as an LCD screen) gives information to customers, such as availability, price and other information about the product.
6. Power Supply (12V DC): The smart vending machine needs a power source to operate all its components.

VI. PROPOSED SYSTEM

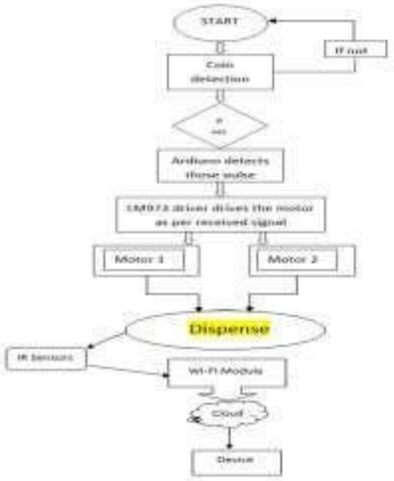
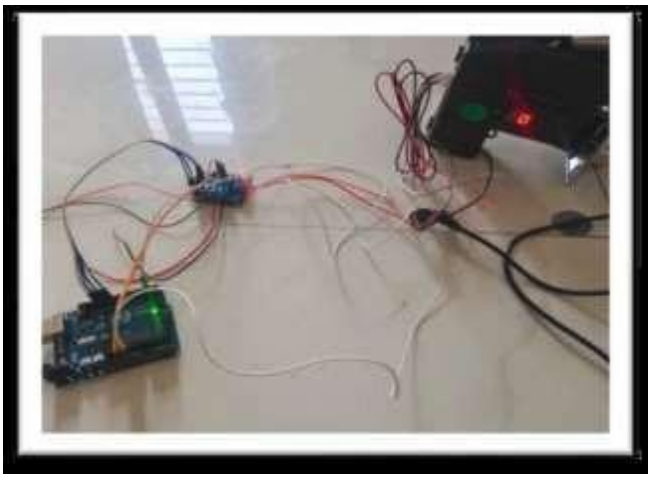


Figure 2: System Flowchart

The flowchart describes the overall process of smart pen vending machine. When a customer inserts a coin into the coin acceptor. The coin is detected based on its size and weight.

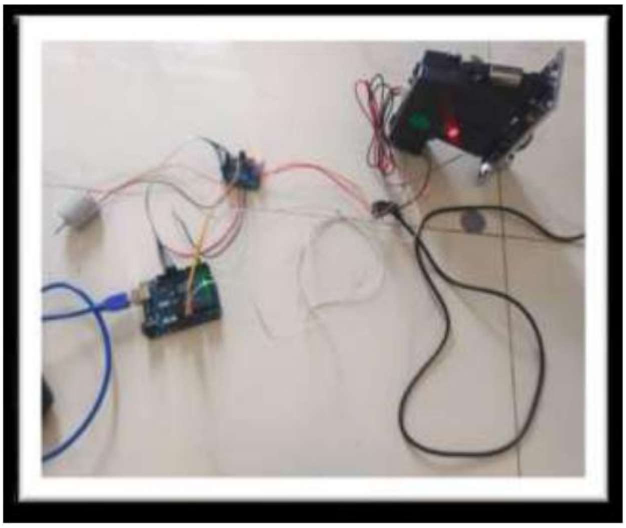
Now if the coin is valid, the coin acceptor module sends the pulse to the microcontroller which is the central unit if the machine but if the coin is not valid, the module rejects the coin. In next step the Arduino detects those pulses which it received as the input from coin acceptor and then the motor driver(LM973) drives or rotates the motor as per the received signal. The Arduino microcontroller activates one of the motors which is attached to the dispensing mechanism depending on the selected dispenser. Now these motors rotate and dispense the relevant product. Now the WiFi module is also integrated into the system which helps in communication with the cloud for sending relevant data or information to the owner of the machine including all the transaction and product dispensed. This cloud can be accessed with smartphone or laptops.

VII. CONSTRUCTION STAGES



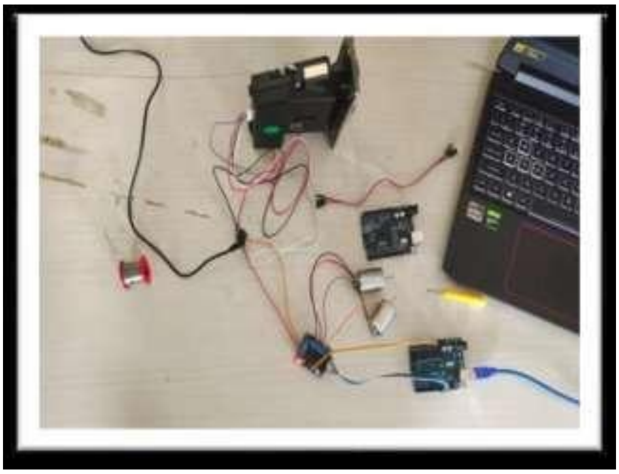
(a)

In this stage we set up the coin accepter to particular coins and sense the pulse given out through the coin accepter in Arduino board with the help of Arduino ide application.



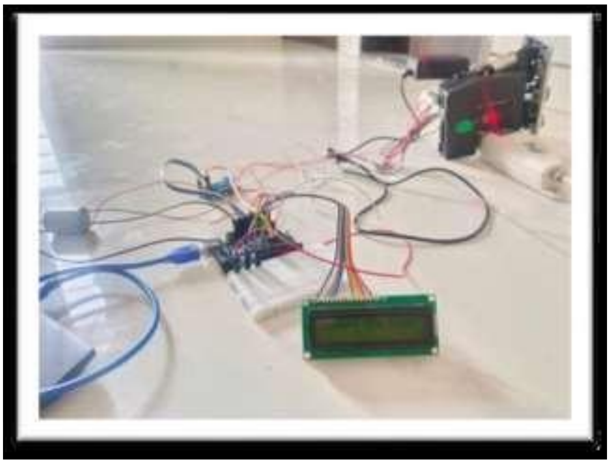
(b)

In this stage we connected the motor driver to 12VDC motor and Arduino board.



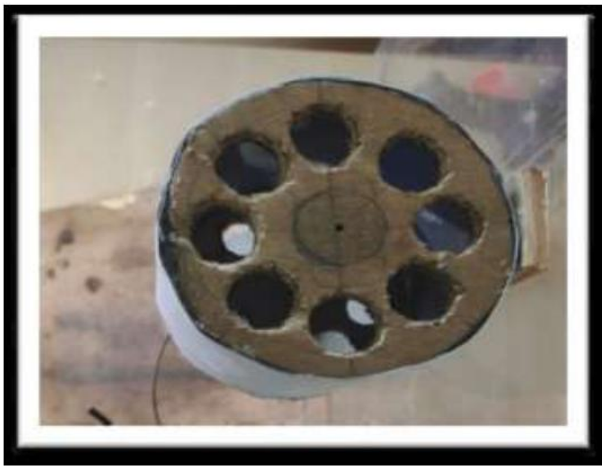
(c)

In this stage we coded the Arduino as per our required specified function.



(d)

In this stage we added 16x2 LCD to our Arduino board and updated our code as required.



(e)

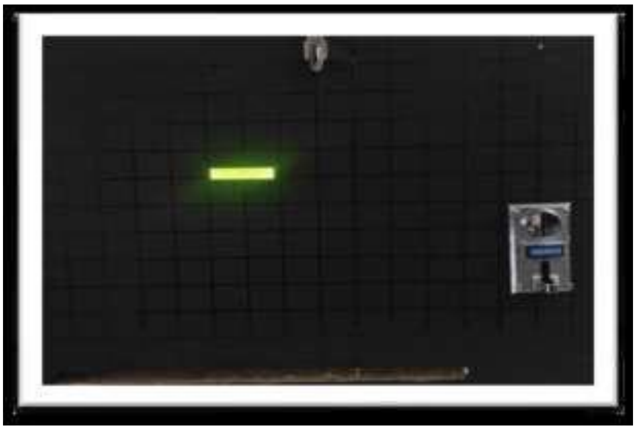
In this stage we started to work on the dispense mechanism for our product which is pen and this is totally a DIY method.

(f)

In this stage we started to work on the frame work of smart vending machine.

(g)

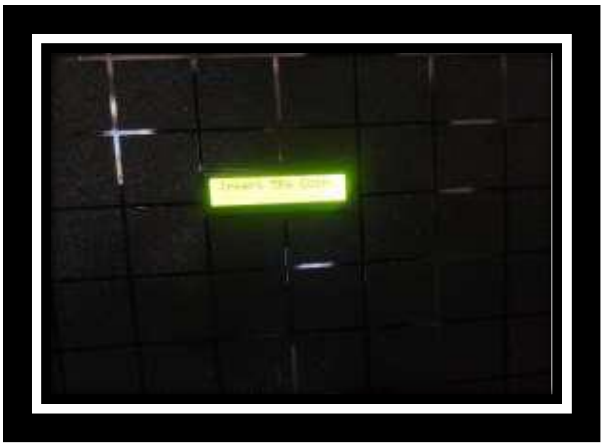
In this stage we have setup the IR Sensor in the pen dispensing area which is connected to Wifi Module to send data to cloud.



(h)

Final model of smart pen vending machine.

VIII. RESULT AND DISCUSSIONS



(a)

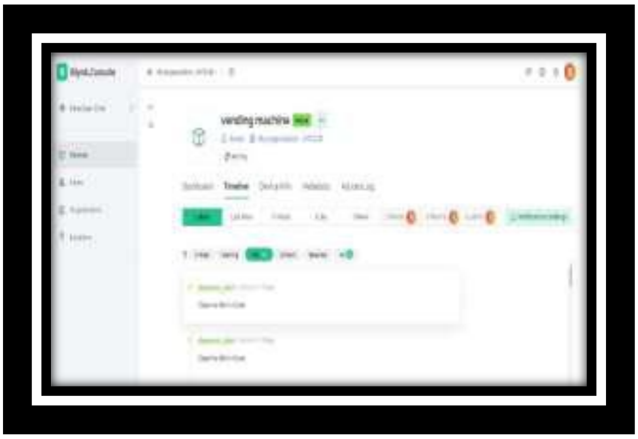
When the machine is in ideal state the lcd screen displays "Insert 5 Rs coin".

(b)

After the insertion of 5 Rs coin, the pen gets ready to dispense and the lcd displays "processing".

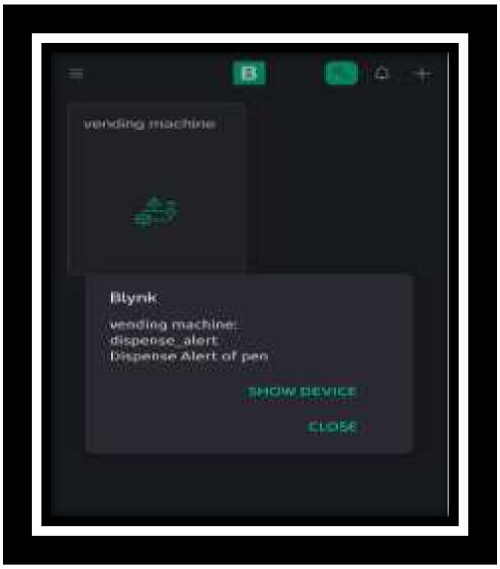
(c)

After the pen is dispensed in the dispensing area the lcd displays “Thankyou Visit Again”.



(d)

After the pen is detected by the IR Sensor in the dispensing area the notification is sent in the real time to the Blynk cloud server via wifi module (which is accessible by the vending machine owner).



Blynk
vending machine:
dispense_alert
Dispense Alert of pen

(e)

A notification is also sent on the mobile device of vending machine owner as an alert.

IX. CONCLUSION

Smart Vending Machine provides the convenient and reliable way for user to purchase products with any human interaction which is very efficient method when it comes to hygiene. Because of being IOT based they provide real time information or data which is beneficial for the owner of the machine. In future scope smart vending machine will evolve more and more resulting to delightful experience for customers as well as owner of the machine.

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Citation of this Article:

Aman Prasad, Shraddha Kumar, Keshav Shriram, Prof. Dr. Vikram Mane, “IOT Based Pen Vending Machine”, Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 8, Issue 3, pp 367-373, March 2024. Article DOI https://doi.org/10.47001/IRJIET/2024.803057

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e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
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Volume:06/Issue:04/April-2024 Impact Factor- 7.868 www.irjmets.com

SMART PORTABLE MEDICINE BOX

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ABSTRACT

As the population ages, the challenges of managing chronic conditions like Alzheimer's disease become more prominent, especially when it comes to keeping up with medication schedules, for elderly individuals, especially those who have memory issues. To aid this problem, we have developed the Smart Portable Medicine Box. The device is specially designed to assist elderly individuals, in managing their medications more effectively. It includes a special cold storage section for insulin, useful to diabetic patients, along with some other features like medication reminders and GSM messaging. Plus, one can customize dosage timing using an RTC module, ensuring that medicines are taken right on schedule. The device aims to lighten the load for patients and caretakers and potentially improve health outcomes. The risk of medication errors could be minimized. Smart Portable Medicine Box has a user-friendly interface making it easy to operate. The device is lightweight, small easy to carry even while traveling, and operates at low power making it more efficient.

I. INTRODUCTION

Elders are essential torchbearers of society. However, as age advances, managing chronic health conditions becomes increasingly challenging. Effective medication management is crucial for keeping elderly individuals healthy and maintaining their quality of life. Among the solutions emerging to address these challenges is the Smart Portable Medicine Box.

The Medicine Box applies strict safety measures to protect healthcare data from unauthorized access and to ensure correct drug dispensing procedures. This enables caretakers to effectively monitor patient health and promptly intervene in case of emergency. The user interface is easy to use, hence it can be used by older people. The medicine dosage is set using the RTC module. When it's time for the medication dose, the buzzer sounds as a reminder. If the dose is not taken or missed, the device sends a message to the designated caregiver.

II. METHODOLOGY

Block Diagram

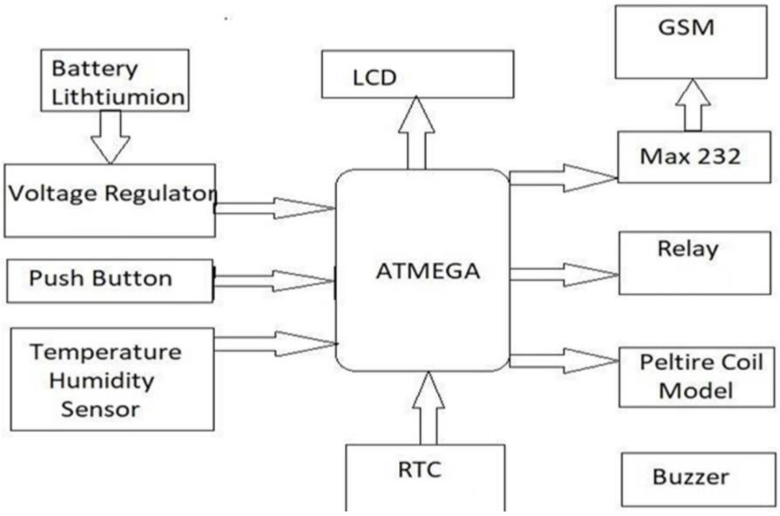

Figure 1: Block Diagram Smart Portable Medicine Box

Various components are used in this Smart Portable Medicine Box that enable effective management of medicines. Its main processing unit is the Atmega328 controller. The box derives power from a battery, thus making it portable. The device uses the Peltier coil model to store medicines requiring low temperatures. The GSM module provides messaging services whereas Max 232 supports communication between the PC and microcontroller. This device also has an alert system as well as a display system where a buzzer gives audible alerts while an LCD shows relevant details. RTC module guarantees accurate timekeeping even if the power supply is off.

After starting up, the system is initiated and implemented by the Atmega328 microcontroller. It takes control of monitoring the medicine storage environment. The GSM module gets connected to the caretaker's cell phone and prepares to send notifications if necessary. MAX232 plays an important role in the proper transmission of data between the microcontroller and PC for effective data transfer.

Based on the prescribed dosage timing, the RTC module can send signals that serve as timely reminders, implementing the buzzer and LCD screen to display relevant information.

III. THE HARDWARE

Microcontroller Atmega328

The following is the pin configuration of Atmega 328

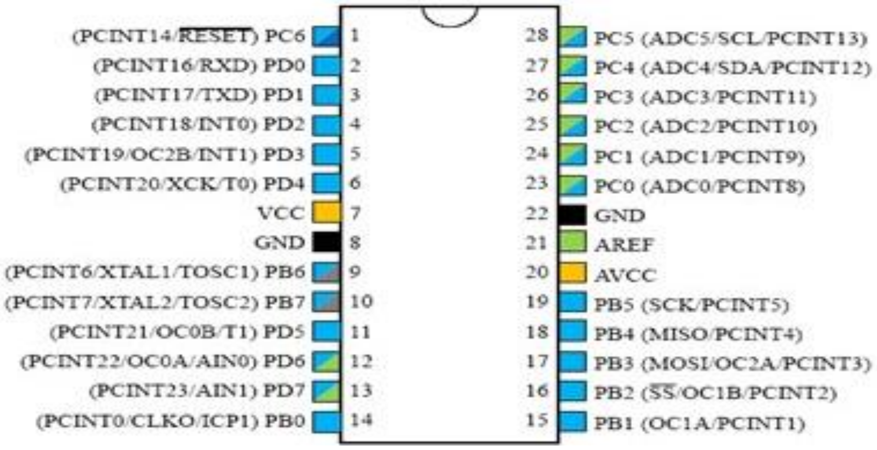
(PCINT14/RESET) PC6 1
(PCINT16/RXD) PD0 2
(PCINT17/TXD) PD1 3
(PCINT18/INT0) PD2 4
(PCINT19/OC2B/INT1) PD3 5
(PCINT20/XCK/T0) PD4 6
VCC 7
GND 8
(PCINT6/XTAL1/TOSC1) PB6 9
(PCINT7/XTAL2/TOSC2) PB7 10
(PCINT21/OC0B/T1) PD5 11
(PCINT22/OC0A/AIN0) PD6 12
(PCINT23/AIN1) PD7 13
(PCINT0/CLKO/ICP1) PB0 14
28 PC5 (ADC5/SCL/PCINT13)
27 PC4 (ADC4/SDA/PCINT12)
26 PC3 (ADC3/PCINT11)
25 PC2 (ADC2/PCINT10)
24 PC1 (ADC1/PCINT9)
23 PC0 (ADC0/PCINT8)
22 GND
21 AREF
20 AVCC
19 PB5 (SCK/PCINT5)
18 PB4 (MISO/PCINT4)
17 PB3 (MOSI/OC2A/PCINT3)
16 PB2 (SS/OC1B/PCINT2)
15 PB1 (OC1A/PCINT1)

Figure 2: Pin Diagram Atmega328

The Atmega328 is based on the AVR RISC architecture with a clock speed of up to 20 MHz. With 32 KB of flash memory, 2 kB of SRAM, and 1 kB of EEPROM, it stores program code as well as data efficiently. It includes several I/O pins and on-chip peripherals such as timers, UART, SPI, and ADC, which enable smooth interfacing with external devices and sensors. Its low power design and wide voltage range from 1.8v to 5.5v is perfect for battery applications. It provides optimal energy consumption and long battery life.

RTC MODULE

Figure 3: RTC MODULE

RTC, a real-time clock, is an electronic component that tracks the current time. The CPU reads this data via a serial port, usually with software, to perform time-dependent tasks. The RTCs are always working and use low power, they can run while the system is completely off.

Voltage Regulator 7805

For most of the ICs, a 5-volt regulated output is required. There is the possibility of getting unregulated DC voltage, so we used the regulator 7805 solution. The three-terminal positive voltage regulator IC 7805 was specially designed to deliver a 5V-regulated DC output. Its maximum input voltage rating is 35V. It ensures that the power delivered to various components of this system remains stable by using regulator 7805

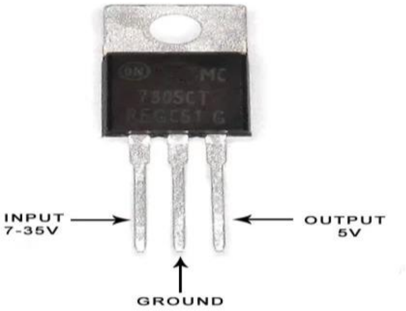

Figure 4: Voltage Regulator 7805

SIM800L GSM

The SIM800L GSM is an important component in the medicine box. It offers various features similar to those of a regular phone, including text messages, and call management. Its compact design and capabilities enhance communication and connectivity within the medicine box. GSM module ensures proper connectivity, allowing remote monitoring and management of medicine box operations efficiently.

SIM800L
IMEI:867273023901304
FCC ID: UDV-2013072402
S2-105HE
-Z141V
CE0678

Figure 5: SIM800L GSM Module

Max 232

MAX232 is an essential integrated circuit known for its ability to convert signals. It is designed to connect TIA-232 serial port signals with TTL-compatible digital logic circuits, functioning as transmitter/ dual receiver. It is widely used for communication between microcontrollers and PCs.

Figure 6: MAX 232

IV. RESULTS AND DISCUSSION

The pictures below represent the result of the work.

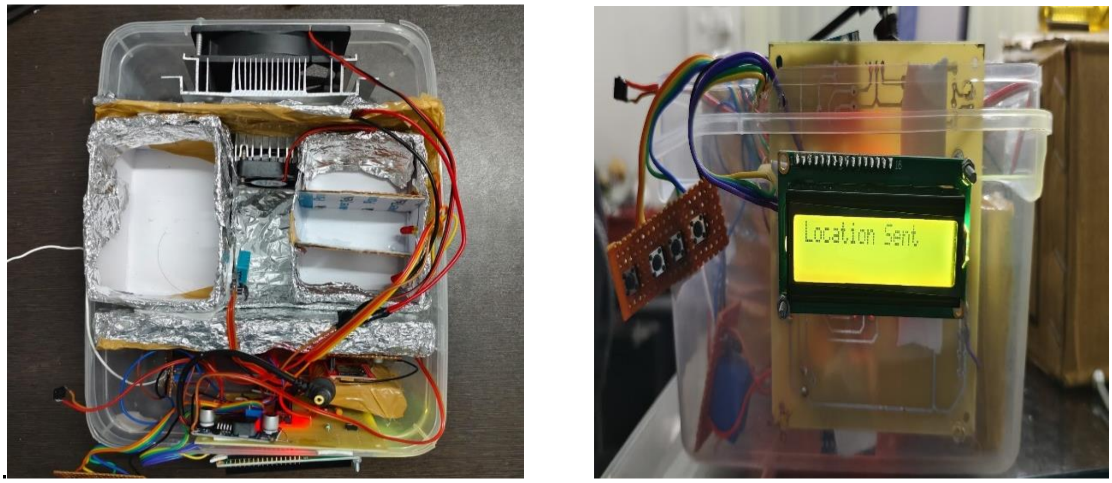

Figure 7: Smart Portable Medicine Box

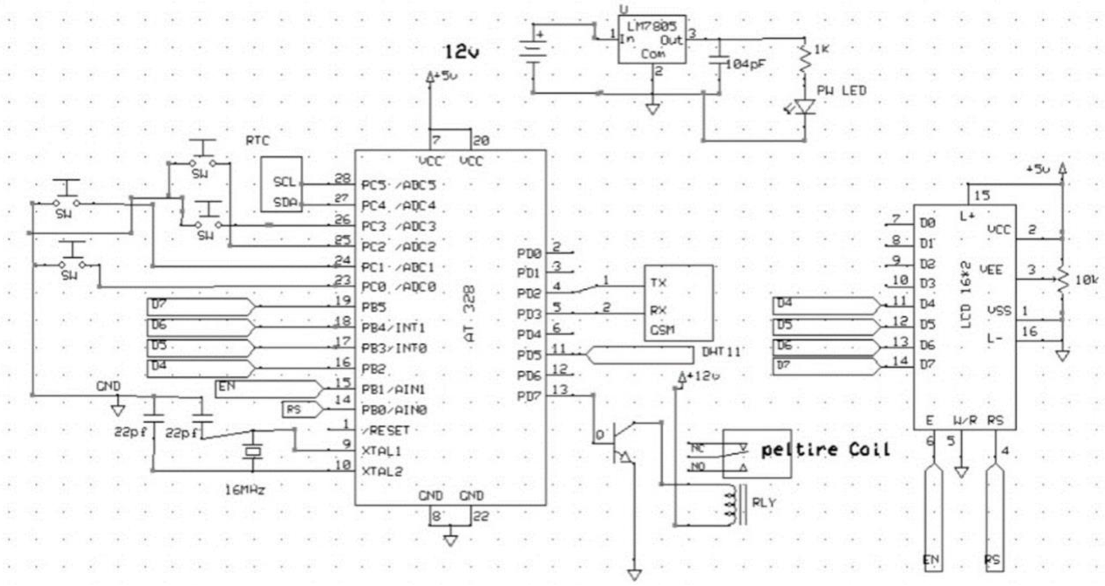

Figure 8: Smart Portable Medicine Box Circuit Diagram

Two compartments have been created for storage purposes- one for insulin and the other the medicines. The insulin section is appropriately insulated to maintain the required temperature and ensure it stays cold. The device is designed with a switch to initiate the device. Overall circuit operation was in excellent condition and performed as expected. Connections are established based on the circuit diagram. As this is the initial prototype, "There is a scope for improvement to make it better."

V. CONCLUSION

The Smart Portable Medicine Box project started with selecting an idea to address challenges faced by elders in managing their medication. After proper planning and consultation with experts, a prototype module for the medicine box was created successfully. Testing and evaluation of the prototype gave positive results. The Successful development of the prototype confirmed the project's main goal was achieved successfully. The device also has great potential for future development. Upgrades like adding sensor-based medication tracking, remote monitoring abilities, and compatibility with wearable devices can be done in the future. The device can also be integrated with health apps to monitor data.

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INDIAN JOURNAL OF SCIENCE AND TECHNOLOGY

RESEARCH ARTICLE

OPEN ACCESS
Received: 17-01-2023
Accepted: 08-07-2023
Published: 14-08-2023

Citation: Jakati JS, Akkole S, Mane V, Harakannanavar SS, Naduvinamani A, Kadakol GP (2023) Design and Optimization of C Structured Microstrip Multiband Antenna for Wireless Communication Using Fractal Geometry. Indian Journal of Science and Technology 16(30): 2365-2373. https://doi.org/10.17485/IJST/v16i30.119

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Funding: None

Competing Interests: None

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Published By Indian Society for Education and Environment (iSee)

ISSN
Print: 0974-6846
Electronic: 0974-5645

Design and Optimization of C Structured Microstrip Multiband Antenna for Wireless Communication Using Fractal Geometry

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Abstract

Objectives: To develop a microstrip antenna with a C structure utilizing fractal geometry to minimize the antenna's size and for more multiband frequency components which are useful in wireless applications. **Method:** This paper presents multiband C shaped microstrip multiband patch antenna. There are two iterations have been applied one by one on square patch which results in fractal patch antenna The IE3D software application has been used to simulate every designed microstrip antenna which resonates at 4.7 GHz, 6.5 GHz at corresponding frequencies.. With the use of this antenna design simulation tool, parametric analyses were done to establish the antenna's geometries. A maximum of two iterations were made to the developed antenna in order to run it in multiband and make it appropriate for wireless applications including WIFI, ISM, and satellite C band. Proposed antenna is designed using IE3D and results are analyzed in terms of gain, return loss, directivity, bandwidth and VSWR. **Findings:** This design makes constructing a microstrip patch C-shaped fractal antenna for ISM and WIFI applications possible at a reasonable cost using a basic FR4 substrate which is cheaper as compared to RT Duroid and other substrates. It features a new shape for its patch and does not just cover a favorable bandwidth. Future assessments may find the antenna to be a good contender due to its compact size, needed bandwidth, more number of multiband and acceptable gain in contrast to antennas that have already been built or manufactured. **Novelty and Applications:** TheIE3D software has been used to run every simulation. The C-shaped antenna's small size (28.83X37.26

mm^2), seven multiband and desired bandwidth with acceptable gain compared to design or fabricated antennas reported earlier. The comparison between the simulated and the measured results is incorporated in the manuscript. A comparison of the presented design with other articles is included to check the novelty of the design. The proposed method helps to target applications such as WiFi, Earth observation and microwave links.

Keywords: Return Loss; Microstrip Patch; IE3D; VSWR; Patch Antenna; Fractal; Multiband

1 Introduction

The Micro strip C Structured Multiband Patch Antenna is the second-generation antennas. It is a metallic patch, printed on thin grounded dielectric substrate using a process similar to lithograpy in which patterns are printedon the substrate while fabricating printed circuit boards or integrated circuit. The main advantages are its low weight and low cost. Narrow bandwidth and low efficiency are its main disadvantages. Fractal antennas are still in their early stages of development. In 1988, the first fractal antenna later on patent and published was built by Dr Nathan Cohen. As we know antenna size and operating wavelength are related such that, when the size of an antenna is made much smaller than the operating wavelength or less than one fourth of the operating wavelength ($\lambda/4$), it becomes highly inefficient. A curve or geometrical figure, each part of whish has the same statistical character as a whole. They are used in which similar pattern recur at a progressively smaller scale, and in describing partly random chaotic phenomena such as a crystal growth and galaxy formation. The c structured microstrip patch antenna can connect directly to a microstrip line transmission line. At the edge of path, impedance is generally much greater than 50Ω(e.g200 Ω). To avoid the impedance mismatch, section of quarter-wavelength long impedance transformer can be used to transform a large input impedance to a 50Ω line. With this feed approach an array of patch elements and their microstrip power division lines can all be designed and chemically etched on the same substrate.

The Sierpinski gaskets fractal shape microstrip patch antenna operates in many resonant frequencies. Due to the self-similar nature of fractals, resonance frequencies can be seen at multiband frequencies (1,2). The L-Shaped Fractal antenna for wireless communication was studied (3), and the designed patch antenna resonated at 5GHz single Frequency. The L-shaped study describes the two types of feeding techniques: Microstrip line feed and inset cut line feed..An F-shaped microstrip fractal patch antenna fabricated using roger RT/duroid material and FR4 g substrate materials. The microstrip line feeding method is employed in this F shape antenna. This antenna is studied up the third iteration using An soft HFSS antenna design tool and obtained 5 resonant frequencies (4). In another work, a novel compact stair-shaped fractal microstrip patch antenna and maximum 3 resonant frequencies are attained and simulated up to third iteration. (5). For high-speed and multi-frequency operation, a customized fractal antenna in the form of a wheel was examined (6). Applications in WBAN and satellite telecommunications can be found for a dual-band comparatively tiny, low-profile antenna that uses Minkowski and Sierpinski carpet fractals (7).

The examination of the Moore and Hilbert patch antenna, which can operate at multiband frequencies and pick up the PD signal, was also conducted (8). To get a frequency bandwidth ratio of 8.4:1 (9), for the uses of wideband frequencies, a hexagonal-triangular slotted design creation was also recently performed, and in one more research design, Hilbert and Minkowski fractal geometry patch antennas were compared in relation to antenna properties, and it was demonstrated that the blended Hilbert and Minkowski antenna has a significant number of resonant frequency components in comparison to the individual antennas(10).

The related work (11,12) and (13) focuses on both fractal patches with self-similarity. However, still there is a need for compacted and more numbers of multiband frequencies of operation by different fractal structures having different shapes. Hence this work focuses on a compact C structure type microstrip antenna with the application of fractal geometry. In this research, the designed antenna operates at 7 different frequencies between 1.722 GHz and 6.0 GHz which also covers the S and C, band applications. The proposed construction consists of C-shaped patch on the top surface and ground at the bottom side. For all resonant frequencies, the designed antenna attained a return loss of less than -10dB. The gain and directivity are fairly good, and the VSWR lies less than 2. This fractal c shaped antenna design yielded multiband behavior and size lessening and attained better gain in the L- band, S-band, and C- band frequencies wireless communication uses.

This literature review work provided an insight in determining the performance of C structured microstrip patch antenna, from the literature survey, Fractal geometry enhanced the bandwidth of the antennas up to great extant. Fractal antennas have different properties which results in small size, high gain, and high efficiency antenna. With increasing the number of iterations of fractal geometry, resonant frequency increases that realized in lower return losses. The performance parameters of antennae for instance radiation pattern, return loss, bandwidth, VSWR, and many resonant frequencies have been explored thoroughly. The microstrip antenna design considerations and their optimization were carried out through the IE3D simulation tool to obtain optimum results. Fractal antennas have various applications in radar, telecommunications, satellite communications, medical imaging, weather forecasting etc. Fractal plays vital role to reduce the size of conventional antenna which is prime requirement for the modern wireless system.

2 Methodology

The proposed microstrip antenna is based on fractal techniques and designed for wireless applications. The radiating element is a C-structured triangle on which fractal concept is applied. Fractal concept is applied on the proposed C-Structured Fractal Microstrip Antenna (CSFM-Antenna), similar to English alphabet letter C. Further the analysis and verification of result is achieved by testing the fabricated antenna and also comparison of simulated and experimental results.

The microstrip C-shaped fractal antenna geometries are designed from the fundamental square patch and then iterations are introduced. The antenna geometry is optimized using the IE3D simulation tool. All the antennas are designed using low-cost glass epoxy FR4, with a 1.6 mm height and dielectric materials constant of 4.4.

2.1 Antenna Design

A. Microstrip Antenna 1, Iteration 0

The size of a microstrip patch antenna and the adopted probe feed have a relationship with the center frequency fr. The width ”W” and length ”L” of the microstrip patch antenna play a significant role in setting the resonant frequency of the operating microstrip antenna in the suggested design of the antenna. The proposed radiating patch antenna of size 28.83X37.26 mm2 for rectangular antenna size is calculated by referring to the microstrip antenna design equations 1 to 7 as provided below(1,2,14), to operate at 2.44GHz.

Calculation of width: The width of the microstrip patch antenna is given by the equation

$$Wo = \left(\frac{c}{2fr}\right)\left(\frac{\sqrt{2}}{\sqrt{\varepsilon r\ +\ 1\,)}}\right) \tag{1}$$

Calculation of effective dielectric constant

$$\varepsilon r_{eff} = \frac{\varepsilon \mathrm{r}+1}{2} + \frac{\varepsilon \mathrm{r}-1}{2}\sqrt{1+12\ \mathrm{h/w}} \tag{2}$$

Calculation of effective patch length

$$Leff = \frac{c}{2fr\sqrt{\varepsilon r_{ef}f}} \tag{3}$$

Calculation of patch length extension

$$\Delta L = 0.412h\frac{\left(\varepsilon r_{eff}+0.3\right)\left(\frac{w}{h}+0.264\right)}{\left(\varepsilon r_{eff}-0.258\right)\left(\frac{w}{h}+0.8\right)} \tag{4}$$

Calculation patch actual length

$$Lo = Leff - 2\Delta L \tag{5}$$

Calculation of patch ground plane parameters (Lg and Wg)

$$Lg = L + 6h \tag{6}$$

$$Wg = W + 6 \tag{7}$$

The ground plane's overall dimensions are 39.7 mm by 47 mm.

Where, ε_{reff} = Effective material dielectric constant.

ε_r = Dielectric constant of the material.

h = Height of dielectric substratum.

c is the speed of light

Utilizing IE3D antenna simulation tool Ver. 15, the patch antenna is simulated. The dielectric substrate for Antenna 1 is FR-4, with a material thickness of 1.6 mm, a dielectric constant of 4.4, and a loss tangent of 0.02. The IE3D antenna modeling software program is used to optimize the antenna-designed parameters. For the optimal gain, impedance bandwidth, and multiband operation, the optimization was carried out across a number of rounds. The suggested antenna-1's geometry is depicted in Figure 1. The various dimensions of antenna 1 are shown in Table 1.

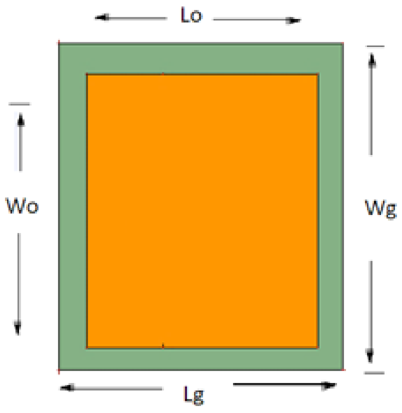

Fig 1. Basic antenna-1's geometry

Table 1. List of parameters of antenna -1 configuration

Antenna Parameters	Antenna Dimension (mm)
L_0 x W_0	28.83x37.26
L_gx W_g	39.7x47

B. Microstrip Antenna 2, Iteration-1

The Figure 2 demonstrates the configurations of the proposed C shape patch microstrip antenna with the first iteration. This proposed antenna is designed by the application of fractal geometry to the basic patch antenna-1. Antenna 2 is constructed by dividing the antenna-1 into 9 equal rectangular structures each of size 9.61mmx 12.42mm and E shape structure of size 9.61mmx 12.42mmx 2mm is constructed at the center of the patch. The various dimensions of antenna 2 are shown in Table 2. The proposed microstrip antenna is designed and simulated using IE3D design tool Ver 15 and is constructed using FR-4 material with εr = 4.4 as the dielectric substrate constant, having a thickness of 1.6 mm, and tangent(δ) = 0.02. The designed microstrip antenna parameters are optimized with the IE3D antenna modeling simulation tool. The optimization was accomplished with much iteration for the better antenna gains, impedance frequency bandwidth, and multiband functioning. The probe feeding technique is being used.

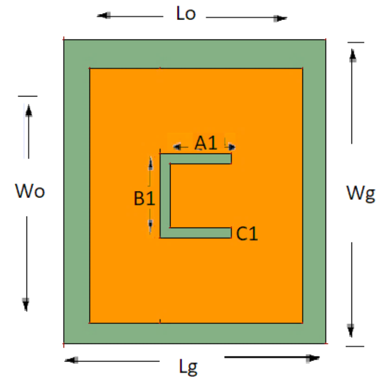

Fig 2. C shape Microstrip Antenna-2 Iteration-1

C. Microstrip Antenna 3, Iteration-2

Figure 3 depicts the configuration of the proposed C-shape microstrip antenna-3 with fractal geometry with iteration-2. Antenna 3 structures are made by dividing the antenna-2 into 9 equal rectangular structures each of size 9.61mm x 12.42mm.

Table 2. List of Microstrip antenna geometry-2 parameters

Parameters	Dimension (mm)
A1	9.61
B1	12.42
C1	2

The C shape structure of size 9.61mmx 12.42mmx 2mm is constructed at the center of the patch In the remaining 8 rectangular parts of each size 9.61mmx 12.42mm, all the 8 rectangular structures have been divided again 9 equal rectangular parts of size 3.203 mm x 4.140mm. At the center of 3.203 mm x 4.140mm, C shape structure of 1mm width is constructed. The various dimensions of antenna 3 are shown in Table 3. IE3D simulation software Ver 15 is used to simulate the antenna 3 and the parameters of the antenna are optimized through a number of repetitions.

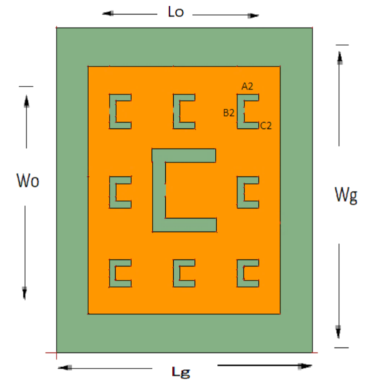

Fig 3. C shape Microstrip Antenna-3 Iteration-2

Table 3. List of Microstrip antenna geometry-3 configurations

Antenna Parameters	Antenna Dimension (mm)
A2	3.203
B2	4.140
C2	1.000

3

Results and Discussion

The twofold iterations of the self-similar fractal microstrip patch antenna with the probe feeding technique were studied using the IE3D antenna simulation tool. The C-shaped fractal patch antennas 2 and 3 are created using inexpensive FR-4 material with a refractive index of 4.4 and simulation results with parameters as displayed in Table 4. This Table 4 clearly shows that these antennae have several multiband resonance components with excellent bandwidth, low return loss, and high antenna peak gain values. Simulated and constructed at 2.44 GHz is the fundamental Antennas-1. By altering the feeding point locations, the findings have been optimized to produce trustworthy antenna-performing characteristics.

The recommended microstrip antenna-1 resonated strongly at three different multiband frequencies and has a peak gain of 1.74 dB with a bandwidth of 170.99 MHz, a return loss of -21.84 dB, and a VSWR of 1.39 at the 2.44 GHz frequency. These specifications are appropriate for wireless applications like WiFi and Bluetooth. Figure 4 s illustration of a 3D radiation pattern exhibits excellent omni-directional radiation properties. Cross polarizations on the 3D radiation patterns at 2.44 GHz are less than 20 dB, and rear radiations are also minimal. Antenna-1 has a peak field directivity of 6.24dbi, a 35.29% antenna efficiency, and a 44.63% antenna radiation efficiency. Incorporating the first iterated fractal geometry to antenna-1 has been used as a strategy to obtain multiband and reduce the volume of the antenna. To acquire better values of radiating parameters, many more optimizations were carried out by altering the C shape structure, as shown in Table 4. According to the results of the simulation, antenna-2 generated five multi-band resonance frequencies that are appropriate for use in 5G, Wi-fi connectivity, and WIMAX applications.

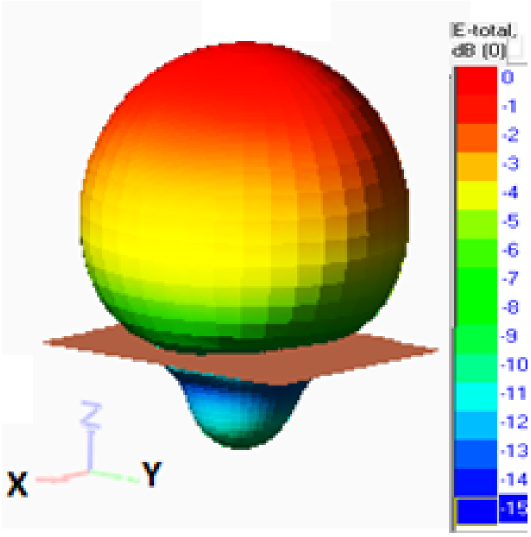

Fig 4. Simulated Basic microstrip antenna-1,3D Radiation plot at 2.44GHz

A maximum antenna gain of 3.27 dB has been attained at 6.488 GHz with a wider bandwidth of 158.84 MHz having an antenna return loss of -17.59dB and 1.20 VSWR which is suitable for radar and satellite applications. The suggested antennas' 2D radiation patterns are shown in Figure 5, which also illustrates their good omni-directional properties with fewer minor lobes and maximal radiation at an angle of 0 degrees. At 3.686GHz, the antenna efficiency was 27.37% and the peak radiation efficiency was 35.39%. At 5 GHz, the antenna efficiency was measured to be 28.85 dB, the radiation efficiency to be 30.43%, and the highest aggregate electromagnetic field directivity to be acquired to be 7.8 dB. The shape antenna-2 reduces its size by 5% as compared to antenna-1.

As can be seen from the results, the C-shape type second-iterated fractal antenna-3 has 7 multiband resonance frequency components that are compatible with ISM, Bluetooth, WIFI, and WIMAX uses. These frequencies have good bandwidth, better returns loss, and VSWR, as depicted in Table 4. The second iterated C-shape structured fractal antenna has a maximum gain of 3.61dB at 5. 362GHz after multiple iterations for optimizing antenna parameters for feed point positions. The antenna efficiency of this proposed antenna-3 is 35.29%, the total field directivity attained is 9.7dBi, and the maximum efficiency of antenna radiation obtained is 44.63%. Additionally, a size decrease of 24% overall is accomplished. Figure 6 depicts a simulated suggested antenna-1,2 and 3 optimized comparative study of return loss(S11), which exhibits a satisfactory return loss. The simulated polar radiation graphs at ø=900 and ø=00 =900 and =00 are displayed in Figure 7 and shows omni-directional characteristic at 6GHz.The return loss characteristics obtained are all above -10dB and indicate good return loss at the resonant frequencies. The VSWR results as shown in Table 4 shows good matching of antenna and feed point and indicate less reflected power. The diagram portrays that the microstrip antenna is much further directive and has greater frequency bandwidth as compared to antenna 2. The designed microstrip antenna three has led to a total size decrease of 24%.

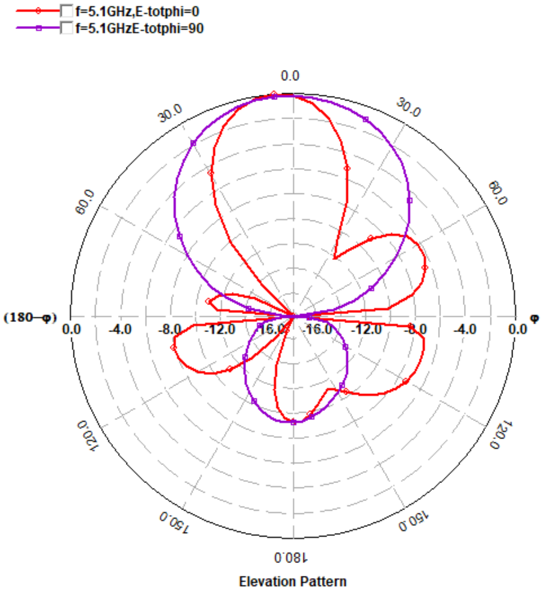

Fig 5. Simulated microstrip antenna-2,2D Radiation Pattern

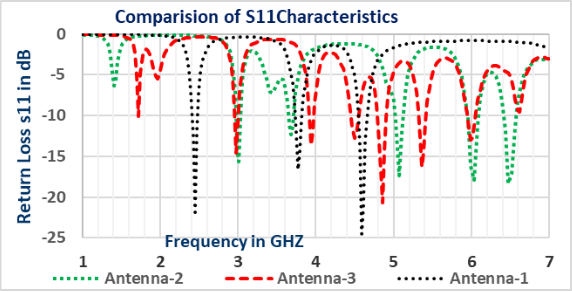

Fig 6. C shape microstrip antenna one, two and three comparison of return loss S11 characteristics

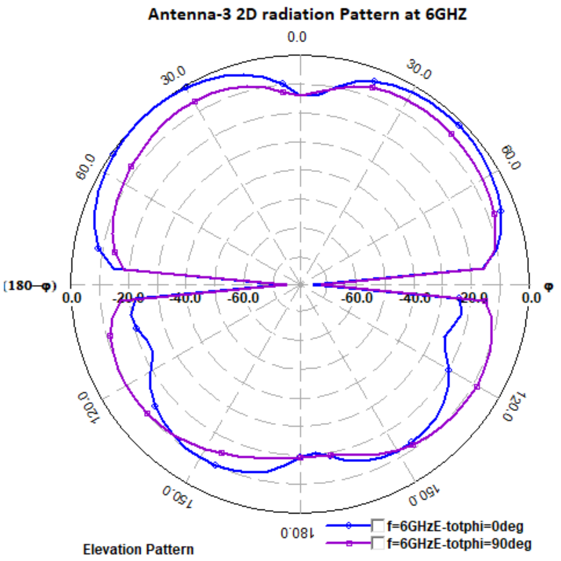

Fig 7. Simulated microstrip antenna-3,2D Radiation Pattern

Table 4. Designed Antenna1,2 and 3 parametrs Results

Type of Antenna	Resonant Frequency (GHz)	Return Loss(S_{11})(dB)	Bandwidth(MHz)	VSWR	Gain(dB)
Antenna-1	2.44	-21.84	170.99	1.39	1.74
	3.79	-13.45	183.20	1.52	0.18
	4.60	-24.20	111.47	1.14	-1.40
Antenna-2	3.012	-15.60	58.59	1.39	-1.01
	3.686	-12.24	60.79	1.64	1.21
	5.088	-17.617	104	1.32	1.16
	6.034	-17.83	138.68	1.30	-2,25
	6.488	-17.59	158.84	1.20	3.27
Antenna-3	1.722	-10.034	09	1.91	-2.45
	2.975	-14.486	50.27	1.52	-2.48
	3.941	-13.527	62.03	1.55	-0.85
	4.490	-12.705	97.56	1.6	-1.5
	4.855	-20.650	110.33	1.25	-0.56
	5.362	-16.198	98.40	1.40	3.61
	6.000	-12.911	110.43	1.58	-0.85

4 Conclusion

A fractal-geometry-based c-structure type microstrip patch antenna has been introduced. Comparing the investigated geometry to the standard basic microstrip antenna, the results are overall optimal. The C-shape-sized microstrip patch antenna resulted in 7 resonant multiband frequencies, where multiband frequencies in the literature found minimum number. According to the presented antenna work design and analysis performed here, the second iteration's overall size was reduced by 24.23 percent (antenna-3). The performance is analyzed regarding the reflection coefficient response, gain, directivity, E-field and radiation pattern. The operating frequencies that produced the best results were 2.44 GHz with a BW of 170.99 MHz and a maximum gain of 1.74 dB for the basic microstrip antenna 1, 6.488 GHz with a frequency bandwidth of 158.84 MHz and the highest gain of 3.27 dB for antenna-2, and 5.362 GHz with a wider bandwidth of 98.40 MHz and a peak gain of 3.61 dB for antenna-3, respectively. The design highlights are compared with other published articles to identify the improvement. The multiband response over the 4 GHz to 12 GHz helps to attain multiple wireless communication applications such as WiFi and Microwave links. Applications in these fields can benefit from these operating frequencies in the S-band (unlicensed applications) like Wi-MAX, Wi-Fi, LTE ISM, and blue tooth modules.

Acknowledgement

We would also like to show our gratitude to the S.G Balekundri Institute of Technology Shivbasavnagar Belagavi, Zeal College of Engineering & Research, Narhe Pune, and Nitte Meenakshi Institute of Technology, Yelahanka, Bangalore for sharing their pearls of wisdom with us during the course of this research, and we thank reviewers for their so-called insights.

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International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 3, pp 315-322, March-2024

https://doi.org/10.47001/IRJIET/2024.803048

Smart AI Blind Stick

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***Abstract* - A smart system concept has been devised to give blind people smart technological assistance. It is challenging for those who are blind or visually impaired to navigate their surroundings. Real-time assistance, object detection, and artificial vision are all features of the Raspberry Pi-based system. In this project, we'll utilize the Raspberry Pi to build a smart system with a speaker module, switch, and camera module for blind people. The voice output of the system is managed by TTS (text to speech), and it consists of a speaker module that gets audio feedback. The proposed system recognizes an object in the surrounding environment and provides auditory input, including warning messages delivered through headphones. The system's overall objective is to provide a low-cost, high-efficiency text-to-voice and navigation aid for the blind that gives them a sense of artificial vision by providing data on both static and moving things in their environment.**

Keywords: Artificial vision and object identification, TTS (text to speech), Low-cost, and text-to-voice.

I. INTRODUCTION

Continuous efforts have been made to advance innovation in order to simplify life. Everyone in today's fast-paced world is embracing innovation's advantages, but some segments of society still struggle with it. Among them are those who are physically incapable of traveling alone or engaging in other activities.

This project aims to provide one such successful show that combines the newest technological advancements to provide intelligent and useful electronic assistance to the dazzle. This project shows how to use and implement a voice assistance system for people with disabilities so they don't have to rely on others to get about. This project uses a Raspberry Pi to identify hops using ultrasonic sensors implanted into each glasses and provide audio assistance based on those leaps. In addition to providing vocal support for navigation, Smart Dazzle Stick alerts the speaker or headphones when a user encounters a dangerous situation. The goal's paths should be investigated. They have greater challenges in life. The patient with this illness is still able to move freely and walk. The original stroller bar offers an optional Voice Collaborator.

Here we have a Raspberry Pi, a buzzer, an ultrasonic sensor, and a sound playback module (speaker). Among them might be the Raspberry Pi. Microcontrollers give everything speed, accuracy, and predictability. The distance between the resistance and the rod is measured by the ultrasonic sensor to ascertain the resistance in front of the person. Speakers will help those who are disabled by the outside world reach their objectives through preparation or assistance. A visually impaired individual is someone who, even with blind eyes, finds it difficult to perceive the smallest details. Hyun must assist these people. The World Health Organization (WHO) estimates that 10% of blind people are blind and unable to function freely and securely. These inquiries offer an additional excellent time technique to assist anxious individuals in making critical decisions. Walkers, often known as white canes or canes, and heterosexual dogs with distinct reactions are the astute and unimpressed classes. The ability to see will become vital to the human body. Our eyes are the first line of access to the nuances in our environment. But the majority of these tools are accurate and have limited capabilities. Ultimately, the smart joystick built on a Raspberry Pi is demonstrated as a means of resolving issues and resolving those that already exist. The smart wand combines several sensors and gadgets to enable users to do a wide range of daily tasks and workouts.

What is Raspberry Pi?

The Raspberry Pi Establishment, a UK-based company that creates educational and computing resources, is the name of a line of stand-alone computers known as Raspberry Pi. Since the Raspberry Pi was first released in 2012, many upgrades and variants have also been released. The first Pi included a 700MHz single-core CPU with 256MB of Smash, but the latest model has a quad-core processor with a clock speed of more than 1.5GHz and 4GB of Slam. The Pi Zero costs a reasonable $5, while the Raspberry Pi costs less than $100 (typically about $35). People use Raspberry Pis for a variety of purposes, including learning to code, building projects, home repairs, using Kubernetes clusters and edge

ISSN (online): 2581-3048
Volume 8, Issue 3, pp 315-322, March-2024
https://doi.org/10.47001/IRJIET/2024.803048

computing, and even for business purposes. Though it runs Linux and may be incredibly inexpensive, the Raspberry Pi also features a large number of input/output (GPIO) pins that allow you to operate electronic devices for physical computing and Internet of Things research.

What is Machine Learning?

By evaluating large amounts of data using sophisticated computations, machine learning can help uncover hidden designs in IoT data. By using the data gathered in centre forms, machine learning may either supplement or replace manual forms. By leveraging machine learning on the Internet of Things (IoT) to carry out predictive tasks across a broad range of applications, companies are enabling enterprises to absorb cutting-edge information and enhance their operational skills. IoT and machine learning provide information-covered experiences for quicker, automated responses and better decision-making. Through the consumption of images, video, and audio, machine learning for the Internet of Things can be used to predict future patterns, identify inconsistencies, and make significant discoveries. By using IoT machine learning, you can:

- Information processing and formatting into a trustworthy format.
- Build models for machine learning.
- Install these machine learning models on the edge, cloud, and keyboard.

II. LITERATURE REVIEW

2.1) T. Rubesh Kumar, C. Purnima "Assistive System for Object Detection with Voice Output For Blind Users" International Journal of Research in Engineering & Advanced Technology 2014.

T. Rubesh Kumar proposed navigation is obviously essential in today's society. Objects are everywhere in the surrounding. There are already a few systems that have some promise for portable use, but they cannot handle product detection. But a big limitation is that it is very hard for blind users to find the position of the object where it is placed. T. Rubesh Kumar, C. Purnima have proposed a camera-based assistive Object detection framework to help blind persons to recognize objects in their daily lives. Main contributions embodied in this prototype system are: A novel motion-based algorithm to solve the aiming problem for blind users by their simply shaking the object of interest for a brief period. A portable camera-based assistive framework to aid blind persons reading text from hand-held objects.

2.2) Pooja Sharma, Mrs. Shimi S. L and Dr. S.Chatterji, "Design of microcontroller based virtual eye for the blind" International Journal of Scientific Research Engineering Technology, 2014.

Pooja Sharma proposed Blindness is a state of lacking the visual perception due to physiological or neurological factors. In this proposed work by Pooja Sharma, Mrs. Shimi S. L. and Dr. S. Chatterji, a simple, cheap, friendly user, virtual eye will be designed and implemented to improve the mobility of both blind and visually impaired people in a specific area. The proposed work includes a wearable equipment consists of head hat, mini hand stick and foot shoes to help the blind person to navigate alone safely and to avoid any obstacles that may be encountered, whether fixed or mobile, to prevent any possible accident. The main component of this system is the ultrasonic sensor which is used to scan a predetermined area around blind by emitting reflecting waves. The reflected signals received from the barrier objects are used as inputs to Arduino microcontroller. The microcontroller carries out the issued commands and then communicate the status of a given appliance or device back to the earphones using Raspberry pi speech synthesizer. The proposed system is cheap, fast, and easy to use and an innovative affordable solution to blind and visually impaired people in third world countries.

2.3) Anusha Bhargava, Karthik V. Nath, Pritish Sachdeva and Monil Samel "Reading Assistant for the Visually Impaired" International Journal of Current Engineering and Technology, 2015.

Anusha Bhargavaetal proposed Majority of the visually impaired use White cane for their navigation. This gives rise to the need for the development of devices that could bring relief to the agonizing tasks that the visually impaired has to go through says Anusha Bhargava, Karthik V. Nath, Pritish Sachdeva and Monil Samel. This project aims to study the image recognition technology with speech synthesis and to develop a cost effective, user friendly image to speech conversion system with help of Raspberry Pi. The project has a small inbuilt camera that scans the object, converts it to audio format using a synthesized voice for detecting objects. Not only does this save time and energy, but also makes life better for the visually impaired as it increases their independency.

2.4) Nagaraja L, Nithin D, Nagarjun R S, Veena S Murthy, Nishanth M Anand "Online Blind Assistive System using Object Recognition" Year: 2019.

Nagaraja L proposed that this work implemented using python and when run gives an accurate decision for object detection and classification, while DNN give accurate results. The problem is with its family of networks regarding speed; it provided very slow results for 5 FPS on a GPU. They have come up with unique text localization formula which works on models of edge distributions and stroke orientation. Problems related to traffic signal detection and identification has been overcome using video stream in Matlab. Visuals are provided for blind person by object detection and its identification. The focus in this paper is on the Object detection and the recognition.

2.5) Mallapa D. Gurav, Shruti S. Salimath, Shruti B. Hatti, Vijayalaxmi I. Byakod , "B-LIGHT: A detecting aid for the Blind People using YOLO and OpenCV" International Journal of Scientific Research Engineering & Technology (IJSRET 2017).

Mallapa D. Gurav et al proposed that, this project presents a smart device that assists the visually impaired which effectively and efficiently detects objects. The proposed project uses the methodology of a camera based assistive device that can be used by people to recognize obstacles. The framework is on implementing image capturing technique in an embedded system based on Raspberry Pi board. The proposed fully integrated system has a camera as an input device to feed the clicked images for digitization and the scanned image is processed by a software module the YOLO (You Only Look Once engine). You Only Look Once (YOLO) is the identification of obstacles using photoelectric devices and computer software. It coverts images of objects into machine encoded text. In this research these images are converted into audio output. YOLO is used in machine process such as cognitive computing, machine translation, text to speech, key data and text mining. The recognition process is done using YOLO the character code in files are processed using Raspberry Pi device on which it recognizes objects using python programming and audio.

2.6) A. Hanah, R. Farook, S. J. Elias, M. R. A. Rejab, M. F. M. Fadzil and Z. Husin, "IoT Room Control and Monitoring System Using Rasberry Pi," 2019 4th International Conference and Workshops on Recent Advances and Innovations in Engineering (ICRAIE), Kedah, Malaysia, 2019.

This project describes a room control and monitoring system using Internet of Things (IoT). It aims to help the user specifically the elderly to monitor their room automatically wirelessly though mobile application. This project using Raspberry Pi 3 Model B to communicate with Firebase cloud platform and mobile application developed using Android Studio. The system accumulates the temperature, humidity and gas surrounding the room and executes the output to the actuator to act and the sensors data are stored into the database. In mobile application, user can login to view the real-time sensors data with date and time. The system will turn on the fan when the temperature is hot; the gas alert system is activated when there is gas leakage occurs by notifying the user through cellular network and light is turned on when there is human motion detected. The user able to use via mobile application to send command to control the room devices. An alert notification is sent to the user mobile application when the system detects a big difference between previous and current sensors data.

2.7) N. S. Sanjay and A. Ahmadinia, "MobileNet-Tiny: A Deep Neural Network-Based Real-Time Object Detection for Rasberry Pi," 2019 18th IEEE International Conference On Machine Learning And Applications (ICMLA), Boca Raton, FL, USA, 2019.

In this paper, we present new neural network architecture, MobileNet-Tiny that can be used to harness the power of GPU based real-time object detection in raspberry-pi and also in devices with the absence of a GPU and limited graphic processing capabilities such as mobile phones, laptops, etc. MobileNet-Tiny trained on COCO dataset running on a non-Gpu laptop dell XPS 13, achieves an accuracy of 19.0 mAP and a speed of 19.4 FPS which is 3 times as fast as MobileNetV2, and when running on a raspberry pi, it achieves a speed of 4.5 FPS which is up to 7 times faster than MobileNetV2. MobileNet-Tiny was modeled to offer a compact, quick, and well-balanced object detection solution to a variety of GPU restricted devices.

2.8) S. R. Kawale, S. Mallikarjun, D. G. V, K. D. V. Prasad, A. M N and A. K. N, "Smart Voice Navigation and Object Perception for Individuals with Visual Impairments," 2023 7th International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), Kirtipur, Nepal, 2023.

Technological advancements have brought about substantial changes to the accessibility alternatives that cater to those with diverse abilities. The integration of artificial intelligence (AI) into assistive technology has presented unprecedented opportunities for enhancing the autonomy and quality of life of those with disabilities. The focus of rigorous investigation is on "Smart Blind Sticks," which are novel equipment designed to enhance the mobility and safety of those with visual impairments. This article presents a comprehensive account of the conceptualization, design, and implementation of a technologically advanced blind stick. The primary objective of this innovative device is to detect and promptly respond to impediments in the immediate environment, hence facilitating navigation for those with vision impairments. The proposed system utilizes advanced sensor technologies and advanced data processing techniques to provide precise obstacle detection. Moreover, it employs state-of-the-art navigation systems to provide instantaneous guidance, guaranteeing seamless and secure transportation at all instances. The distinguishing characteristics of the smart blind stick set it apart from conventional white canes, hence affording its users more mobility. Experimental evidence showcases the practical use of this approach, therefore emphasizing its capacity to significantly enhance accessibility and promote autonomy among individuals with visual impairments.

2.9) L. Thomas, T. K. L and S. K. H. R, "Artificial Intelligence for Face recognition and Assistance for Visually Impaired," 2023 5th International Conference on Energy, Power and Environment: Towards Flexible Green Energy Technologies (ICEPE), Shillong, India.

In this world, many people are affected by blindness and they face so many difficulties in their daily life. According to World Health Organization (WHO), there are approximately 2.2 billion people who are completely blind. They need to depend on primitive solutions like white canes, trained dogs, or other people. But these helping hands cannot always assist them. The affected people need a smart assisting device that avoids bumping into an obstacle and helps in navigating from one place to another independently. This proposed work describes the smart walking stick which makes blind people walk safely. By using the latest technologies and IoT devices, this smart walking stick can be developed where it provides safe navigation to the user. The proposed system employs a novel solution for navigation in indoor with the help of deep learning algorithms. In case of panic situations or emergency conditions, the predefined message with the user's location will be sent to the caretaker using an API. This smart walking stick is affordable, durable and provides more convenience to the user to walk safely, and gives more confidence without depending on any other externals.

2.10) Wang, "A Body Measurement Method Based on the Ultrasonic Sensor," 2018 IEEE International Conference on Computer and Communication Engineering Technology (CCET), Beijing, China, 2018.

To realize the automatic measurement and improve the efficiency of the body measurement in the garment customization, we propose a body measurement method based on the ultrasonic sensor. The novel measurement structure and method are proposed to achieve the accurate bust, waist, and hip (BWH) information. First, the depth information is measured by the ultrasonic sensor arrays. The sensors should capture the front and back depth of the key body parts, the depth information and the certain position of sensors can generate the space coordinates. Second, the space coordinates are fitted with the quantic function to generate the curves. Third, the front curve, back curve, and the estimated parameter constitute the finial BWH data. Experimental results indicate that the proposed method can achieve accuracy of 95.6%.

III. PROBLEM STATEMENT

A smart navigation system for visually impaired people that makes obstacle detection easier for blind people. By using object detection and identification, this technology enables blind people to travel on their own. Software that converts text to speech is used to notify users of objects that are discovered.

IV. OBJECTIVES

The significant impact that the creation of a Smart Blind AI Stick promises for visually impaired folks worldwide is driving this transformative adventure. It is more than just a technological advancement; it is a ray of hope that brings safety and independence. This project pushes the envelope of disability and promotes equality of opportunity and inclusivity. By developing such a tool, we not only advance assistive technology but also make a strong statement about the boundless potential of innovation. It is evidence of our dedication to turning obstacles into chances and creating a more promising and approachable future for all people, irrespective of their visual impairments.

V. SYSTEM DESIGN

The central processing unit is a Raspberry Pi, which provides a small and affordable option for the design. The General Purpose Input/Output (GPIO) pins allow for the easy management of input and offer flexible connectivity to a variety of devices, such as switches, LEDs, and ultrasonic sensors. The Raspberry Pi 3 Model B+, which was selected, runs on a micro SD card and requires a 5V power source for effective data storage. Its flexibility and connectivity possibilities are enhanced by its hardware features, which include an Ethernet port, four USB ports, an HDMI port, and an audio jack.

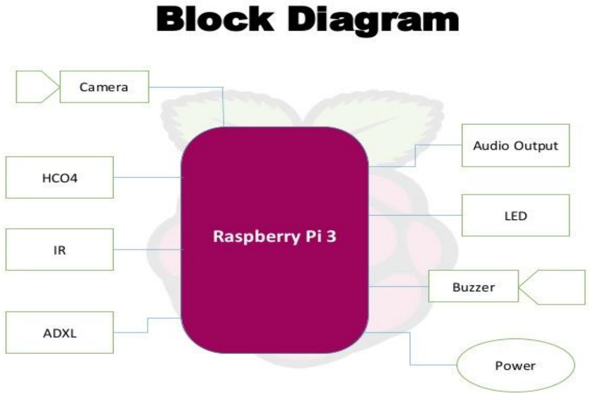


Figure 1: Block Diagram

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 3, pp 315-322, March-2024

https://doi.org/10.47001/IRJIET/2024.803048

In order to interface with ultrasonic sensors and enable precise and instantaneous obstacle detection, the GPIO pins are essential. The 700MHz single-core processor of the Raspberry Pi makes sure that algorithms run quickly. With support for Python, Java, C, and C++ among other programming languages, the Raspberry Pi offers a flexible platform that may be used to build sophisticated features.

In order to augment its functionality even more, an Ethernet port is employed for internet access, which makes it easier to install the necessary driver APIs. This connectivity makes it possible for the system to obtain necessary resources, such as extra software and driver updates. Utilizing information from linked sensors, the Raspberry Pi algorithm plays a key role in determining the distances between barriers.

The creative addition of a text-to-speech (TTS) driver API increases usability and accessibility. The obstacle detection system produces distance data, which this API translates into voice. The user then receives the real-time, synthesized speech through earphones, giving them a seamless, instantaneous knowledge of their surroundings. Using an integrated approach, a comprehensive and intuitive smart stick system for efficient navigation and obstacle awareness is created by utilizing the capabilities of the Raspberry Pi.

VI. PROPOSED SYSTEM

A) Import the given image from dataset

Using Keras' pre-processing picture data generator function, we must import our data set and generate the size, rescale, range, zoom range, and horizontal flip functions. Next, we use the data generator method to import our image dataset from the folder. Here, we set the parameters for the train, test, and validation phases as well as the target size, batch size, and class mode. We then use this function to train our own network by adding CNN layers.

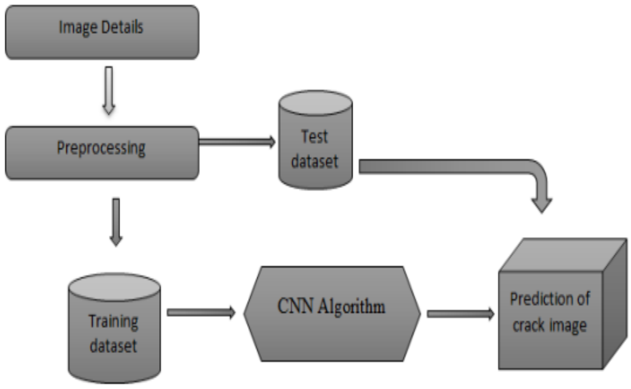


Figure 2: System Architecture

B) To train the module by given image dataset

With the help of a classifier, fit generator function, training steps for each epoch, the total number of epochs, validation data, and validation steps, we are able to train our dataset.

C) Working process of layers in CNN model

Convolutional neural networks, or CNNs, are a type of deep learning technique that can recognize different characteristics of an input image and assign weights and biases to them based on training. Compared to alternative classification techniques, ConvNet necessitates significantly less pre-processing. Primitive techniques require hand-engineered filters, but with sufficient training, ConvNets may learn these filters and properties. The architecture of a ConvNet was impacted by the configuration of the Visual Cortex and is akin to the patterns of connections between neurons. Only alterations in the receptive Field, a very small area of the visual field, cause individual neurons to fire. Each of the four levels in their network comprises 1,024 input units, 256 in the first hidden layer, 8 in the concealed layer, and 2 output units.

Input Layer: CNN's input layer holds picture data. Three-dimensional matrices are used to represent image data. It must be rearranged into a single column. A photograph that is 28 × 28 = 784 in size needs to be transformed to 784 x 1 before it can be entered.

Convo Layer: Since the convolution layer extracts features from the image, it is often referred to as the feature extractor layer. A portion of the image is first linked to the Convo layer, which performs the convolution process described earlier and calculates the dot product between the filter and the receptive field, a local area of the input image that is the same size as the filters. The output volume of the process is represented by a single integer. Next, repeat the technique by applying a Stride filter over the subsequent receptive field of the identical input image. Until the entire image has been processed, it will carry out this process again. The output will be the input for the next layer.

Pooling Layer: A pooling layer is used to reduce the physical volume of the input image after convolution. It is used in between two convolution layers. Applying FC after the Convo layer without adding pooling or max pooling will need a lot of processing power. Therefore, using maximum pooling is the sole method to reduce the geographic volume of the input image. Max pooling was used in a grayscale slice with a Stride of 2. It detects that the 4 x 4 input is reducing to a 2 by 2 size.

Fully Connected Layer (FC): Within the completely linked layer are neurons, weights, and biases. It establishes connections between neurons in different layers. People have learned how to classify photos into several groups by using it.

Softmax / Logistic Layer: The last layer of CNN is called Softmax. It is located at the base of the FC layer. Softmax is used for multi-classification, while logistic is used for binary classification algorithms.

Output Layer: The output layer stores the label as one-hot encrypted data. You now comprehend CNN quite well.

D) Classification

The first step in the analysis of video streams is called Moving Object Extraction, during which the system identifies and isolates objects that are in motion. This is a crucial step since it sets up the tasks of analysis and recognition that come after. Background subtraction, a method that distinguishes moving objects from the static background by identifying regions of notable change between successive video frames, is one often used strategy in this step. The system may efficiently filter out unnecessary information and focus just on the items of interest by isolating these dynamic aspects.

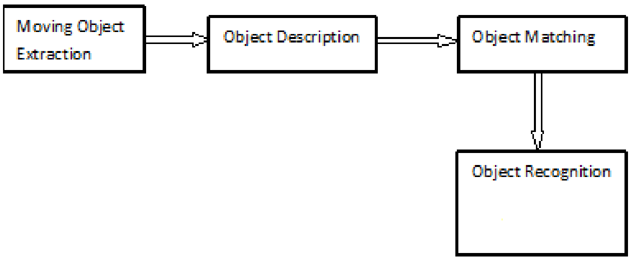


Figure 3: Classification

The system moves on to the Object Description stage after extracting the moving items. Here, each retrieved object's properties and attributes are painstakingly described by the system. Aspects like size, form, colour, and even motion patterns can be included in these attributes. The system learns a great deal about the look and behaviour of the objects by carefully examining these attributes, which helps with subsequent tasks like recognition and classification.

The retrieved objects are compared to a database of known items in the Object Matching step of the process, which comes after the Object Description stage. Determining the identity or category of each object requires this matching process. The system can determine the likely identify of the objects by comparing their attributes from the extracted objects with those stored in the database. This allows for more precise object recognition and categorization.

In the final stage, called Object Recognition, the system uses the comprehensive object descriptions and the matching results to give class labels to the objects. The system classifies the items into predetermined classes like "car," "pedestrian," or "bicycle" by using complex algorithms and pattern recognition techniques.

VII. RESULT AND DISCUSSIONS

As living standards have improved, we have become so materialistic that we have forgotten about the strong lives led by those with physical disabilities. They experience tiresome, indifferent treatment from others because they are physically hindered. They became, in a sense, subservient to others for their daily schedule of tasks. People who are blind or disabled consistently rely on others to complete their daily tasks. The eyes are a tried-and-true tool for seeing and sensing the outside world; damage to such a vital sense organ actually affects the outside world's capacity to perceive data.

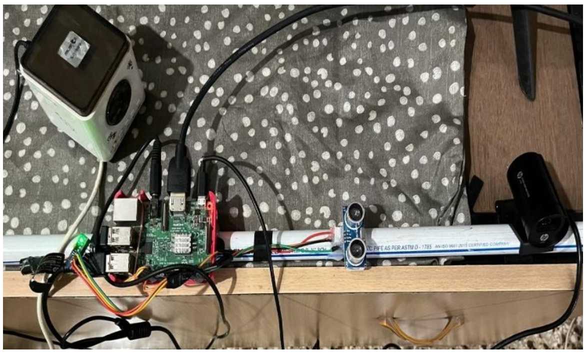
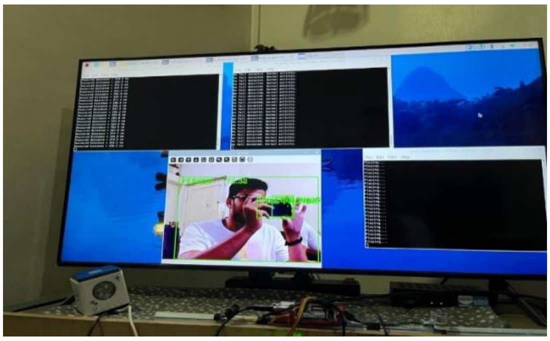
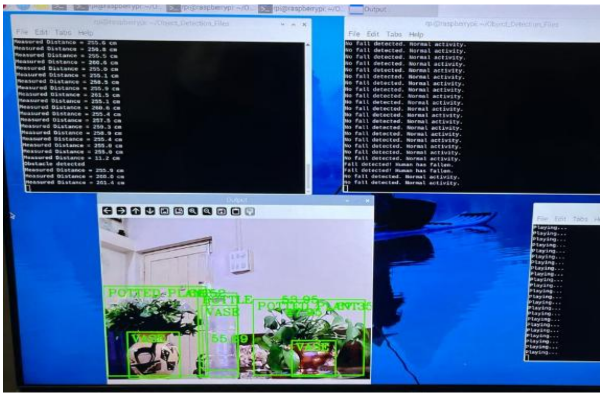


Figure 4: Proposed Hardware

As a result, getting about in such an environment can be an exceptionally difficult task because confused individuals are unable to rely on their sight and so encounter a variety of difficulties. This will assist them in overcoming their obstacles. The framework was tested in an actual setting. We have positioned bumps and deterrents in multiple locations to gather data for both ultrasonic sensors. We have measurements for the removal of the obstruction at 50, 100, 150, 200, and 300 centimetres.



(a)

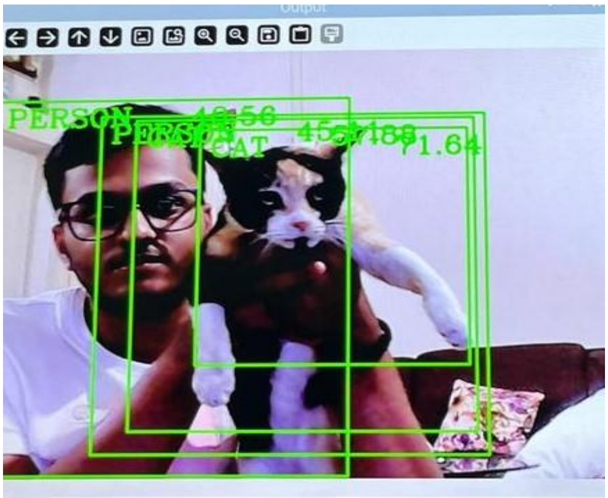


```
Measured Distance = 255.6 cm
Measured Distance = 256.8 cm
Measured Distance = 255.5 cm
Measured Distance = 260.6 cm
Measured Distance = 255.0 cm
Measured Distance = 255.1 cm
Measured Distance = 258.5 cm
Measured Distance = 255.9 cm
Measured Distance = 261.5 cm
Measured Distance = 255.1 cm
Measured Distance = 260.6 cm
Measured Distance = 255.4 cm
Measured Distance = 257.5 cm
Measured Distance = 259.3 cm
Measured Distance = 258.0 cm
Measured Distance = 255.4 cm
Measured Distance = 255.0 cm
Measured Distance = 255.0 cm
Measured Distance = 11.2 cm
Obstacle detected
Measured Distance = 255.9 cm
Measured Distance = 260.0 cm
Measured Distance = 261.4 cm
```

```
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
No fall detected. Normal activity.
Fall detected! Human has fallen.
Fall detected! Human has fallen.
No fall detected. Normal activity.
No fall detected. Normal activity.
```

```
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
Playing...
```

(b)



(c)

Figure 5 (a)(b)(c): Result of Hardware

VIII. CONCLUSION

This analysis provided a description of an ideal system for scanning hand-held objects and written communications to assist the blind. We have projected a completely unique text localization method supported by models of stroke orientation and edge distributions in order to recover text regions from sophisticated backgrounds. The associated feature maps calculate the text's global structural feature at each element. Block patterns create a feature vector by projecting the projected feature maps of an image patch. To determine potential candidates for text patches ready for text classification, a neighbouring character grouping is used. Text in footage captured by cameras is localized using the Associate Ada boost learning model. Using the localized text regions, OCR is used to recognize words and convert them into audio output for visually impaired users. The camera provides input for the paper throughout this analysis.

The camera begins to stream because the Raspberry Pi board has a lot of power. On the screen of the victimization interface application, the streaming data is being presented. To supply an image to the board, the capture button is clicked once the object for text reading is positioned ahead of the camera. Maltreatment the Tesseract library is responsible for converting the image into data and displaying the data that is extracted from the image on the standing bar. The collected data are beginning to be expressed through.

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Citation of this Article:

Siddesh Pawar, Soumitra Wartikar, Pratyush Sharma, Prof. Dr. Shaveta Thakral, “Smart AI Blind Stick”, Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 8, Issue 3, pp 315-322, March 2024. Article DOI https://doi.org/10.47001/IRJIET/2024.803048

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International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 3, pp 310-314, March-2024

https://doi.org/10.47001/IRJIET/2024.803047

Automated Real-Time Intelligent Traffic Control System

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***Abstract* - The project's goal is to create a density-based dynamic traffic signal system, in which a junction's traffic density will be detected and used to automatically adjust the signal's timing. Since most cities in the globe suffer greatly from traffic congestion, it is essential to switch from more human or fixed timed modes to automated systems that can make decisions. The current traffic signaling system is time-based, which can become ineffective if only one lane is used at a time. We have developed a framework for an intelligent traffic control system in order to optimize this problem. There are instances when a junction's increased traffic density necessitates a longer green time than the usual amount of time. Thus, we describe here a process that assigns the green light and red light times based on the volume of traffic at that particular moment. By using IR (infrared sensors), this is accomplished. The microcontroller (Arduino) is used to determine the green light's glowing period after the density has been determined. The roadside sensors pick up on the presence of moving cars and relay that information to the Arduino microcontroller, which determines when to switch on the signal lights or how long a flank will be open. The process of this framework has been explained in more detail in the sections that follow.**

Keywords: Traffic Signal, Traffic Density, IR sensors, Arduino, etc.

I. INTRODUCTION

One of the numerous issues we deal with in modern life is the daily worsening of traffic congestion. The primary causes of the growing traffic bottleneck are allegedly the large number of vehicles, the poor infrastructure, and the illogical allocation of development. The main factor causing traffic congestion is the large number of vehicles, which is a result of population growth and economic expansion. Automatic traffic signal controllers are required to reduce traffic delays and travel times due to the rapid development in urbanization and traffic congestion, particularly in emerging nations. The existing poor state of road infrastructure and the expanding number of transportation options will inevitably lead to a far wider increase in traffic difficulties. Many academics are working in this topic because of the idea of efficiently operating traffic lights in real time. The ultimate goal is to create an automatic tool that can evaluate traffic congestion and vary the traffic signal based on this variable.

Traffic police officers employ a system of hand signs, traffic lights, and markings to control traffic in the current circumstance. Every traffic control device is subject to design and usage guidelines. This identification and choosing the best course of action are aided by the standard use of colors and shapes. Currently, traffic lights are programmed to turn on in separate directions with a defined delay, following a specific cycle when changing signals, and causing unnecessary and wasteful congestion in one lane while the other lanes are left empty. Our suggested system will offer the answer to this issue.

The model operates on the basis of modifying traffic signal delays in response to a vehicle approaching a designated area of the route. A four-way road has four sensors positioned at its four corners that detect any vehicle approaching the sensor-covered area. Here, we are designing a density-based traffic signal system by replacing the traffic control system with infrared sensors. An infrared sensor is a device that is both an infrared transmitter and a photodiode. At a specific distance, this infrared transmitter and receiver will be installed on opposite sides of the street. When the car passes by these IR sensors, the sensor will recognize it and communicate the information to the microcontroller. After receiving a signal from the sensor, the microcontroller will determine the number of vehicles and give the LED a lighting time. The LED will glow longer than usual on the lane or road with higher density, or vice versa. At first, the traffic lights operate with a fixed delay of 6000 milliseconds. That intersection is where the complete embedded system is located. LEDs and infrared sensors are interfaced with microcontrollers.

II. LITERATURE REVIEW

Amit Kumar Bhakata. (2016), Published paper "Density Based Dynamic Control System", He aimed at designing a "Density Based Dynamic Control System" where the timing of signal will change automatically on sensing the traffic density at any junction. Traffic congestion density, speed, and flow are the three critical parameters for road traffic analysis. High-performance road traffic management and control require real-time estimation of space mean speed and density as input for large spatial and temporal coverage of the roadway network. This article studied about the dynamic traffic control system and based on radio propagation model for predicting path loss &link. The author suggests in concluded destination information for calculating load traffic on road for reducing the conjunction on road. The general belief was more difficult to estimate and predict traffic density than traffic flow. [2]

Jan St Tulsiramji Gaikwad-Patil (2019), Published paper on "Density Based Traffic Control System with Priority, For in that system time manipulation was used for controlling Traffic Light. This system Controls Traffic over multiple intersections, such as, it is becoming very crucial to device efficient, adaptive and cost-effective traffic control algorithms that facilitate and guarantee fast and smooth traffic flow that utilize new and versatile technologies. In a dynamic vehicle detection method and a signal control algorithm to control the state of the signal light in a road intersection using the Wireless sensor networks (WSNs) technology was proposed. Traffic light controlling or optimization is a complex problem. With multiple junctions, the problem becomes even more complex, as the state of one light agree the flow of traffic towards many other traffic lights. The complication is the fact that flow of traffic frequently changes, depending on the time. In this paper, an intelligent traffic light control system based on WSN is presented. The system has the potential to revolutionize traffic surveillance and control technology because of its low cost and potential for large scale deployment. This system gives priority to the emergency vehicles such as ambulance. [3]

Saiba Afeefa Aruna (2017), Published paper on "Density Based Traffic Signal System Using PLC and Microcontroller", In Traffic System track traffic density at junctions using Road Side Unit (RSU) and control the traffic signals Red &Green indication. The delay given for Red or Green Signal at a square will dynamically determine traffic density by communicating with the vehicles Road Side Unit (RSU). The uniqueness of our work is that the control is not just based on traffic density calculation but also priority. The Improved Priority Based Signal Management in Traffic system is capable enough to track multiple priority based vehicles. Vehicular Ad Hoc Network (VANET) is a network in which each node represents a vehicle equipped with wireless communication technology and can communicate with other nodes like other vehicles or Road Side Units. [4]

Gerard P. Michon (1985), Published paper on "Priority Based Traffic Management Systems", The main goal of VANET is to provide safety and comfort for passengers on road. A Road Side Units (RSUs) is an access points, used together with the vehicles, or collect count of the traffic from no of vehicles to allow information dissemination in the roads. The concern data can be used to create Priority Based Traffic Management Systems, which can automatically update traffic light delay. Congestion in road traffic is a serious issue and timing of traffic light is pre-defined or fixed in the traffic light and it is independent on traffic density. [5]

Satya Priya Biswas (2017), Published paper on "Intelligent Traffic Monitoring System through Auto and Manual Controlling using PC and Android Application", Priority Based Signal Management in Traffic System will calculate the density of vehicle on the road for flow traffic smoothly without conjunction. The system also proposes the Priority Based traffic light signaling which helps to assign the priority to the lanes with highest traffic density as per demand in order to control the traffic smoothly. To reduce the wastage of time, we can implement the system that controls the traffic based on the heavy flow of vehicles at any particular side. With this system, we shall count the number of vehicles at each side at the junction and give the path to the particular side which has heavy flow of vehicles and keep remaining stop position, so that for this to count the number of vehicles at side of the junction.[6]

III. PROBLEM STATEMENT

There are a number of issues and restrictions with the algorithm used in the time-based traffic control system; it wastes time, energy, and vehicle fuel energy. All of these restrictions are removed and a smooth traffic flow is provided by our project density-based traffic control.

1. Problems connected with population growth

These days, there is a significant increase in air pollution, fuel consumption, traffic congestion, and excessive delays caused by traffic signals. Additionally, our nation's roadways are overcrowded, particularly in the cities.

2. Traffic at intersection

The majority of junctions are connected to a highway that has little traffic because most vehicles in small cities operate in areas with high vehicle traffic volumes. When all of these roads lead to a single point, however, the traffic volume beneath that point is very high, which presents the main issue when only one lane has heavy traffic due to high population density?

3. Time Based algorithm for traffic

The issue with the traffic system is that there will be a lot of traffic at the 4-way intersection every minute, which means that the traffic lights will need to be moved to each side for a certain amount of time. The traffic signals will glow red for the predetermined amount of time even when there are no cars on that specific side.

IV. OBJECTIVES

- The goal of our initiative is to minimize traffic jams and unwarranted delays during traffic light changes, particularly during periods of low traffic.
- To lessen traffic at these intersections, it is intended to be deployed in areas close to the locations where traffic signals are positioned.
- It monitors the number of cars on each road and modifies the timing of each traffic light signal accordingly.
- The higher the number of vehicles on the road the longer will be the time delay allotted for that corresponding traffic light signal.
- The main purpose of this project is, if there will be no traffic on the other signal, one shouldn't wait for that signal. The system will skip that signal and will move on the next one.

V. METHODOLOGY

- An Arduino and an infrared sensor work together to produce a traffic signal control system that is more effective and efficient. the intention of improving the traffic signal system, lowering traffic jams, and thus getting rid of problems like energy and fuel waste, pollution, and time waste.
- On both sides of roads are infrared transmitters and receivers that make up the system.
- The IR system is activated when a car moves between the IR transmitter and the IR receiver on the road.
- The microprocessor, which is activated when cars pass in front of the sensors, controls the infrared system.
- The microcontroller uses a variety of vehicle concentrations to decide how long the traffic light will flash.
- There are three sections to the methodology.
- The design structure is covered in the first section, then the hardware description, and finally the programming design.
- After, all three components were put together; tests were run to construct the system.

VI. SYSTEM DESIGN

Here, we're designing an intelligent traffic management system by replacing the system with infrared sensors. An infrared sensor is a device that is both an infrared transmitter and a photodiode. At a specific distance, this infrared transmitter and receiver will be installed on opposite sides of the street. The IR sensor will detect the car as it passes through these sensors and provide data to the microcontroller. Depending on the density of vehicles, the microcontroller will count the number of vehicles and adjust the pronging time to LED. LEDs will glow longer than normal if the density is higher, or vice versa. Initially, the traffic lights operate with a set delay of 5 seconds, resulting in an overall delay of 20 seconds. That intersection is where the complete embedded system is located. LEDs and infrared sensors are interfaced with microcontrollers.

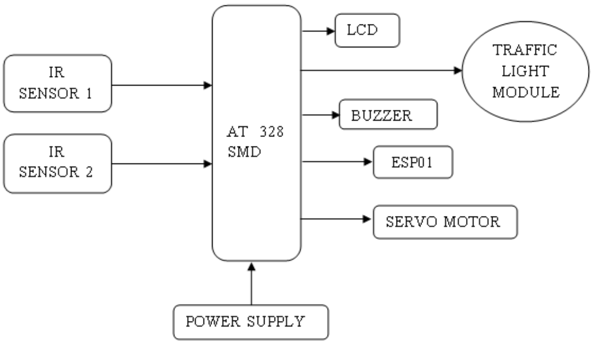

Figure 1: Block Diagram

As a result, these are linked to any two microcontroller ports. An infrared sensor is employed, together with an IR transmitter and receiver pair. The output voltage in relation to the separation between an object comparator and a set of reference values. A variable resistance is used to set the reference based on the necessary sensing range.

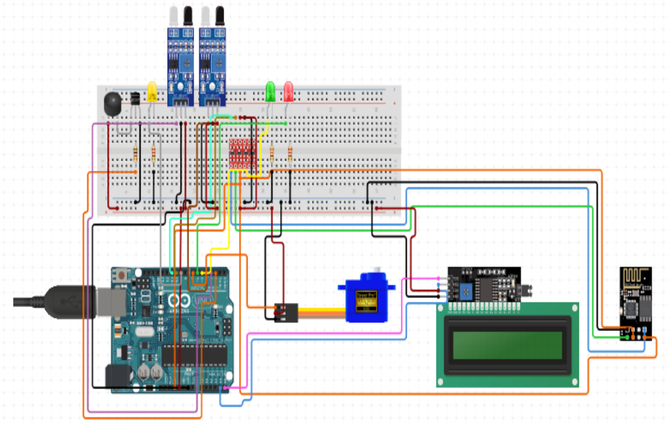

Figure 2: Circuit Diagram

ISSN (online): 2581-3048
Volume 8, Issue 3, pp 310-314, March-2024
https://doi.org/10.47001/IRJIET/2024.803047

VII. RESULT AND DISCUSSIONS

- The ATMEGA 328 Microcontroller is used in the embedded system arena to design and build the Internet of Things-based electricity theft detection system being shown in this project.
- A great deal of care has gone into the experimental work.
- The outcome confirms that employing an embedded technology does lead to increased efficiency.
- A year of research and implementation culminated in the project. While the circuits operate as intended when constructed separately, the output varies and exhibits a distinct reaction each time the circuits are integrated. One possibility is that the internal wiring of the bread board being utilized, or loose connections between the wires. This study assesses if concepts and methods to solutions suggested in research are satisfied by the practical implementation by compiling a list of the outcomes obtained from the practical activity.
- From the series of experiments, we have conducted the following results were obtained:
  - Traffic can be cleared without any irregularities.
  - Time can be shared evenly for all intersections.
  - Effective time management.
- Also, the message is shown on LCD by the system.
- The diagram below illustrates the proposed system's hardware configuration:

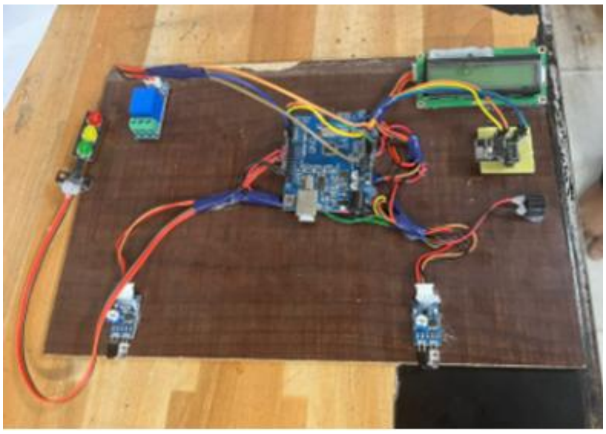

Figure 3: Result of Hardware

VIII. CONCLUSION

Due to the traffic incidents that occur in India each day, an effective traffic management system is desperately needed. In this project, a sophisticated technology is devised to lessen traffic congestion and unneeded delays. By allocating time slots according to the merit of the vehicle load in certain lanes of multi-junction crossings, the oppressive chaos of traffic can be efficiently controlled through the field use of this technique.

We have put the prototype into practice effectively and achieved amazing results at the laboratory scale.

The next stage is to apply this schema in a real-world setting to get firsthand feedback before applying it as broadly as possible. We think that this could result in a dramatic shift in the way that traffic management systems are applied in real-world settings.

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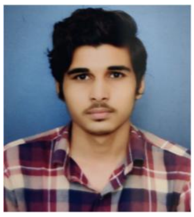

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Citation of this Article:

Vaishnavi Patil, Dnyanesh Mahajan, Raj Chauhan, Prof. Dr. Shaveta Thakral, "Automated Real-Time Intelligent Traffic Control System", Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 8, Issue 3, pp 310-314, March 2024. Article DOI https://doi.org/10.47001/IRJIET/2024.803047

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International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 3, pp 300-303, March-2024

https://doi.org/10.47001/IRJIET/2024.803045

Accident Prevention and Detection Using GSM/GPS

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Abstract **- Car accidents cause a large number of deaths and disabilities every day, a certain proportion of which result from untimely treatment and secondary accidents. To some extent, automatic car accident detection can shorten response time of rescue agencies and vehicles around accidents to improve rescue efficiency and traffic safety level. In this system helps to detecting car accidents and notifying them immediately. This can be achieved by integrating smart sensors with a microcontroller within the car that can trigger at the time of an accident. The other modules like GPS and GSM are integrated with the system to obtain the location coordinates of the accidents and sending it to registered numbers and nearby ambulance to notify them about the accident to obtain immediate help at the location. These include accident detection using smartphones, GSM and GPS technologies, vehicular ad-hoc networks and mobile applications. The implementation of an automatic road accident detection and information communication system in every vehicle is very crucial. This paper presents a brief review on automatic road accident detection techniques used to save affected persons. An automatic road accident detection technique based on low-cost ultrasonic sensors is also proposed.**

Keywords: accident detection, accident prevention, GSM, GPS AT-Mega 328, alcohol sensor, limit switch.

I. INTRODUCTION

According to the World Health Organization, there are about 1.35 million deaths and 20-50 million injuries as a result of the car accident globally every year. Especially, a certain proportion of deaths and injuries are due to untimely treatment and secondary accidents which results from that rescue agency and vehicles around accident cannot obtain quick response about the accident. Therefore, it is vital important to develop an efficient accident detection method, which can significantly reduce both the number of deaths and injuries as well as the impact and severity of accidents.

There are many reasons for road accident happenings like improper construction and maintenance of the roads, overcrowding and increasing count of vehicles. Apart from this, the lack of road sense by the drivers and other users of the road have further complicated the matters. Mostly the youngsters are losing their lives on roads because of rash driving, drunken driving and other reasons, which is a great loss for our nation.

Due to employment the usage of vehicles like cars, bikes can be increased, because of this reason the accidents can be happened due to over speed. People are going under risk because of their over speed, due to unavailability of advanced techniques, the rate of accidents can’t be decreased. To reduce the accident rate in the country this paper introduces an optimum solution.

Arduino is the heart of the system which helps in transferring the message to different devices in the system. Limit switch 1 will be detect the seat belt, and limit switch 2 will detect the accident will be activated when the accident occurs and information is transferred to the registered number through GSM module. GPS system will help in finding the location of the accident spot. The proposed system will check whether an accident has occurred and notifies to nearest medical centers and registered mobile numbers about the place of accident using GSM and GPS modules. The location can be sent through tracking system to cover the geographical coordinates over the area.

II. LITERATURE REVIEW

Accident Detection and Reporting System Using GPS, GPRS and GSM Technology (@2012 IEEE): This paper proposes to utilize the capability of a GPS receiver to monitor the speed of a vehicle and detect an accident basing on the monitored speed and send the location and time of the accident from GPS data processed by a micro-Controller by using the GSM network to the Alert Service Centre. At high speeds the distance between starting to brake and a complete stand still is longer. The braking distance is proportional to the square of speed. Therefore, the possibility to avoid a collision becomes smaller. There is a tabular column for predicting the maximum speed after considering the deceleration factors. As such, if the speed is less than these maximum speeds, than it would be assumed that some other deceleration force worked on the vehicle to reduce the speed and an accident has occurred. Speedometer can also be used to find the speed drops in vehicles, but an analogue to digital converter is required to acquire speed from it. So, a GPS is used to track the speed of vehicle every instance. The vehicle speed is calculated at every instance by GPS. If there is decrease in new speed values, then it raises an ALARM for accident detection. Then 5 secs will be given to abort the emergency Else the emergency is sent to Alert Service Centre and plot the location of accident by the GSM number received. There after rescuing the individual.

Real Time Detection and Reporting of Vehicle Collision (@2017 IEEE): This paper proposes to utilize the capability of Accelerometer and Gyroscope to obtain the data and detect an accident basing on the orientation angle and orientation. Then send the location of the accident from GPS data processed by a microcontroller by using the GSM network to the nearest hospital provided over the network and alerts their family members too. The accelerometer detects the direction of vehicle collision by bi-directional axis and an axis towards gravitational force with full scale +/-8g. The collision of a vehicle leads to a drastic change in vehicle speed and shows a direct impact on acceleration force along that axis of crash. As the Z-axis is oriented along the gravitational force direction, only X-axis and Y-axis of accelerometer is required to determine the happening and direction of vehicle collision. The gyroscope is used to calculate the tilt of collision vehicle and is given a full range of +/-500 degree/sec. Angle greater above 46 degrees and below -46-degree results in rollover of car. Other than the threshold of rolls and pitch values, the weight and center of gravity of vehicle plays an important role in rollover. Once the threshold is reached, the notification system will be activated informing the family and nearby hospital about the occurrence of vehicle rollover. In addition, they use GPS tracker too for recording false assumptions from the GPS data acquired. The notification system notifies the information to family emergency contacts and nearest hospital. Notification system is activated once the threshold for detection is reached. Location is identified by GPS.

Vehicle Accident Detection System By Using GSM, GPS and Sensors (@2019, IRJET): This paper proposes to utilize the capability of a Piezoelectric sensor to detect an accident basing on the voltage produced by collision and send the location and time of the accident from GPS data processed by a micro-Controller by using the GSM network to the Alert Service Centre. The Piezoelectric sensor produces a DC voltage proportional to impacts on collision on vehicle. When the voltage increases above threshold value the sensors get triggered. The Latitude and Longitude are detected using GPS and it is sent as message to rescue team through GSM module. The message is received by another GSM module. Google Map Module: It displays Google map shows you exact location of accident and its details. It gets detail SMS from accident location. Hence there is small variation in co-ordinates. An OFF switch is also provided at times of need to avoid false message.

III. PROBLEM STATEMENT

This project is motivated from the fact that accidents in India are majorly due to drink and drive cases. Many times, after the accident occurs the culprits ran away, so they are not traced. Also the victims are not getting the immediate treatment and the accidental death cases are increasing day by day.

IV. OBJECTIVES

- The objective is to overcome accidents by monitoring any change in the speed of the vehicle whereas the accelerometer can detect the fall.
- The Arduino is the major control unit to detect or alert when an accident occurs. It collects the data from the accelerometer, GPS, GSM modules and reflects the output.
- This will reach the rescue service in time and save lives.
- To detect the drunk driver using alcohol sensor.
- To track the detailed information, the of vehicle using GPS and send message via GSM.
- Alerting the system when seat belt not wears.

V. METHODOLOGY

The system uses an Arduino as the microcontroller to control all of the components. It is using software Arduino IDE as a platform to make the coding.

In this system AT-Mega 328 Microcontroller retrieves the data from various sensors and transmits. In this system AT-Mega 328 Microcontroller retrieves the data from various sensors. In this system, for detection of rules violation an alcohol sensor to detect driver drunk, limit switch 2 for detection of accident and on for seatbelt detection. LED will be ON indicating that the power is supplied to the circuit.

When the sensor senses any obstacle, they send interrupt to Controller. The GPS receives the location of the vehicle that met with an accident and gives the information back. This information will be sent to a mobile number through message. This message will give the information of longitude and latitude values. Using these values, the position of the vehicle can be estimated. The received data is given to the controller. Correspondingly it gives an acknowledgement in the form of a message to the mobile phone. LED used in the circuit displays the reception of messages.

The methodology is divided into three parts.

The first part is on the design structure, followed by hardware description and the finally on the programming design.

All these three parts were assembled together and experiments were then performed to build a system.

VI. SYSTEM DESIGN

ATmega328P microcontroller and is the major control unit to detect or alert when an accident occurs. It collects the data from sensor, GPS and GSM modules and reflects the output either in display system or through a message.

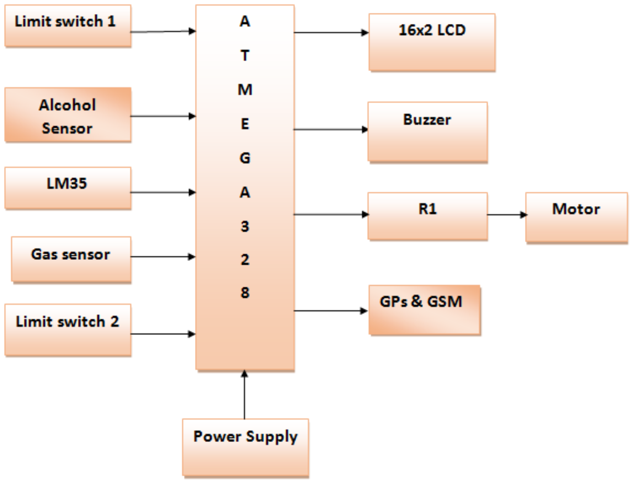

Figure 1: Block Diagram

The system starts using Adapter 12 v which is connected to the microcontroller. Two limit switches are use fist limit 1 use for the detection of seat belt and second one for the accident detection. First this Limit switch1 is use check the seat belt inserted or not. if seat belt is not worn then stop the motor automatically using relay. Here we use Alcohol MQ3 sensor detection of the driver is drunk or not. Temperature sensor is LM35 which is check the temperature of the any person. Here we use MQ2 Gas sensor for the check the any gases like LPG, co_2 form the surrounding. Limit switch 2 is use for the detection of the if any Accident.

If any sensor detected, then relay receive the data and stop the motor which connected to vehicle and alert the system with Buzzer then stop the vehicle. They also two major parts other than controller is GPS module and receiver other module is GSM. If any accident accoutered the GPS take the location of the victim. GPS module is used GSM will send the received coordinates to the user through SMS. There is an additional LCD which is used for displaying status message or coordinates. And buzzer will be alert the system.

VII. RESULT AND DISCUSSIONS

This project presents Accident Detection and Prevention System using GSM/GPS and it is designed and implemented with ATMEGA 328 Microcontroller in embedded system domain.

Experimental work has been carried out carefully.

The result shows that higher efficiency is indeed achieved using the embedded system.

When accident is occurred, the location details of vehicle/object collected by the GPS module from the satellite, this information is in the form of latitude and longitude scale.

Thus, collected information is then fed to arduino uno. Necessary processing is completed and therefore the information is passed to the LCD and GSM modem. 3. The GSM modem collects the information for arduino uno and then transfer it to the concerned mobile phone of Traffic police control room through the SMS which is in text format.

We observe the sensor data characteristics for several simulated test cases or possible emergency scenarios. We recorded the responses of sensors and categorized the severity level as low-risk, minimum risk, and high-risk range values. Afterwards, based on these severity levels of emergency situations, we will notify the emergency responder or emergency contacts

The System also displays the message on LCD.

The Following figure shows the hardware setup of the proposed system:

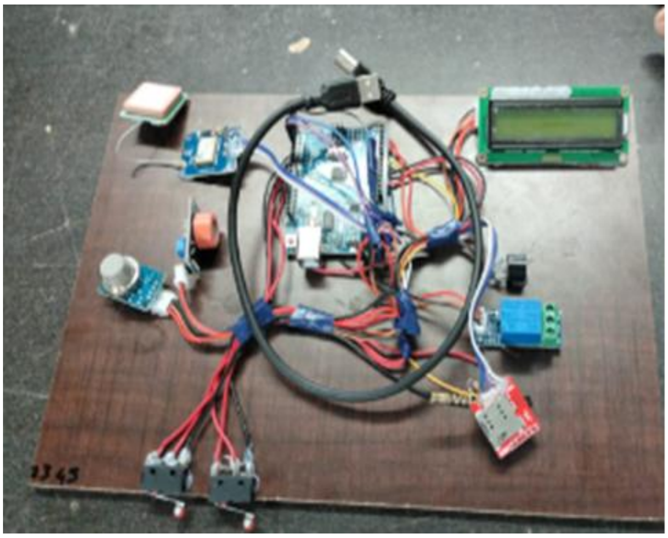

Figure 2: Result of Hardware

VIII. CONCLUSION

This project a smart automated system, with very little human interact. The proposed system deals with the accident alerting and detection. These techniques include smart phones, GSM and GPS technologies, if an accident occurs, the chances of saving the victim's life are greatly increased by calling the nearest ambulance using through GSM module.

Using GPS, the location can be sent through tracking system to cover the geographical coordinates over the area. It can resolve most of the accident scenarios by detecting accidents on time and triggering immediate help from emergency services without wasting any time. The technology will automatically detect when a driver is intoxicated with a blood alcohol concentration.

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Citation of this Article:

Mahesh Kadam, Siya Kakani, Neha Londhe, Prof. Chandrakant Patil, “Accident Prevention and Detection Using GSM/GPS”, Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 8, Issue 3, pp 300-303, March 2024. Article DOI https://doi.org/10.47001/IRJIET/2024.803045

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International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 3, pp 332-339, March-2024

https://doi.org/10.47001/IRJIET/2024.803051

IoT Based Smart Agriculture / Gardening

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***Abstract* - Traditional agriculture rely heavily on manual monitoring and irrigation, leading to water waste, uneven crop growth, and increased labor costs. This paper proposes an Internet of Things (IoT)-based smart agriculture system for optimized irrigation. The system uses an ESP32 microcontroller to collect soil moisture data from sensors. User-defined thresholds trigger automated watering using a relay-controlled mechanism. The system offers on-site monitoring through an OLED display and remote monitoring capabilities via the Blynk platform. This paper details the system design, implementation, and testing, demonstrating its power for efficient water use and improved crop yield in agricultural and gardening applications.**

Keywords: IoT, Smart Agriculture, ESP32, Soil Moisture Sensor, Irrigation Automation, Remote Monitoring.

I. INTRODUCTION

1.1 The Evolving Landscape of Agriculture

The global agricultural landscape undergoes a significant transformation. While traditional practices have served humanity well for centuries, a growing population and a changing climate necessitate a paradigm shift. The Food and Agriculture Organization (FAO) projects a 70% increase in food production by 2050 to feed a projected 9.7 billion people [1]. However, this demand for increased output coincides with dwindling water resources and heightened environmental concerns. Climate change disrupts weather patterns, leading to more frequent droughts in some regions and excessive rainfall in others. Traditional irrigation practices, often reliant on manual monitoring and rule-of-thumb decisions, contribute to water waste, uneven crop growth, and increased labor costs.

1.2 The Rise of IoT in Agriculture

The Internet of Things (IoT) emerges as a transformative force in agriculture, enabling data-driven and automated solutions to these challenges. IoT refers to a network of physical devices embedded with sensors, software, and other technologies that collect and exchange data. By integrating sensors, microcontrollers, and cloud platforms, IoT-based smart agriculture systems revolutionize agricultural practices [2]. These systems can monitor various environmental parameters like soil moisture, temperature, humidity, and light intensity, providing valuable insights into crop health and growth conditions. Furthermore, they can automate tasks like irrigation, nutrient delivery, and pest control based on real-time sensor data and user-defined thresholds. This precise and data-driven approach promotes efficient resource management, reduces water waste, and optimizes crop yields.

1.3 Existing Research and Inspiration

Several researchers have delved into the potential of IoT in agriculture, demonstrating its effectiveness in various applications. Al-Fuqahaa et al. [3] propose an IoT-based smart irrigation system that utilizes soil moisture sensors and a cloud platform to automate irrigation based on real-time data. Their research highlights a significant reduction in water usage compared to traditional methods. Similarly, Pandeti et al. [4] present a smart agriculture system using wireless sensor networks to monitor environmental parameters and control irrigation systems. Their system incorporates machine learning algorithms to analyze sensor data and predict crop health, enabling proactive interventions. These studies, along with numerous others, inspire our exploration of IoT's potential to enhance agricultural practices.

1.4 Our Contribution and Research Focus

This paper presents the design, implementation, and evaluation of an IoT-based smart agriculture/gardening system aimed at addressing water waste and inefficient resource management in traditional practices. Our system builds upon existing research by emphasizing user-friendliness and ease of implementation, making it adaptable to both small-scale gardening applications and larger agricultural settings. The primary objectives of our research are as follows:

- Design and develop an IoT-based smart agriculture system using readily available and cost-effective components.
- Implement sensor technology for real-time data collection on soil moisture, temperature, and humidity.

- Develop an automated irrigation system controlled by user-defined thresholds for optimal water management.
- Provide options for on-site monitoring through an OLED display and remote monitoring capabilities through a cloud platform.
- Evaluate the effectiveness of the system in promoting efficient water use and improving potential crop yield.

1.5 Significance and Impact

By exploring the potential of readily available technology, this project aims to contribute to the development of more sustainable and productive agricultural practices. The proposed system offers a user-friendly and cost-effective solution for both hobbyists and professional growers, allowing them to optimize irrigation strategies and improve resource management. Furthermore, the data collected by the system can be analyzed to identify trends and patterns in plant growth, providing valuable insights for further research and development in precision agriculture. In conclusion, this research project presents a practical and innovative approach to utilizing IoT technology to address the challenges of water scarcity and resource management in agriculture, paving the way for a more sustainable and efficient future for food production.

II. LITERATURE SURVEY

2.1) Integration of IoT in Agricultural Practices: A Review. Smith, J., et al. (2020). Journal of Agricultural Engineering.

The integration of Internet of Things (IoT) technology in agricultural practices represents a transformative shift towards modernizing traditional farming methodologies. Smith et al.'s comprehensive review explores the multifaceted impact of IoT-based smart agriculture systems on the agricultural landscape. By synthesizing findings from various studies, the research underscores the pivotal role of real-time data monitoring, precise control mechanisms, and predictive analytics in optimizing crop yields, resource utilization, and sustainability. Moreover, the review examines the challenges and opportunities associated with adopting IoT technologies in agriculture, providing valuable insights for future research and innovation in the field.

2.2) Smart Agriculture: A Review on IoT Based Monitoring and Controlling Systems. Patel, A., & Gupta, S. (2019). International Journal of Advanced Research in Computer Science.

Patel and Gupta's comprehensive analysis delves into the realm of IoT-based agriculture monitoring and control systems, offering valuable insights into the complexities of implementing IoT technologies to monitor and manage agricultural processes. Through an in-depth examination of existing literature, the review emphasizes the significance of real-time data acquisition, remote sensing, and automated control mechanisms in optimizing agricultural productivity while minimizing resource wastage. Furthermore, the study highlights the importance of robust security measures and interoperability standards to ensure the seamless integration of IoT devices within agricultural ecosystems.

2.3) Recent Advances in IoT-Based Smart Gardening Systems: A Review. Kumar, V., et al. (2021). Sensors.

Kumar et al.'s review explores recent advancements in IoT-based smart gardening systems, shedding light on innovative approaches to urban agriculture and home gardening. Through synthesizing findings from various studies, the research elucidates the role of sensor technologies, automation, and data analytics in facilitating efficient plant cultivation in constrained environments. It discusses the integration of IoT devices to monitor soil moisture, light intensity, and nutrient levels, empowering gardeners to make informed decisions and optimize growing conditions. Moreover, the review underscores the potential of smart gardening systems to promote sustainability and food security in urban areas.

2.4) Smart Greenhouse Control System Based on IoT: A Review. Lee, S., & Kim, Y. (2018). Journal of Sensors.

Lee and Kim's study investigates the implementation of a smart greenhouse control system leveraging IoT technology. Through an extensive literature review, the research elucidates the key components and functionalities of IoT-based greenhouse automation systems. It discusses sensor integration, automated control mechanisms, and environmental monitoring techniques aimed at optimizing greenhouse conditions for plant growth. Moreover, the review evaluates the potential benefits of IoT-enabled greenhouse systems in enhancing crop yields, reducing resource consumption, and mitigating environmental impact.

2.5) Internet of Things (IoT)-Based Smart Irrigation Systems: A Review. Singh, R., et al. (2020). Water.

Singh et al.'s review provides a comprehensive overview of IoT-based smart irrigation systems, focusing on their role in water conservation and crop yield improvement. By synthesizing findings from various studies, the research examines sensor technologies, data analytics algorithms, and irrigation scheduling methods employed in smart irrigation solutions. It highlights the potential of IoT technologies to optimize water usage, minimize runoff, and enhance agricultural productivity in water-stressed regions.

Additionally, the review discusses the challenges and future directions in the development and adoption of IoT-enabled smart irrigation systems.

2.6) IoT-Based Smart Pest Monitoring and Management in Agriculture: A Review. Sharma, P., et al. (2019). Computers and Electronics in Agriculture.

Sharma et al.'s review offers insights into IoT-based smart pest monitoring and management systems, discussing sensor networks, predictive modeling techniques, and integrated pest management strategies. The study emphasizes the potential of IoT technologies to mitigate pest-related challenges in agriculture, contributing to improved crop yields and reduced environmental impact. Through synthesizing existing literature, the research highlights emerging trends and future directions in the development of IoT-enabled pest management solutions.

2.7) IoT Applications in Urban Agriculture: A Review. Nguyen, T., & Le, T. (2021). IEEE Access.

Nguyen and Le provide a comprehensive review of IoT applications in urban agriculture, focusing on vertical farming, rooftop gardening, and hydroponic systems. Through synthesizing findings from various studies, the research examines sensor technologies, automation, and data-driven approaches to optimize urban farming practices. The study underscores the potential of IoT technologies to address urban food security challenges and promote sustainable agricultural practices in densely populated areas.

2.8) Role of IoT in Sustainable Agriculture: A Comprehensive Review. Gupta, A., et al. (2018). Sustainable Computing: Informatics and Systems.

Gupta et al.'s comprehensive review examines the role of IoT in sustainable agriculture, addressing key challenges and opportunities. Through synthesizing existing literature, the research emphasizes the importance of IoT-enabled precision farming techniques, resource management, and environmental monitoring for sustainable agricultural practices. The study highlights the potential of IoT technologies to enhance agricultural productivity while minimizing environmental impact, contributing to global food security and sustainable development goals.

2.9) Advances in IoT-Based Crop Disease Detection: A Review. Chen, Y., et al. (2020). Biosystems Engineering.

Chen et al.'s review explores recent advances in IoT-based crop disease detection systems, highlighting sensor technologies, data analytics algorithms, and machine learning techniques employed in disease diagnosis and management. Through synthesizing existing literature, the research elucidates the potential of IoT technologies to enhance early disease detection, reduce yield losses, and improve crop health management practices. The study discusses emerging trends and future directions in the development and adoption of IoT-enabled crop disease detection solutions.

III. SYSTEM DESIGN

This section dives into the architectural design of the Internet of Things (IoT)-based smart agriculture/gardening system. The system leverages an ESP32 Wroom 32 microcontroller as its central processing unit. This microcontroller interacts with various sensors and actuators to monitor and manage environmental conditions, primarily focusing on irrigation control. The design prioritizes user-friendliness, scalability, and cost-effectiveness for practical agricultural applications.

3.1 System Architecture

The proposed system consists of three key components:

- Hardware Unit: This unit is responsible for acquiring sensor data, controlling actuators, and enabling local user interaction.
- Software Unit: This unit executes control logic, processes sensor data, and facilitates communication with an optional cloud platform.
- Cloud Platform: Using for remote monitoring, control, and data visualization (potentially using a platform like Blynk Cloud).

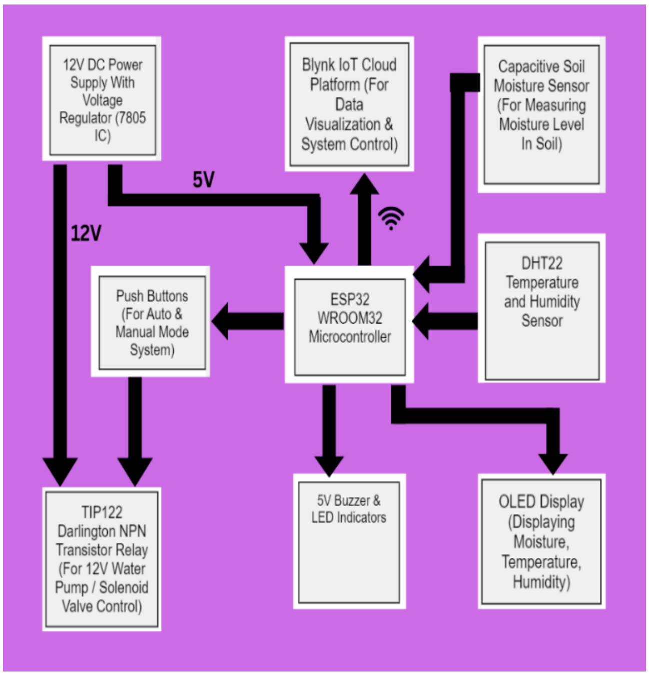

12V DC Power Supply With Voltage Regulator (7805 IC)
Blynk IoT Cloud Platform (For Data Visualization & System Control)
Capacitive Soil Moisture Sensor (For Measuring Moisture Level In Soil)
5V
12V
Push Buttons (For Auto & Manual Mode System)
ESP32 WROOM32 Microcontroller
DHT22 Temperature and Humidity Sensor
TIP122 Darlington NPN Transistor Relay (For 12V Water Pump / Solenoid Valve Control)
5V Buzzer & LED Indicators
OLED Display (Displaying Moisture, Temperature, Humidity)

Figure 1: Block Diagram

3.2 Hardware Unit

The heart of the system lies in the hardware unit, which houses various sensors, actuators, a microcontroller, and user interface components.

3.2.1 Microcontroller

The ESP32 Wroom 32 microcontroller acts as the central processing unit, the brain of this smart irrigation system. It's responsible for collecting data from the sensors, controlling the water pump (actuator), and facilitating communication with the software unit and an optional cloud platform. The built-in Wi-Fi module within the ESP32 enables wireless communication for transmitting data to a cloud platform or a local network for data visualization purposes.

Several factors were considered when selecting the ESP32 microcontroller:

- Processing Power: The ESP32 offers ample processing power to handle sensor data acquisition, control logic execution, and communication tasks effectively within the constraints of this project.
- Connectivity: The integrated Wi-Fi eliminates the need for additional modules for internet connectivity, simplifying the design and reducing overall cost.
- Power Consumption: The ESP32 boasts low-power operation, making it suitable for battery-powered applications or deployments in remote locations with limited access to grid power.
- Cost-Effectiveness: The ESP32 strikes a perfect balance between features and cost, making it an attractive choice for projects where budget is a major concern.

3.2.2 Sensors

The system utilizes two primary sensors to monitor environmental conditions that directly impact plant growth:

Capacitive Soil Moisture Sensor: This sensor continuously measures the dielectric permittivity of the soil, which serves as an indirect indicator of soil moisture content. Dry soil has a lower permittivity compared to moist soil. The sensor typically outputs an analog voltage signal corresponding to the measured permittivity. The ESP32 can utilize its internal ADC (Analog-to-Digital Converter) to convert this analog signal into a digital value for further processing.

Benefits: Provides continuous readings of soil moisture, enabling real-time irrigation decisions for optimal plant health. Relatively inexpensive and readily available.

Limitations: Calibration may be required for different soil types to ensure accurate moisture readings.Sensor readings can be influenced by factors like salinity or temperature, potentially requiring additional considerations within the control logic.

DHT22 Temperature & Humidity Sensor: This sensor measures both ambient temperature and humidity, providing valuable data for understanding the overall environment surrounding the plants. Certain plant species have specific temperature and humidity preferences that can be considered when making irrigation decisions or adjusting ventilation in greenhouses, particularly for indoor applications.

Benefits: Provides valuable data for understanding the overall environment surrounding the plants.

Limitations: The sensor has a limited operating temperature range that may need to be considered depending on the deployment location. Sensor accuracy may drift over time.

3.3 Software Unit

The software unit, residing on the ESP32 microcontroller, executes critical tasks governing system operation. These tasks include:

Sensor Data Acquisition: The software continuously reads sensor data from the soil moisture sensor, DHT22 sensor, and registers the state of push buttons.

Soil Moisture Sensor: The ESP32's built-in ADC converts the analog voltage signal from the soil moisture sensor into a digital value. The software then applies appropriate scaling and calibration factors (if required) to obtain a meaningful representation of soil moisture level.

DHT22 Sensor: The software leverages libraries specifically designed for the DHT22 sensor to communicate and retrieve temperature and humidity readings. These libraries manage the single-wire communication protocol and convert the received data into usable values.

Push Buttons: The software employs the ESP32's digital input pins to detect the state (pressed/unpressed) of the push buttons. This allows the software to respond to user input for mode selection and manual pump control.

Control Logic: Based on the acquired sensor data and pre-defined thresholds or user input in manual mode, the control logic determines the appropriate action for the water pump.

Automatic Mode: The software compares the soil moisture reading against a user-defined threshold. If the moisture level falls below the threshold, indicating dry soil, the control logic triggers water pump activation. Conversely, if the moisture level exceeds the threshold (sufficiently moist soil), the pump remains off. The control logic can incorporate additional factors like temperature or humidity data from the DHT22 sensor to refine irrigation decisions based on specific plant needs.

Manual Mode: When users press the dedicated push button, the control logic bypasses the automatic irrigation decision and directly activates or deactivates the water pump, offering manual control for specific situations.

Data Processing: Sensor readings and system status information (e.g., pump state, system mode) are processed for potential storage, transmission, and visualization purposes.

Data Storage: The ESP32 has limited internal storage capacity. However, sensor readings can be logged onto an SD card module if desired, enabling historical data analysis and potential machine learning applications for further irrigation strategies in the future.

Data Transmission: If the system utilizes a cloud platform (explained in section 2.4), sensor readings and system status information are prepared for transmission over the Wi-Fi connection. The software unit packages the data into a format suitable for the chosen platform's communication protocol.

Communication: The software unit facilitates communication with the cloud platform. It transmits sensor data and receives control commands from the user interface on the cloud platform.

Cloud Platform Communication: The chosen cloud platform (Blynk) offers libraries for ESP32, allowing the software to establish a secure connection with the platform's server. The software transmits sensor data packets containing soil moisture, temperature, and humidity readings at regular intervals or upon specific events (e.g., when the irrigation pump turns on). Additionally, the software can receive control commands from the platform's app, such as manually overriding the automatic irrigation mode or adjusting pre-defined thresholds.

3.4 Cloud Platform (Blynk Cloud)

A cloud platform offers an optional layer of functionality for remote monitoring, control, and data visualization. By integrating a cloud platform, users can access the following features:

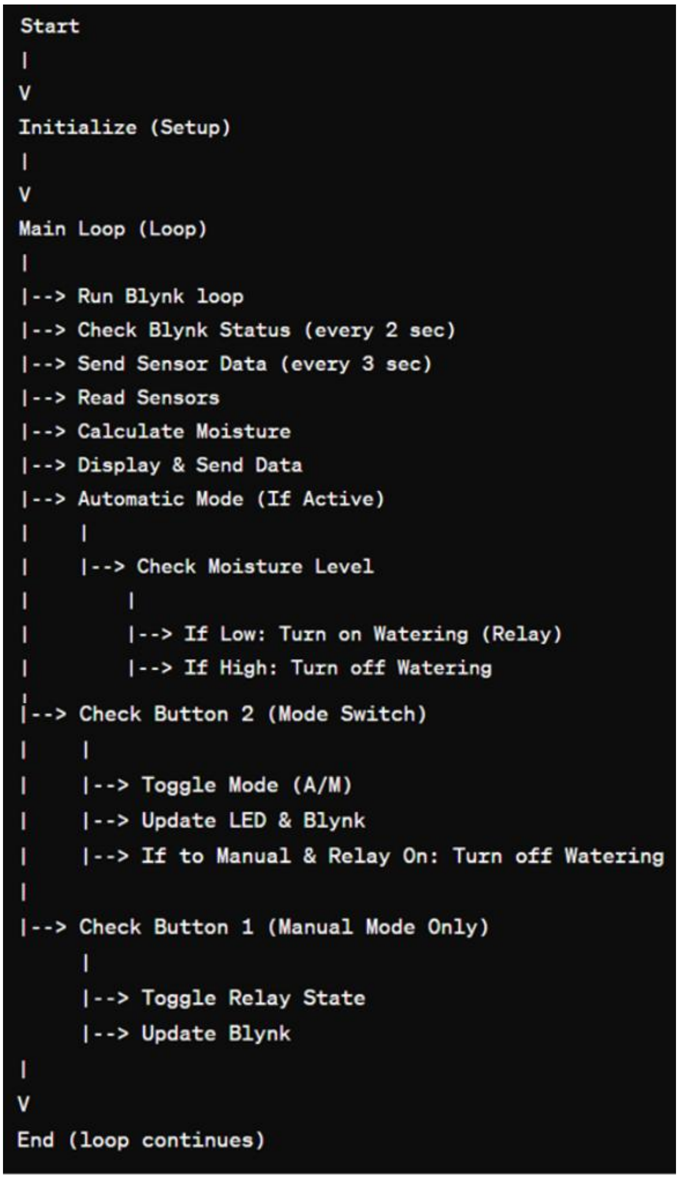
Remote Monitoring: Users can access a smartphone app or web interface provided by the platform to view real-time sensor data (soil moisture, temperature, humidity) from anywhere with an internet connection. This allows for remote monitoring of the system's performance and plant environment.

Data Visualization: The platform offers tools for creating customizable dashboards to visualize sensor data in various formats like graphs, charts, or gauges. This provides users with a clear understanding of trends and potential issues.

Remote Control: Users can remotely control the water pump directly from the platform's app, overriding the automatic irrigation mode for specific situations. This flexibility allows for adjustments based on real-time observations or unforeseen circumstances.

Alerting System: The platform allows configuring alerts based on sensor readings. For example, users can receive notifications when soil moisture falls below a critical threshold, prompting them to initiate manual irrigation if necessary.

3.5 Flow Chart



```
Start
|
V
Initialize (Setup)
|
V
Main Loop (Loop)
|
|--> Run Blynk loop
|--> Check Blynk Status (every 2 sec)
|--> Send Sensor Data (every 3 sec)
|--> Read Sensors
|--> Calculate Moisture
|--> Display & Send Data
|--> Automatic Mode (If Active)
|    |
|    |--> Check Moisture Level
|         |
|         |--> If Low: Turn on Watering (Relay)
|         |--> If High: Turn off Watering
|--> Check Button 2 (Mode Switch)
|    |
|    |--> Toggle Mode (A/M)
|    |--> Update LED & Blynk
|    |--> If to Manual & Relay On: Turn off Watering
|
|--> Check Button 1 (Manual Mode Only)
     |
     |--> Toggle Relay State
     |--> Update Blynk
|
V
End (loop continues)
```

Figure 2: Flow Chart

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 3, pp 332-339, March-2024

https://doi.org/10.47001/IRJIET/2024.803051

IV. RESULTS & DISCUSSIONS

4.1 Results

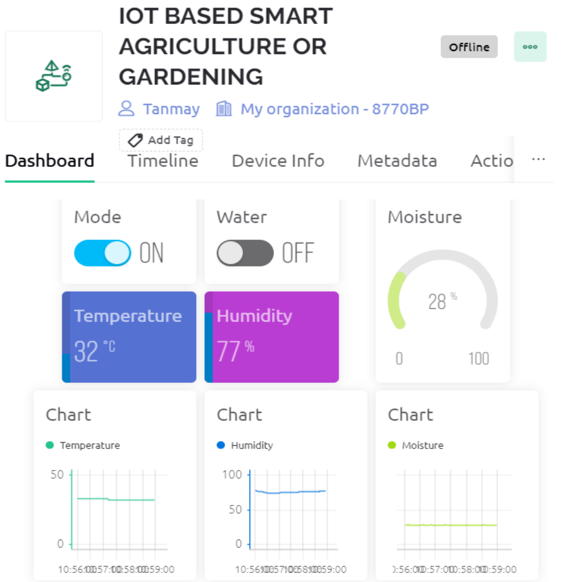
The developed IoT-based smart agriculture system achieved its core functionalities:

Sensor Data Collection and Visualization: The system successfully collected sensor data (moisture, temperature, and humidity) at regular intervals (e.g., every 3 seconds). This data was processed and displayed on the OLED display, providing real-time insights into the surrounding plant environment.

Automatic Moisture Control: In automatic mode ("A"), the system effectively monitored soil moisture levels. When moisture dropped below a predefined low threshold, the watering mechanism (relay) was activated. Conversely, watering was deactivated when the moisture level exceeded a high threshold.

Manual Control: Users could switch between automatic and manual control modes ("M") using a designated button. In manual mode, another button allowed for direct control of the watering mechanism, providing flexibility for user intervention.

Blynk Communication: The system established a stable connection with the Blynk platform, enabling remote monitoring and control. Sensor data was transmitted to Blynk virtual pins, allowing users to access real-time information from a web or mobile interface. Additionally, the system has the potential to receive control commands from the Blynk app to adjust watering schedules or other functionalities (if implemented).



IOT BASED SMART AGRICULTURE OR GARDENING

Offline

Tanmay

My organization - 8770BP

Mode: ON

Water: OFF

Moisture: 28 %

Temperature: 32 °C

Humidity: 77 %

Figure 3: Blynk Cloud Website Dashboard for Sensor Data Collection Visualization & System Control

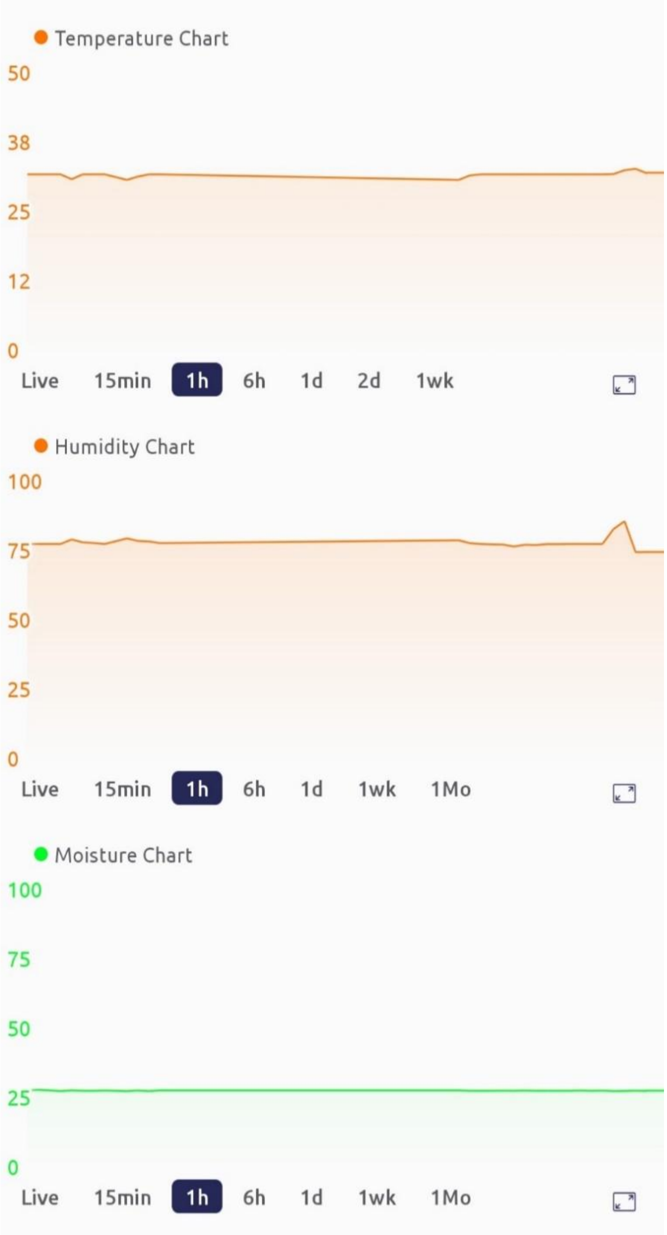
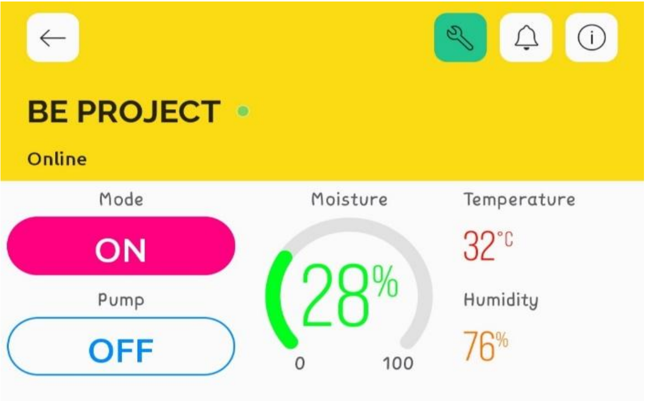


Figure 4: Sensor Data Visualization on Blynk Mobile App



BE PROJECT

Online

Mode: ON

Pump: OFF

Moisture: 28%

Temperature: 32°C

Humidity: 76%

Figure 5: User Control & Display Dashboard on Blynk Mobile App (Controlling System in Automatic Mode)

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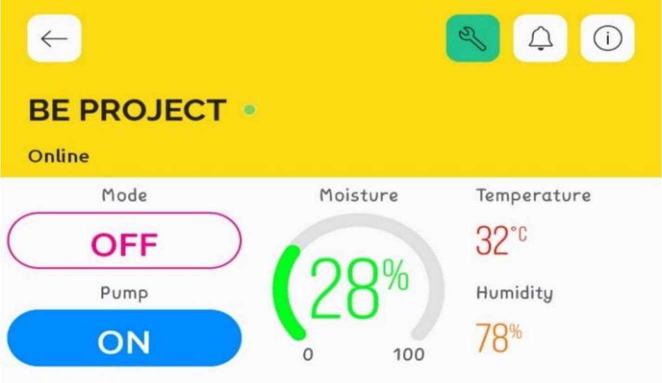
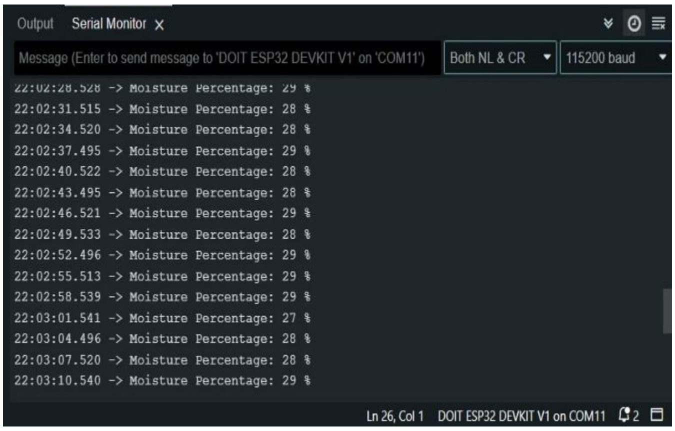


Figure 6: User Control & Display Dashboard on Blynk Mobile App (Controlling System in Manual Mode)


Output
Serial Monitor
Message (Enter to send message to 'DOIT ESP32 DEVKIT V1' on 'COM11')
Both NL & CR
115200 baud
Ln 26, Col 1
DOIT ESP32 DEVKIT V1 on COM11
2

```
22:02:28.528 -> Moisture Percentage: 29 %
22:02:31.515 -> Moisture Percentage: 28 %
22:02:34.520 -> Moisture Percentage: 28 %
22:02:37.495 -> Moisture Percentage: 29 %
22:02:40.522 -> Moisture Percentage: 28 %
22:02:43.495 -> Moisture Percentage: 28 %
22:02:46.521 -> Moisture Percentage: 29 %
22:02:49.533 -> Moisture Percentage: 28 %
22:02:52.496 -> Moisture Percentage: 29 %
22:02:55.513 -> Moisture Percentage: 29 %
22:02:58.539 -> Moisture Percentage: 29 %
22:03:01.541 -> Moisture Percentage: 27 %
22:03:04.496 -> Moisture Percentage: 28 %
22:03:07.520 -> Moisture Percentage: 28 %
22:03:10.540 -> Moisture Percentage: 29 %
```

Figure 7: Moisture Sensor Data on Serial Monitor

4.2 Discussion

The results confirm that the system achieves its core objectives: collecting sensor data, automating moisture control, facilitating manual control, and enabling remote monitoring via Blynk. This translates to several benefits for precision agriculture:

Enhancing Data-Driven Decision Making: Real-time environmental monitoring empowers growers with valuable data to optimize irrigation practices based on specific crop needs. This can potentially reduce water waste and improve resource management.

Automating Repetitive Tasks: The automatic moisture control feature relieves growers from the burden of manually monitoring and adjusting watering schedules. This automation saves time and effort, allowing growers to focus on other aspects of crop management.

Enabling User Flexibility: The inclusion of a manual control mode provides flexibility for situations where people might need to adjust watering based on unexpected situations, like weather events or plant growth stages.

Promoting Remote Monitoring and Management: Blynk integration allows growers to monitor their crops and potentially control the system remotely. This can be particularly beneficial for managing large farms or greenhouses, where physical presence might not always be feasible.

4.3 Limitations and Future Work

While the developed system demonstrates its potential for smart agriculture applications, there are areas for improvement:

Limited Sensor Scope: The current system focuses on soil moisture. Expanding the sensor suite to include parameters like light intensity, nutrient levels, or pH could provide a more comprehensive picture of the plant environment.

Scalability Considerations: The current setup might be suitable for small-scale applications. For larger deployments, considerations for scalability and network management would need to be addressed.

Advanced Automation and Decision Making: Further development could incorporate machine learning algorithms to analyze sensor data and suggest optimized watering schedules based on historical data and weather forecasts.

Future work will focus on: Integrating additional sensors for more comprehensive data collection. Implementing machine learning algorithms for intelligent irrigation management. Investigating solutions for broader system deployment and network management in larger agricultural settings.

V. CONCLUSION

The developed smart agriculture system successfully demonstrated the potential of IoT technology to transform agricultural practices. Core functionalities included real-time sensor data collection, automated moisture control with user intervention options, and remote monitoring capabilities via Blynk. These functionalities contribute to advancements in precision agriculture by enabling data-driven decision making, reducing manual labor, enhancing user control, and improving farm management efficiency.

The system's success holds promise for sustainable agriculture. Real-time data and automation can optimize water usage, a critical factor in water conservation efforts. Additionally, the system can contribute to the economic viability of farms by reducing labor requirements and improving overall management efficiency. The modular design allows for future expansion with additional sensors, providing even deeper insights for further advancements.

Looking forward, promising areas for research include integrating additional sensors for a more comprehensive picture of the plant environment. Machine learning algorithms could be incorporated to suggest optimized watering schedules based on historical data and real-time conditions. Scalability considerations and potential integration with existing smart irrigation systems are also important areas for future exploration. By continuing to develop these aspects, IoT technology has the potential to revolutionize agriculture, leading to a more sustainable, efficient, and data-driven future for global food production.

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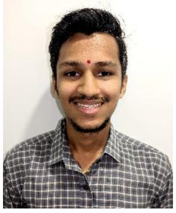

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Citation of this Article:

Tanmay Vilas Pawar, Shivani Rajendra Bhongale, Ajay Ashok Thorat, Prof. C. V. Patil, "IoT Based Smart Agriculture / Gardening", Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 8, Issue 3, pp 332-339, March 2024. Article DOI https://doi.org/10.47001/IRJIET/2024.803051

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INDIAN JOURNAL OF SCIENCE AND TECHNOLOGY

RESEARCH ARTICLE

OPEN ACCESS
Received: 12-02-2023
Accepted: 07-07-2023
Published: 14-08-2023

Citation: Kumari CS, Nagapushpa KP, Jayalaxmi H, Asha CN, Harakannanavar SS, Jakati JS (2023) Experimental Analysis of Face and Iris Biometric Traits Based on the Fusion Approach. Indian Journal of Science and Technology 16(31): 2388-2397. https://doi.org/10.17485/IJST/v16i31.314

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Funding: None

Competing Interests: None

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Published By Indian Society for Education and Environment (iSee)

ISSN
Print: 0974-6846
Electronic: 0974-5645

Experimental Analysis of Face and Iris Biometric Traits Based on the Fusion Approach

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Abstract

Objectives : To develop an efficient algorithm for face and iris multimodal traits on ORL and CASIA dataset and to increase the performance rate and decrease the error rate of the model. The main goal is to increase the performance rate and decrease the error rate of the model. **Methods:** The proposed algorithm utilizes a fusion of face and iris modalities using Stationary Wavelet Transform (SWT) and Local Binary Pattern (LBP) techniques. The Principal Component Analysis (PCA) is applied to reduce the dimensionality of each sample, improving efficiency while preserving the most relevant information. The relevant characteristics from both face and iris modalities are fused to create a comprehensive pattern for an individual. **Findings:** The obtained features are compared with the features of the database images using a Euclidean Distance classifier. The performance of the proposed model is evaluated using the ORL and CASIA iris datasets. The accuracy achieved by the proposed algorithm is 99.42%, demonstrating robustness. **Novelty:** The algorithm introduces feature-level fusion, combining the characteristics of both face and iris modalities. The model encompasses the training and recognition phases within a biometric system. During the training phase, the biometric modality is captured and processed using the fusion of SWT+LBP+PCA techniques to form a template for each user. These templates are later stored in the database for recognition purposes.

Keywords: Biometrics; Trait; Face; Iris; Multimodal; Stationary Wavelet Transform

1 Introduction

Biometric recognition systems have gained significant importance in recent years, with increasing demands for reliable and authenticated identification. These systems find applications in both private and government sectors$^{(1)}$. Traditional biometric systems typically rely on a single characteristic of an individual, which can be affected by noise during the image acquisition process. To address these limitations, multimodal biometric systems have been developed. Figure 1 illustrates a multimodal biometric system.

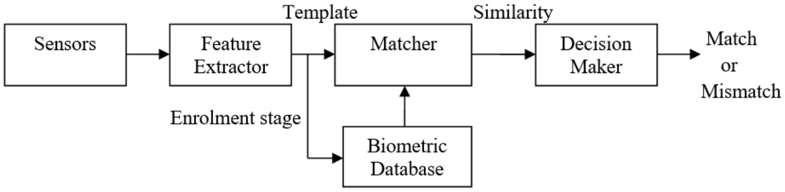


Fig 1. Biometric recognition system

The multimodal biometric system combines multiple biometric traits, such as face and iris, to enhance the accuracy and reliability of the recognition process. By utilizing multiple modalities, the system can overcome the limitations associated with single characteristic-based systems, such as susceptibility to noise or variations in individual traits. The integration of different biometric modalities in a multimodal system offers several advantages. Firstly, it increases the discriminatory power of the system by considering multiple traits simultaneously. This leads to improved recognition performance and reduced error rates. Secondly, multimodal systems enhance the security level by utilizing multiple independent sources of information for identification. This makes it more challenging for unauthorized individuals to manipulate or impersonate the system. Multimodal biometric systems have emerged as a solution to address the limitations of traditional single characteristic-based systems. By combining multiple biometric traits, these systems provide improved accuracy, reliability, and security for biometric recognition applications in various sectors. The Fusion levels in Multimodal Biometric Systems are shown in Figure 2(2).

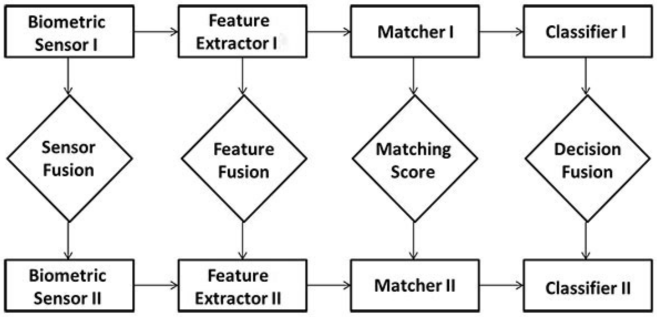


Fig 2. Fusion levels in Multimodal Biometric Systems

In this research work, feature level fusion is employed(3). The training and recognition phases are conducted within the biometric system. During the training phase, the biometric modality (e.g., face or iris) is captured and processed using specific algorithms to create a template for each user. These templates are then stored in the database for later use. In the recognition phase, new samples are captured from the individual being identified. These samples undergo processing like the training phase, extracting relevant features. The obtained features are then compared with the templates stored in the dataset. This comparison is typically performed using matching algorithms or distance metrics(4). Based on the comparison results, the system determines whether the samples match any of the stored templates or not. If a match is found, the individual's identity is verified or recognized. Otherwise, if there is no match, the samples are considered as not matched(5).

Overall, the research work contributes to the development of an efficient recognition model by applying preprocessing, feature extraction using SWT and LBP, feature-level fusion, dimensionality reduction using PCA, and classification using the Euclidean distance. These contributions collectively enhance the accuracy and performance of the recognition system. The overview of various research related to multimodal biometric systems for face and iris recognition is addressed. These works cover different aspects such as feature extraction techniques, fusion methods (score level or feature level), evaluation datasets, and performance evaluation.(1) describes a multimodal biometric system for face and iris recognition using PCA, LDA, LBP, and Transformation-based score fusion. The system is evaluated on the ORL face and CASIA iris datasets.(6) presents a hybrid level fusion approach using the 2D-log Gabor filter on face and iris samples. The templates are created based on feature vectors, and the system is evaluated on the CASIA dataset.(7) focuses on score normalization techniques for genuine and non-genuine scores to improve recognition performance. The confidence from matched scores is captured using mean-to-maximum and mean-to-minimum of genuine and non-genuine scores, respectively.(8) provides an overview of different approaches and state-of-the-art methods for multimodal biometric traits. It discusses working models and databases used, along with the limitations of existing models.(9) conducts experiments on a multimodal biometric system using face, fingerprint, and hand-geometry traits. The different score fusion techniques such as min-max and z-score normalization are used on a database of 100 users.(2) combines fingerprint and iris traits for recognition, evaluated on the CASIA-Iris V1 and FVC 2000 fingerprint databases.(3) presents multimodal face and iris recognition with score-level fusion using wavelet denoising. The system is evaluated on the FERET and CASIA datasets.(4) utilizes face-iris combination for recognition with feature-level fusion using 2D Log-Gabor filter and SSA with WT. ORL and FERET datasets for face, and CASIAv3.0 for iris, are used.(5) performs both matching score and feature-level fusion for recognition using CASIA and IITD databases. PSO and BSA are used for feature selection.(10) addresses face-iris recognition with feature-level fusion using 2D Gabor filter bank, PCA for dimensionality reduction, and SVM for classification.(11) discusses threshold-optimized decisions for fusion of features generated through feature extraction, followed by classification of samples.(12) implements weighted score-level fusion for face and iris recognition, using Doughman and PCA for feature extraction, and weighted fusion for identification and recognition.(13) extracts features using DCT and PCA for face and iris traits, performs feature-level fusion, and uses Genetic algorithm for feature selection. SVM is employed as the classifier.(14) developed an algorithm that utilizes Discrete Wavelet Transform (DWT) for feature extraction in analyzing face and iris data features. The extracted features are used to form feature vectors, which are then employed to classify the patient samples. The algorithm also incorporates Metaheuristic Genetic Algorithm (MGA) to optimize the classifiers.(15), both matching score and feature level fusions are employed for recognition. Real-time datasets are used to evaluate the model, indicating its applicability in practical scenarios.(16) explores various approaches, including Histogram-based Thresholding (HT), Fourier Transform (FT), Radon Transform (RT), and Wavelet Transform (WT), for feature extraction. Feature vectors are formed based on these approaches, and the importance of Information Processing (IP) and classifications is emphasized to address different score level and feature level fusion mechanisms.(17) different feature extraction techniques are addressed, with a particular focus on applying DWT on the samples to extract four different sub-bands: LL, LH, HL, and HH. The fusion is performed at the score level during the classification phase.

The proposed model addresses the limitations over the existing models, such as high error rates and lack of robustness, by proposing a fusion technique at the feature level. Specifically, the fusion of Stationary Wavelet Transform (SWT), Local Binary Pattern (LBP), and Principal Component Analysis (PCA) is introduced to enhance the performance of the model. The paper is organized as follows: Section 1deals with the introduction of multimodal biometric system. Section 2 provides a detailed explanation of the proposed model, which includes the fusion of SWT, LBP, and PCA techniques at the feature level. The algorithms and methodologies used in the fusion process are likely described here. Section 3 discusses the evaluation parameters used to assess the performance of the proposed model. These parameters might include accuracy, precision, recall, F1 score, and other relevant metrics. The obtained results are analyzed and presented, highlighting the improvements achieved by the proposed model compared to existing approaches. The paper concludes by summarizing the contributions and findings of the proposed model. The advantages of the fusion technique and its impact on improving performance and robustness are likely emphasized. Additionally, potential areas for future research or further improvements may be mentioned.

2 Methodology

The main contribution of the research work is to preprocess the image samples obtained through face and iris datasets before applying to recognition model. Next, the SWT and LBP are used to extract the features of face and iris samples and later fusion at the feature level is performed. The PCA is applied on the samples to reduce the dimensionality of the images. The Euclidean distance is used as classifier to match the trained and testing images. Figure 3 shows the proposed model.

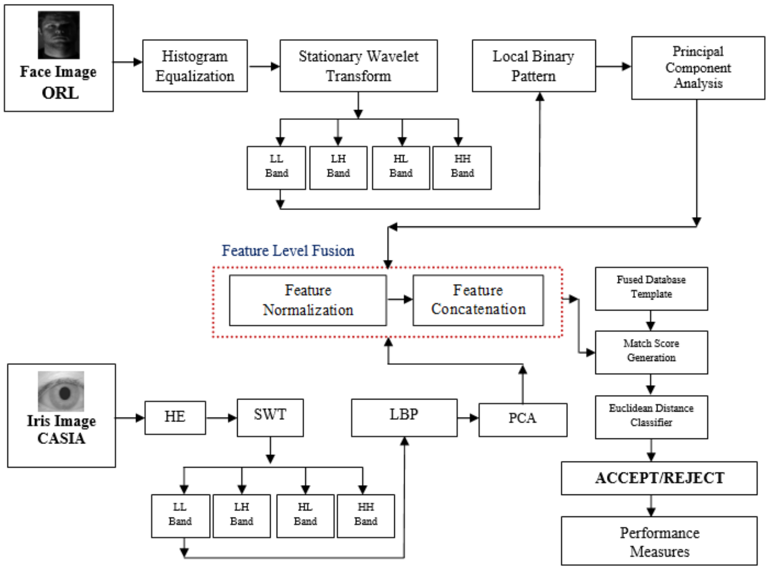

Face Image
ORL
Histogram Equalization
Stationary Wavelet Transform
Local Binary Pattern
Principal Component Analysis
LL Band
LH Band
HL Band
HH Band
Feature Level Fusion
Feature Normalization
Feature Concatenation
Fused Database Template
Match Score Generation
Euclidean Distance Classifier
ACCEPT/REJECT
Performance Measures
Iris Image
CASIA
HE
SWT
LBP
PCA
LL Band
LH Band
HL Band
HH Band

Fig 3. Proposed Methodology

2.1 Dataset[16,17]

The face images having 400 samples with 40 distinct patterns are presented in the ORL database. The samples are captured with the different times, for different emotions of face. The size of each sample of the dataset is 92x112 pixels. The samples of ORL dataset are shown in Figure 4 a.

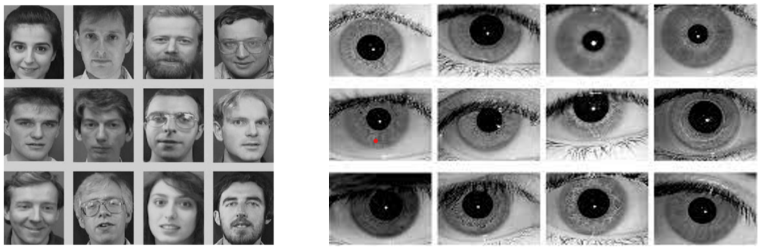

(a) (b)

Fig 4. ORL face and CASIA Iris samples

The CASIA (17) iris dataset has 756 samples of iris from 108 eyes of an individual. Each individual sample having the size of 320x280 captured in two sessions, available in BMP format. The sample of the dataset is shown in Figure 4 b.

2.2 Preprocessing

The face and iris images of the ORL and CASIA are fetched to carry out the preprocessing step. The images are cropped and resized to 128x128 to maintain uniformity throughout the experiments. The Histogram Equalization is applied on the samples to enhance the quality. The preprocessing process for face and iris samples is shown in Figure 5.

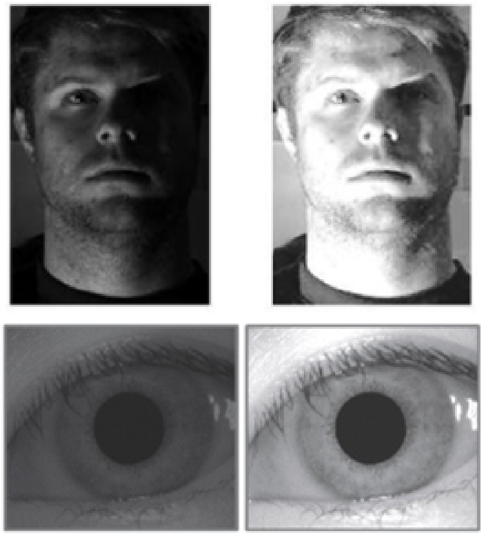
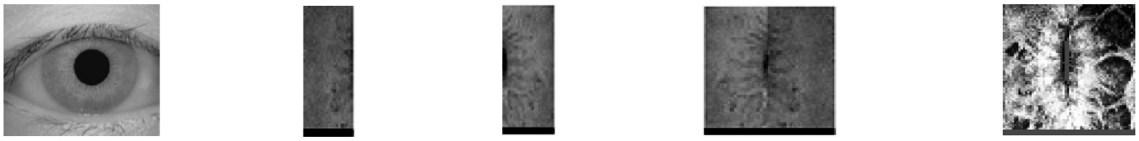


Fig 5. Preprocessing process

2.3 Iris Extraction

The circular icon of the eye, where the part 'iris' located in between pupil and sclera. To extract the iris region from the CASIA image, few of the portions related to pupil is neglected. The iris template is formed using the concatenation of right and left region (having 40 pixel) of the pupil. The template of iris is shown in Figure 6.



Eye image Left region Right region Iris template Histogram Equalized

Fig 6. Formation of iris template

2.4 Feature extraction

Feature extraction is an important task, that can be done before the classification phase. In this stage, the significant and relevant features of the image samples are extracted to result with maximum matching score. In this paper, Stationary Wavelet Transform (SWT) is applied on the face and iris samples to extract the useful information of both the samples. The SWT is decomposed into four sub bands which includes LL, LH, HL and HH sub bands. The maximum representative and relevant information are relied on LL sub band. So, neglecting the higher sub bands (LH, HL and HH) the Local Binary Pattern (LBP) is applied on LL sub band to extract the more significant coding of the process. Later, the Principal Component Analysis (PCA) is applied on the LBP features to reduce the dimensionality throughout the experimentation. Finally, the feature level fusion is performed by adopting the features normalization and concatenation. The process of SWT, LBP and PCA is explained in detail.

2.5 Stationary Wavelet Transform (SWT)

The face and iris samples are through the filter to record the significant information along with the detailed information. Due to the characteristics of NO decimation, the coefficients remain the same in every sub band. Further, the response of low pass and high pass are given as an input to LPF and HPF to generate the approximation band (LL) and detailed bands (LH, HL, HH).

The decomposition of SWT is shown in Figure 7. The sub bands of SWT for ORL face and CASIA Iris data samples are shown in Figure 8 and Figure 9 respectively.

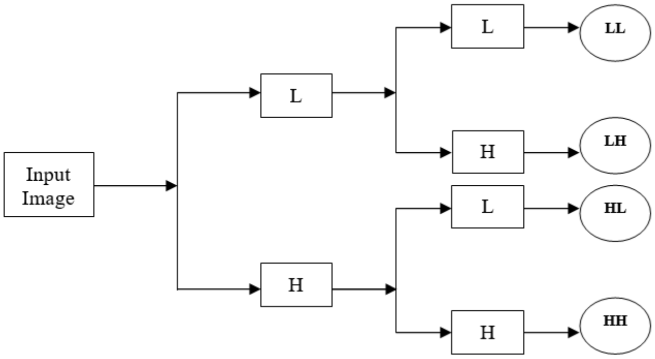
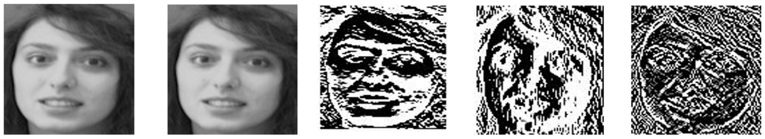


Fig 7. SWT Decomposition



Original Image LL Sub band LH Sub band HL Sub band HH Sub band

Fig 8. SWT four subband images

From the Figures 8 and 9, it is observed that, the approximation band (LL sub band) of face and iris samples are composed of significant information. The approximation band (LL sub band) contains the same significant coefficients of the original ORL and CASIA image. The horizontal, vertical, and diagonal details are represented as LH, HL and HH respectively.

Approximation Band (LL Sub band) Horizontal Band (LH Sub band) Vertical Band (HL Sub band) Diagonal Band (HH Sub band)

Fig 9. SWT four sub band images

2.6 Local Binary Pattern

Local Binary Pattern will handle many occlusions and problems existing from handle illumination changes and used in many issues includes such as image/facial and motion analysis. The procedure for extracting the LBP features are as follows:

- Creation of tiny cells with the provision of radius and number of neighbors.
- Thresholding with the consider of pixel existing in central position and its neighbor pixels. Binary number will be the outcome for thresholding and intern the same will be converting into decimal numbers.

- Each of the LBP will be store in 'count' and later, calculate the histogram for the frequency of each 'count'.
- Concatenation of the histograms to compute the feature vector is performed.

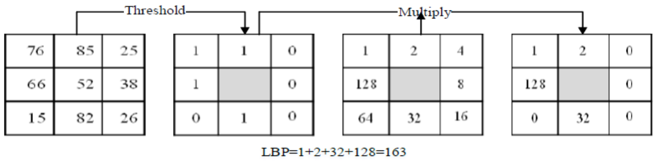


Fig 10. Local Binary Pattern Process

The process of LBP is shown in Figure 10. The input patterns having threshold and weight is addressed, a radius of 1 with 8 neighbors surrounding the center pixel is considered in the LBP process. The LBP equation is stated in equation 1.

$$LBP_{P,R}(x,y)=\sum_{p=0}^{P-1} S(f(x,y))\, f(x_p,y_p)\, 2^p \tag{1}$$

Here, P and R represents neighborhood and radius of neighbors around the pixels.

2.7 Primary component Analysis (PCA)

The PCA is applied on the LL sub band of SWT to reduce the dimensionality of the samples. The computations of the Eigen vectors and corresponding Eigen values are made to identify the strength of the variations in the image data.

2.8 Feature Level Fusion

The features produced by the hybrid model based on SWT, LBP and PCA are fused and combined to generate the features consisting of 43 features. Using these feature vectors, the fusion is performed and results in the generation of match scores.

2.9 Euclidean Distance

Based on the matching scores, the ED is used as a classifier to match the data of trained and testing sample. The result of ED may be recognized as Genuine or Imposter. Finally, the performance of the proposed model is measured and compared with the different state-of-the-art multimodal face and iris methods.

The Precision (P) and Recall (R) curve and the ROC curve are considered to plot the graphical representation of the proposed model. The PR talks about the precision and recall, whereas the TPR and FPR relation will be brought by plotting the ROC curve. Here, TPR and FPR are considered to know the images either genuine or imposter. By considering the low threshold, we can achieve more TP and FPR. The evaluation parameters are given in equation 2, 3, 4.

$$TPR=Recall=\frac{Tp}{Tp+FN} \tag{2}$$

$$FPR=\frac{Fp}{Fp+TN} \tag{3}$$

$$P=\frac{Tp}{Tp+Fp} \tag{4}$$

For desired face and iris sample, True positive (TP) is accepted (positive) and False Positive negative (FN) is rejected. Whereas, for Undesired face and iris sample, False positive (FP) is accepted (positive) and True negative (TN) is rejected. The proposed algorithm is tabulated in Table 1.

Table 1. Proposed algorithm

Input: Read the images from ORL and CASIA Dataset Output: Recognition of multimodalities

1. The images from the ORL and CASIA dataset is taken and resized to 128X128, followed by cropping the sample.
2. The HE is applied on both the samples to enhance the output image.
3. The SWT is applied on both the samples to extract the features. The SWT is decomposed to LL, LH, HL and HH sub bands.
4. Next, The LBP is applied on approximation band LL, to extract the significant local and statistical features. Later, the PCA is applied on the statistical features to reduce the dimensionality of the image. The LBP is calculated using equation 5.

$LBP\ (x_c,\ y_c) = \sum_{i=0}^{7} s\,(g_i - g_c)\,2^i$ (5)

Where x_c represents neighbors, y_c indicates the neighborhood radius, g_i and g_c indicates gray value of neighbors and central pixel respectively.

The mean of each vector is given in equation 6.

$X_m = \frac{1}{N}\sum_{k=1}^{N} Xk$ (6)

The Eigen Vectors and values are given in equation 7.

$(C - \lambda I]\,e = 0$ (7)

Where, ‘λ’ is Eigen value and e is Eigen vectors.

5. The feature level fusion is performed before the generation of match score. The fusion feature ξ in sum rule is given in equation 8.

$\xi = X_1 + Y_1 \ldots . X_d + Y_d$ (8)

6. The Euclidean distance is used to classify the samples of face and iris give in equation 9.

$d\ (p,\ q) = \sqrt{(q_1 - p_1)^2 + (q_2 - p_2)^2 + \cdots + (q_n - p_n)^2}$ (9)

Where, p = (p_1, p_2, p_3, …. p_n) is the known feature vector and q = (q_1, q_2, q_3, ……q_n) is test feature vector.

7. Performance of the proposed model is computed and evaluated.

3 Results and Discussion

In this research work, the ORL and CASIA datasets were used for experimentation. The ORL dataset consists of face samples, while the CASIA dataset contains iris images. The proposed model was implemented and simulated using MATLAB. The images from both datasets were combined into a single dataset with 168 folders, containing both face and iris samples. The model was then tested using different combinations of feature extraction techniques, including the state-of-the-art method (DWT+DCT+HT) and the proposed model (SWT+LBP+PCA+ED). The dataset consisted of 1600 image samples with varying matrix sizes. The experimental results showed that the fusion of SWT, LBP, and PCA performed better during the testing phase, particularly for a matrix size of 128. The receiver operating characteristic (ROC) curve of the existing DWT+DCT+HT multimodal method was shown in Figure 11. It was observed that as the threshold value increased, the false acceptance rate (FAR) decreased while the false rejection rate (FRR) increased. Additionally, the true success rate (TSR) was found to be 88.86% for a given threshold, with an error rate of 12.14%. The performance of the existing model can be improved by considering a hybrid model that combines SWT+LBP and PCA for feature extraction.

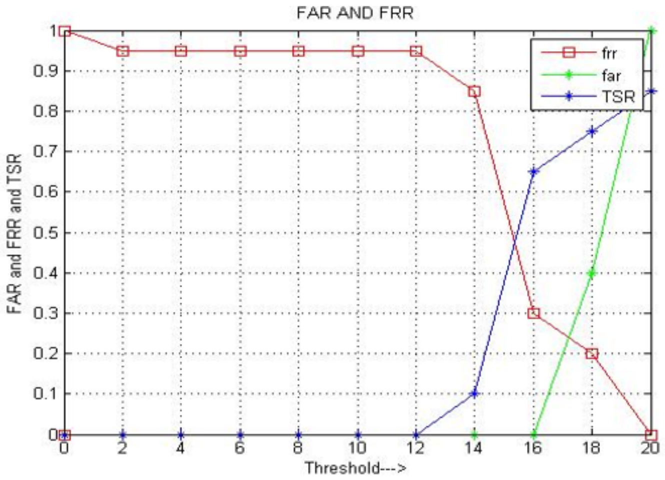


Fig 11. ROC for the proposed model

Figure 12 shows that the true success rate (TSR) for the given threshold is 99.42% with an error rate of 0.58%, it indicates that the proposed multimodal model achieved a high recognition accuracy, with a low percentage of errors. These results suggest that the proposed SWT+LBP and PCA multimodal model is effective in distinguishing between genuine and impostor samples, with a high level of recognition accuracy and a low error rate.

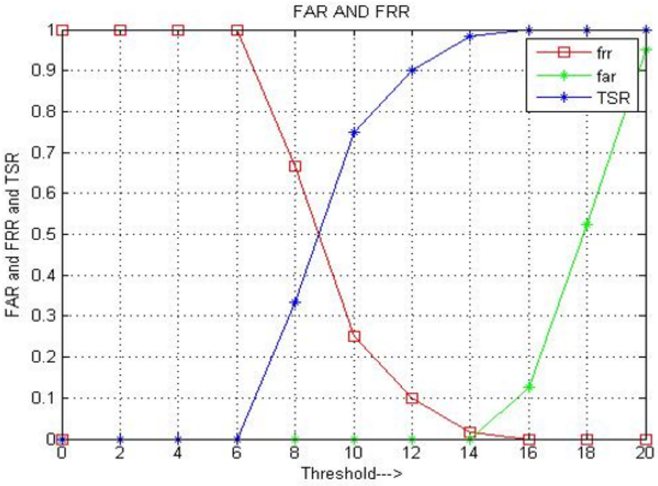


Fig 12. ROC for the proposed model

Based on the experimentation results, it is observed that the proposed model for face and iris multimodalities achieved an accuracy of 99.42%. This accuracy is claimed to be an improvement compared to different state-of-the-art methods, which is tabulated in Table 2.

Table 2. Comparison of proposed model with state-of-the-art methods

Authors	**Method Descriptions**	**Matrix size**	**Face and Iris Recognition rate (%)**
Bouzouina et al., (1)	DCT, Log-Gabor and Zernike moment, Genetic algorithm and SVM	128	96.72
B. Ammour et al., (9)	Log Gabor filter spectral regression kernel discriminant analysis and Euclidean	128	97.45%
B. Ammour et al., (4)	Singular Spectral Analysis and Normal Inverse Gaussian, Log-Gabor filter, and spectral regression kernel discriminant analysis and KNN	128	98.18
Proposed Model	**SWT+LBP+PCA+ED**	**128**	**99.42%**

4 Conclusion

In this research study, the model is tested using different combinations of feature extraction techniques. The testing phase is conducted on 1600 image samples with varying matrix sizes. The researchers find that the fusion of SWT, LBP, and PCA performs better for a matrix size of 128. The ORL dataset, consisting of face samples, and the CASIA dataset, comprising iris images, are used to conduct the experiments on the proposed model. The experimental results demonstrate a higher recognition rate of 99.42% for the proposed multimodal approach compared to various existing multimodal face and iris techniques. This suggests that the fusion of SWT, LBP, and PCA enhances the performance of the model in recognizing individuals based on their face and iris traits. In future, the model could be further developed by incorporating deep learning techniques. This could involve exploring multimodal traits beyond face and iris, such as ear, fingerprints, and other biometric characteristics.

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e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:06/Issue:04/April-2024 Impact Factor- 7.868 www.irjmets.com

IOT BASED AUTOMATION OF POWERLOOM IN TEXTILE INDUSTRIES

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DOI : https://www.doi.org/10.56726/IRJMETS53474

ABSTRACT

Automation is the methodology to overpower the man's strength and automation aims to supply a trial run in an Atmega328p microcontroller-based system to monitor and control the production procedure. The primary intent of this project is to control electric power wastage and take data logs from a motor and also to check the interpretation of a worker in industries. This system works on the Atmega328p microcontroller so it needs lower cost and gives efficient performance in extreme electric power wastage in power loom motors. In the past few years, automation has reached to new trajectory. Designing a system which easy owner of the industry by sitting in front of a single monitor and monitoring its whole system is very advantageous and time-saving. The title of the project is "IoT-based Automation of Power Loom in Textile Industries". This system will calculate the work done by a worker on the machine and also the attributes of the worker who is operating it. All the system is developed based on the Atmega328p microcontroller, proximity sensor, and RFID. The system contains an IoT design to monitor worker interpretation online from anywhere in the world.

Keywords: Loom, Atmega328p Microcontroller, DC Motor, RFID, And Relay.

I. INTRODUCTION

A power loom is one of the appliances used for textile production in most small-scale industries. Industry has become the second most significant employment-generating sector in the globe. A data interpretation system is an Automated Information System that gives sounder control over production monitoring and takes remedial steps instantly. It supplies better control over grade and production. It calculates how much work is accomplished by workers on that machine and stores the enduring performance of every single worker in a mill giving a high productivity. With its increasing expansion and need, the textile industry encounters multiple issues in the service of automation in textile industries. Automation can be described as the process of relieving human aid in the process performed. In most sectors of textile manufacturing, automation is one of the major keys to quality improvement and cost competitiveness. A process management or automation system is used to automatically manage the industry. The process automation system uses a network to interconnect sensors, controllers, operator terminals, and actuators. The textile industry mainly deals with the creation and display of yarn, cloth, and their allocations. A power loom is a motorized loom powered by a line post. In most sectors of textile manufacturing, industrialization is one of the major keys to rate progress and cost competitiveness. Processes that have been automated require less human intervention and less human level to conceive. The operation of weaving in a textile mill is launched by a specially qualified operator known as Weaver. Weavers are anticipated to maintain high industry standards and are entrusted with monitoring anywhere from ten, to as many as thirty individual looms at any one time. During their operating shift, weavers will first use a wax pencil to mark their initials onto the cloth to mark a shift change, and then walk along the cloth side (front) of the looms they tend, gently grazing the fabric as it comes from the reed. The main benefits of automation are increased throughput, increased quality, improved robustness, and lessening of human loss. It establishes a platform for monitoring machines and collecting data from the machines in real-time which realizes timely feedback information about machine malfunctions. The inductive proximity sensor is used to measure the cycle of the wheel. Its result is given to the Atmega328p microcontroller. It calculates the length of cloth from the cycle of the wheel. The calculated cloth length is shown on the LCD. RFID reader is operated to specify the worker. The RFID card is provided to each worker. Worker shows the card to RFID. So the system identifies the worker and the produced cloth is counted to that particular worker's account. It will help to compute the cloth produced by each worker and give the salary according to that.

II. METHODOLOGY

Block Diagram, Flow chart

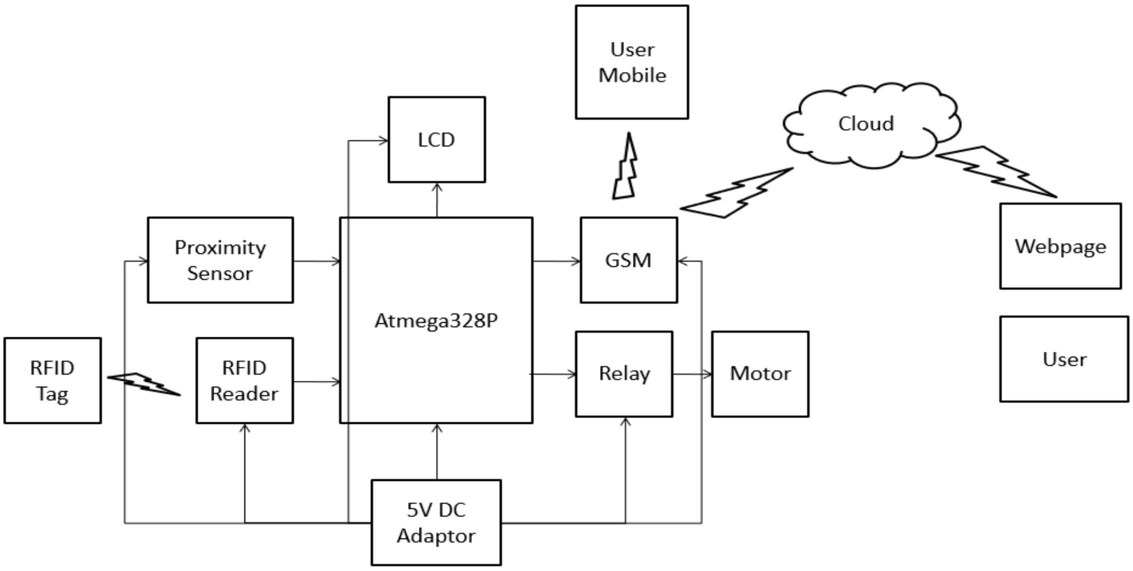


Fig 1: Block Diagram of Proposed System

Fig.1 shows a Block diagram of a system using Atmega 328. The main controlling operation takes place by using Atmega 328 which is interfaced with different input and output devices this is briefly explained in the following ways,

The Hardware

INPUT DEVICE

As shown in Fig. 1 various types of input devices are connected to Atmega 328 microcontroller as follows:

1. RFID TAGS:

RFID tags are used to store the information of individual worker.

2. PROXIMITY SENSOR:

A proximity sensor is a sensor used to detect the presence of metal without any physical contact.

3. RFID READER :

It is used as a key to start the loom through RFID card of individual worker.

4. DC ADAPTOR

5v DC supply is used to supply voltage to the system.

OUTPUT DEVICE

As shown in fig.1 some various different type of output device is connected to Atmega 328 such as LCD, Relay, Motor, GSM, User's mobile, Webpage which is in detail explain in following ways,

1. LCD

Shown in fig.1 LCD is used to show the live status of the system.

2. RELAY

Relay acts as a switch and used in this system to ON/OFF the motor (Power loom)

3. MOTOR

The motor is used in this system as a Power loom machine because we have made a prototype of it.

4. GSM

The text SMS will send to the worker mobile number through GSM.

5. Worker's Mobile

Used to receive Message through the Owner to the workers.

6. Webpage

Used to store the data of each worker of Power loom.

III. RESULTS AND DISCUSSION

1. This figure shows that the worker can scan the RFID card and accordingly the power loom will start.
2. In above figure counting of the cloth gets start an it will start to display on LCD screen.
3. Above figure shows that to turn off the power loom, the worker will again scan the card.
4. Above figure shows that, as the Owner scans their RFID card then all the data of power loom is sent to their respective workers and to the Owner.
5. From above figure we can see that the data is received by the Owner and the workers

Hardware Result:

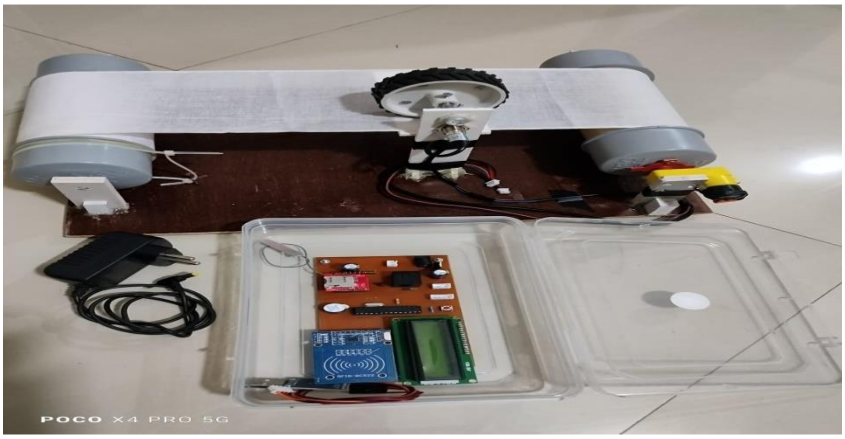


Fig 2: Hardware Assembly of System

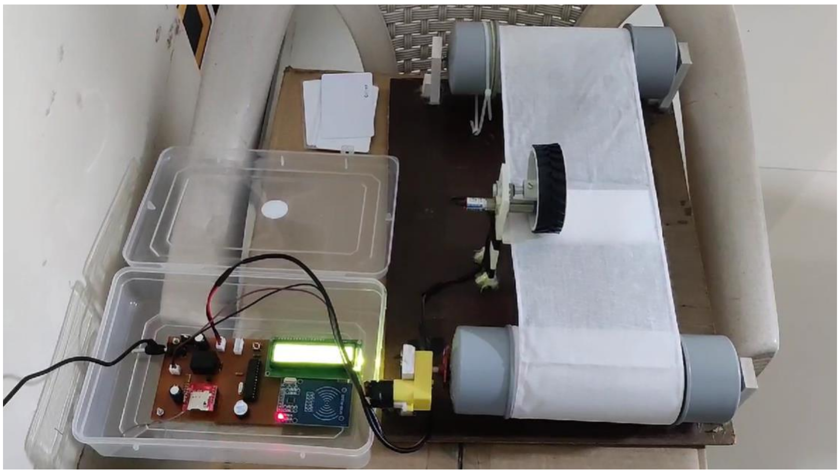
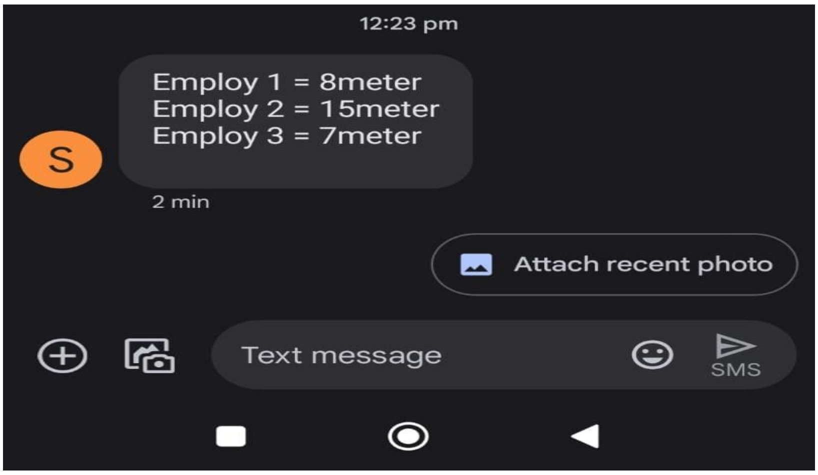


Fig 3: Hardware working Result


12:23 pm

Employ 1 = 8meter
Employ 2 = 15meter
Employ 3 = 7meter

2 min

Fig 4: Onwer Message Record

Software Result:

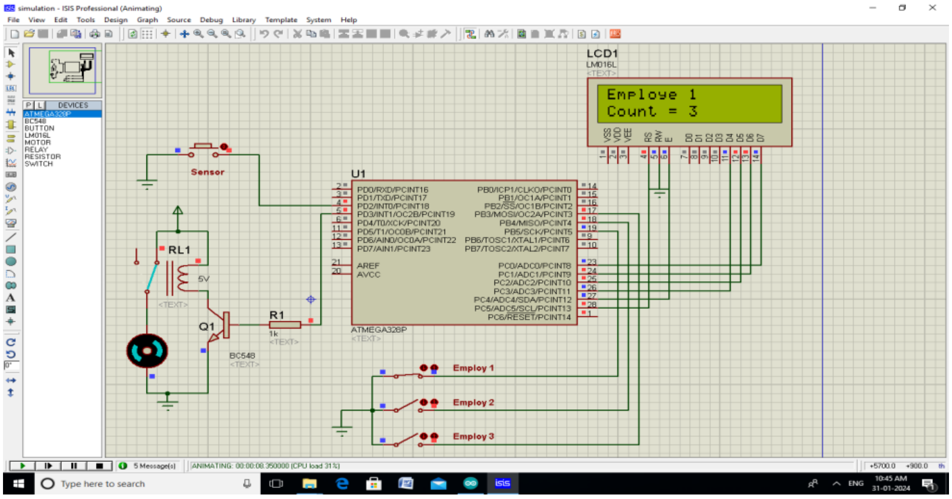


Fig 5: Simulation Result on Protious Software

IV. CONCLUSION

Automation system for Power Loom design by using PIC microcontroller and GSM technology. The automation done by this system provides a very effective way for reducing the human efforts, time, and easy to calculate of cloth and salary of employee. This system promises a better accuracy, low cost and lowering required time needed in the system. In the textile industry if implement this existing automation system then definitely reduce the human efforts.

ACKNOWLEDGEMENTS

We have great pleasure in presenting the dissertation on IOT IOT-based automation of Power Loom in the Textile Industry. We are thankful to Prof. P. A. Khade wholeheartedly who guided us in our project and motivated us on the topic of based Automation of Power Loom in Textile Industry. He also guided us to put several examples that can be easily explained and understood, to complete this dissertation. He provided us with the details about project selection, design, implementation, and key factors of the project.

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International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 3, pp 323-327, March-2024

https://doi.org/10.47001/IRJIET/2024.803049

Plant Leaf Disease Detection and Classification Using CNN

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Abstract **- Crop disease diagnosis is very crucial task for every farmer and individual in order to prevent various losses like less productivity, less quality and quantity or it can also lead to defective yield. Therefore, early identification and early detection can help to save the crop yield. Agricultural productivity is something on which economy highly depends. This is one of the reasons that diseases detection in plants plays an important role in agriculture field, as having disease in plants are quite natural. Manual diagnosis of plant diseases needs expert knowledge along with awareness. So, automatic diseases detection and identification of plants by application of computer vision approaches is of utmost importance. In this system, different computer vision approaches for plant diseases detection are analyzed. The results demonstrate the effectiveness of various methods in leaf disease detection.**

Keywords: Leaf disease detection, Image processing, Segmentation, Feature extraction, Convolutional Neural Networks, CNN.

I. INTRODUCTION

India is an agricultural country and depends on agriculture for around 70% of the total population. Farmers can select various crops for cultivation and also pesticides for them. Any disease to anything makes it weak. In the same way plant becomes weak when leaf has diseases and plant growth is also affected. Therefore, monitoring plants is an important role in cultivation of plants. In early days, this was performed manually by the person with expertise in this area. This requires a huge amount of effort and considerable processing time as well.

We propose image processing methods for detecting plant disease. Firstly, the Symptoms of the disease in the plants are observed on the leaves, stem and fruit. The disease can detect by using the plant leaf. In our project we have implemented image processing technique for the identification of plant disease and to increase the yield in agriculture production. Plant disease identification is a key in preventing yield losses. Plant disease studies signify the study of patterns is seen on the plant visually. Health monitoring and identification of diseases on plants is very important for sustainable farming. Manual control of the plant diseases is very difficult. It requires huge amount of work and an expertise to detect the disease. This process also requires more processing time. Therefore, image processing technique is used for detection of plant disease.

Traditionally, plant disease detection relied on manual inspection by experts, which is time-consuming and subject to human error. The emergence of computer vision and artificial intelligence has opened up new possibilities for automating the detection process and providing accurate and timely recommendations for pesticide treatments.

The primary objective of this project is to leverage image processing and deep learning techniques to build a robust and efficient system that can accurately identify plant leaf diseases and suggest appropriate pesticides. By utilizing the power of CNNs, which have shown remarkable performance in image classification tasks, the project aims to overcome the limitations of traditional methods and provide a reliable and automated solution for disease detection in plants.

The project's methodology involves several key stages, including data collection and preprocessing, disease detection model training, image processing and feature extraction, disease classification, and pesticide suggestion. To train the disease detection model, a comprehensive dataset of plant leaf images representing both healthy and diseased states will be collected. These images will undergo preprocessing to remove noise and enhance relevant features, ensuring optimal input for the deep learning model.

The heart of the system lies in the CNN-based disease detection model, which will be trained on the labeled plant leaf images. The model will learn to identify patterns and features indicative of various diseases. Through an iterative process of training and validation, the model's accuracy and generalization capabilities will be improved.

In addition to the CNN model, the project will incorporate image processing techniques for feature extraction from plant leaf images. This step will involve extracting disease-specific characteristics, such as edges, colors, and textures, to enhance the accuracy of disease detection. Once the system accurately detects the plant leaf diseases, an intelligent algorithm will be implemented to suggest appropriate pesticides based on the identified disease. The algorithm will take into account factors such as the severity of the disease, the type of crop, and environmentally friendly pesticide options, ensuring responsible and effective treatment recommendations.

To provide a user-friendly interface, a graphical user interface (GUI) will be developed to facilitate interaction with the system. Users will be able to upload plant leaf images, and the system will provide real-time disease detection results along with recommended pesticides. User feedback will be encouraged to continually improve the accuracy and performance of the system.

II. LITERATURE REVIEW

Vishnu S, A. Ranjith Ram [1], In this review paper we discuss the various methodologies for plant disease detection. Studies show that relying on pure naked-eye observation of experts to detect and classify diseases can be time consuming and expensive, especially in rural areas and developing countries. So we present fast, automatic, cheap and accurate image processing based solution. Solution is composed of four main phases; in the first phase we create a color transformation structure for the RGB leaf image and then, we apply color space transformation for the color transformation structure. Next, in the second phase, the images are segmented using the K-means clustering technique. In the third phase, we calculate the texture features for the segmented infected objects. Finally, in the fourth phase the extracted features are passed through a pre-trained neural network.

Pawan P. Warne, Dr. S. R. Ganorkar, [2] This paper presents an approach for careful detection of diseases, diagnosis and timely handling to prevent the crops from heavy losses. The diseases on the cotton are critical issue which makes the sharp decrease in the production of cotton. So for the study of interest is the leaf rather than whole cotton plant because about 8595% of diseases occurred on the cotton leaves like Alternaria, Cercospora and Red Leaf Spot. In this proposal initially preprocessing the input image using histogram equalization is applied to increase the contrast in low contrast image, K-means clustering algorithm is used for segmentation which classifies objects based on a set of features into K number of classes and finally classification is performed using Neural network. Thus image processing technique is used for detecting diseases on cotton leaves early and accurately. It is used to analyze the cotton diseases which will be useful to farmers.

Dimitri A. Lisin, Marwan A. Mattar, Matthe w B.Blaschko,[3] Object recognition is a central problem in computer vision research. Most object recognition Systems have taken one of two approaches, using either global or Local features exclusively. This may be in part due to the difficulty of combining a single global feature vector with a set of local features in a suitable manner. In this paper, we show that combining local and global features is beneficial in an application where rough segmentations of objects are available. We present a method for classification with local features using non-parametric Density estimation. Subsequently, we present two methods. For combining Local and Global features. The first uses a “stacking” ensemble technique, and the Second uses a hierarchical classification system. Results show the superior performance of these combined methods over the component classifiers, with a reduction of over 20% in the error rate on a challenging marine science application.

P.R. Rothe * and R. V. Kshirsagar, [4] Feature extraction is a significant constituent of a pattern recognition system. It carries out two assignments: converting input parameter vector into a feature vector and or reducing its dimensionality. A distinct feature extraction algorithm makes the classification process more effectual and efficient. The allocation and recognition of cotton leaf diseases are of the major importance as they have a cogent and momentous impact on quality and production of cotton. In this work we present a snake based approach for the segmentation of images of diseased cotton leaves. We extract Hu’s moments which can be used as shape descriptors for classification. A theory of two-dimensional moment invariants for planar geometric figures is also presented. Three diseases have been considered, namely Bacterial Blight.

P.Revathi, M.Hemalatha, [5] This Proposed Work exposes, an advance computing technology that has been developed to help the farmer to take superior decision about many aspects of crop development process. Suitable evaluation and diagnosis of crop disease in the field is very critical for the increased production. Foliar is the major important fungal disease of cotton and occurs in all growing Indian regions. In this work we express new technological strategies using mobile captured symptoms of cotton leaf spot images and categorize the diseases using HPCCDD Proposed Algorithm. The classifier is being trained to achieve intelligent farming, including early Identification of diseases in the groves, selective fungicide application, etc. This proposed work is based on Image RGB feature ranging techniques used to identify the diseases (using Ranging values) in which, the captured images are processed for enhancement first. Then color image segmentation is carried out to get target regions (disease spots). Next Homogenize techniques like Sobel and Canny filter are used to identify the edges; these extracted edge features are used in classification to identify the disease spots. Finally, pest recommendation is given to the farmers to ensure their crop and reduce the yield loss.

III. PROPOSED SYSTEM

Image Acquisition:

It is the process of taking an image out of a source—usually one that is hardware-based—in order to process it. The hardware-based component of our concept is WebCamera. It is the initial stage in the workflow sequence since a picture is necessary for all processing to be done. The resulting image has not undergone any kind of processing.

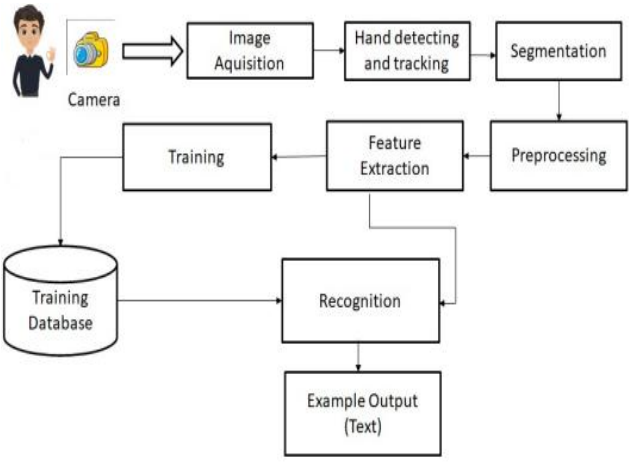


Figure 1: Proposed Methodology

Segmentation:

Segmentation is the process of taking items out of the background of an image that has been taken. The segmentation process makes use of edge detection, context subtraction, and skin-color detection. Recognizing gestures requires the detection and segmentation of hand motion and location.

Features Extraction:

Preprocessed images are used to extract predefined features, such as form, contour, geometrical feature (position, angle, distance, etc.), color feature, histogram, and others, which are then utilized for sign identification or classification. A step in the dimensionality reduction process that separates and arranges a sizable amount of raw data is feature extraction. Lowered to more manageable, smaller classrooms Processing would be easier as a result. The most significant aspect is the sheer quantity of variables present in these enormous data sets. This data requires a significant amount of processing power to process. So, by choosing and combining variables into functions, function extraction helps to extract the optimal feature from enormous data sets. These features accurately and uniquely describe the actual data collection process, and they are also very user-friendly.

Preprocessing:

Preprocessing techniques such as erosion, dilation, and Gaussian smoothing are applied to each image frame in order to remove noise. Converting a color image to grayscale results in a smaller image. Grayscale picture conversion is a popular way to minimize the quantity of data that needs to be processed. Preprocessing goes through the following phases:

a) Morphological Transform (Morphological Transform):

To produce an output image with a comparable size, morphological processes employ a structural feature on the input image. To find the value of each pixel in the output image, it compares the matching pixel in the input image with its neighbors. Morphological alterations come in two flavors: erosion and dilation.

Dilation: The output pixel's value is the maximum value of all the nearby pixels. If every pixel in a binary image has the value 1, then that pixel is set to 1. Morphological dilatation closes tiny gaps and makes artifacts more visible.

Erosion: The value of the o/p pixel is the lowest of all the nearby pixels. In a binary image, a pixel is set to 0 if every one of its neighbors is also 0. Morphological erosion removes minor artefacts, leaving behind larger objects.

b) Blurring:

Blurring occurs when an image is passed through a low-pass filter. In computer vision, the term "low-pass filter" describes a technique for removing noise from an image while preserving the integrity of the remaining portion. Before moving on to more complex tasks, including edge detection, a blur is a basic process that needs to be finished.

c) Thresholding:

Thresholding is a type of image segmentation where an image's pixels are altered to facilitate picture interpretation. The act of turning a grayscale or color image into a binary—basically, black and white—is known as thresholding. Thresholding is most frequently used to choose regions of

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048
Volume 8, Issue 3, pp 323-327, March-2024
https://doi.org/10.47001/IRJIET/2024.803049

interest in an image while disregarding the parts we don't care about.

d) Recognition:

In this instance, classifiers will be used. The techniques or algorithms used to interpret the signals are called classifiers. The Hidden Markov Model (HMM), K-Nearest Neighbor classifiers, Support Vector Machine (SVM), Artificial Neural Network (ANN), and Principle Component Analysis (PCA) are a few popular classifiers that recognize or comprehend sign language. CNN will be used as the classifier in this research, nevertheless. CNNs are utilized for picture recognition and classification due to their high precision. Utilizing a hierarchical paradigm, the CNN creates a network akin to a funnel before producing a fully-connected layer that processes the output and connects all of the neurons.

e) Text output:

Recognizing and translating into text different body postures and movements, as well as comprehending human behavior.

IV. RESULTS AND DISCUSSIONS

It can be inferred from the results that the validation test of the Plant Leaf Disease Detection using CNN was considered legitimate that the system is a valuable tool for detecting plant leaf disease.

The whole process is divided into three stages:

1. Input images are first created by an Android device or uploaded to our web application by users.
2. Segmentation pre-processing includes the process of image segmentation, image enhancement and color space conversion. First, the digital image of the image is enhanced with a filter. Then convert each image into an array. Using the scientific name for Binarizes Diseases, each image name is converted to a binary field.
3. CNN classifiers are trained to identify diseases in each plant class. Level 2 results are used to call up a classifier, which is trained to classify various diseases in that plant. If not present, the leaves are classified as "healthy".

When we provide the system with input, we need new light for the system to function at its best. 90% of the data were utilized for training, and 10% were used for testing. More data might be used for testing and training, which would improve the accuracy and output of the system.

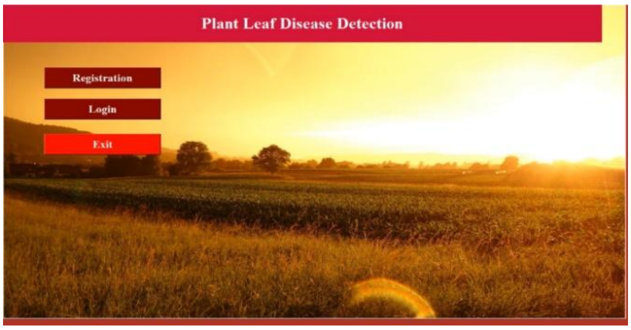
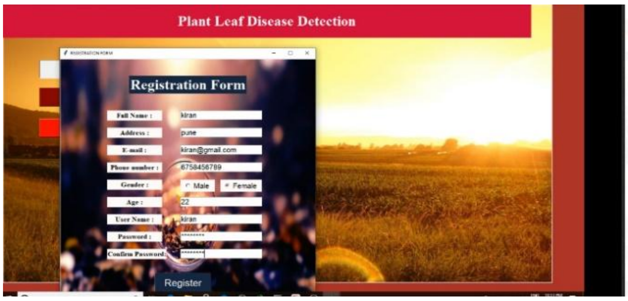


Figure 2: Home Page



Full Name : kiran
Address : pune
E-mail : kiran@gmail.com
Phone number : 6758456789
Gender : ○ Male ● Female
Age : 22
User Name : kiran
Password : ********
Confirm Password: ********

Figure 3: Registration

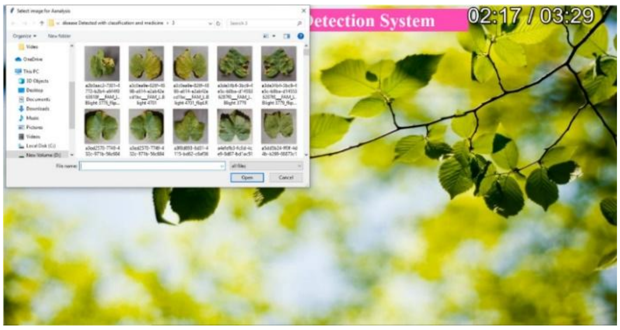


Figure 4: Result

V. CONCLUSION

This proposed system focuses on developing automated leaf diseases. It saves time and effort. In this system, we have proposed a new method for measuring the leaf diseases of the leaf object. This enabled us to process all the images from the same scale and further enabling us to determine the diseases value of the leaf object. Using deep learning we were able to extract the features of the leaf object and further classify it accurately. Study involved collecting leaf samples from different regions. Work was carried out to investigate the use of computer vision for classifying maize leaf diseases. Algorithms based on image-processing techniques, feature extraction and classification, were deployed. The feature extraction process used color co-occurrence methodology, which uses the texture of an image to arrive at unique features, which represent that image.

ISSN (online): 2581-3048
Volume 8, Issue 3, pp 323-327, March-2024
https://doi.org/10.47001/IRJIET/2024.803049

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Citation of this Article:

Rohan Bhosale, Aniket Paul, Sahil Shinde, Prof. Pooja Menon, "Plant Leaf Disease Detection and Classification Using CNN", Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 8, Issue 3, pp 323-327, March 2024. Article DOI https://doi.org/10.47001/IRJIET/2024.803049

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e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:06/Issue:04/April-2024 Impact Factor- 7.868 www.irjmets.com

REMOTELY CONTROLLED SMART ELECTRIC VEHICLE USING ADVANCED EMBEDDED SYSTEM

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ABSTRACT

The project titled " Remotely Controlled Smart Electric Vehicle Using Advanced Embedded System " aims to develop a cutting-edge solution for efficient and convenient electric vehicle control. With the growing popularity of electric vehicles (EVs), there is a need for innovative control systems to enhance user experience and optimize energy consumption. The proposed system utilizes advanced embedded technologies to enable remote monitoring of an electric vehicle. The primary objectives include designing a robust embedded system that allows users to remotely start stop, and maneuver the electric vehicle using a dedicated mobile application. Additionally, the system incorporates smart features such as real-time vehicle diagnostics battery status monitoring, and GPS tracking for enhanced safety and convenience.

I. INTRODUCTION

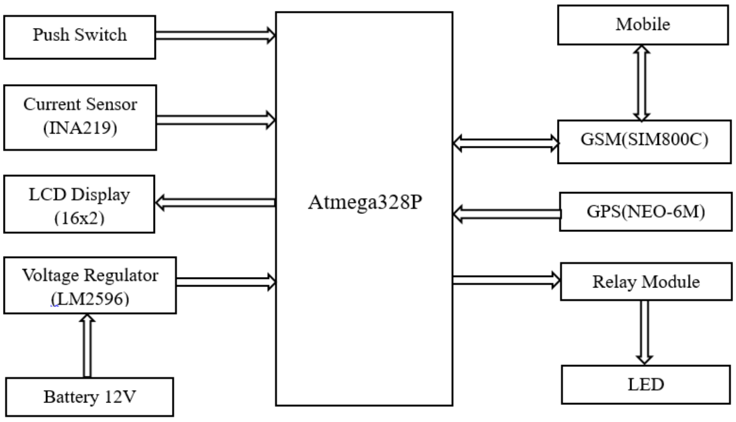
The global number of vehicles is expected to increase as ownership becomes more affordable due to the growing economics of countries such as China and India. However, the adoption of vehicle tracking systems is still very much lacking. Such a system can be used for many applications including the security of personal vehicles, public transportation systems, fleet management, and others. Vehicle tracking systems have been available in the market for some time but they are application-specific region-specific and are costly. Therefore a system designed for car security will not be suitable for fleet management. It is envisioned that the proposed system will be easily customizable for various applications. The proposed system can be used globally and is expected to be cheaper. The safety of personal and public vehicles may be a major concern nowadays so having a GPS vehicle tracking system ensures their safety while travelling. This vehicle tracking system is often installed in consumer vehicles as a theft prevention and retrieval device. Police get the exact location details and then they follow the signal transmitted by the tracking system to locate a stolen vehicle.

II. EASE OF USE

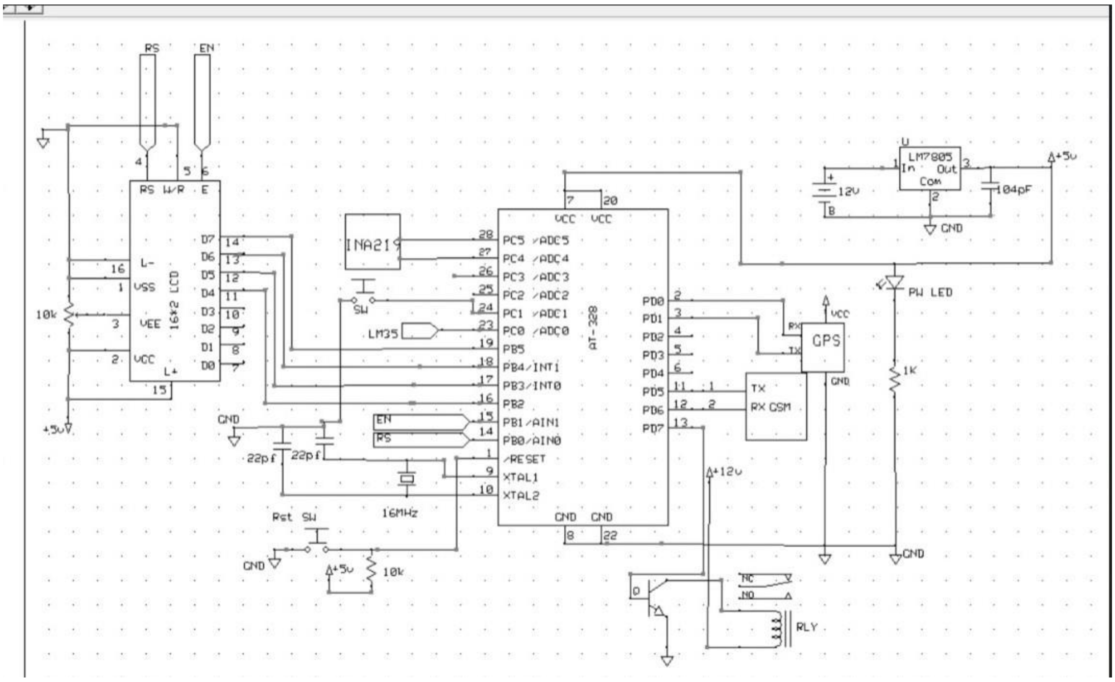
This paper deals with real-time monitoring of vehicles, enabling fleet managers or vehicle owners to track the location of their vehicles at any given time. For businesses with multiple vehicles, such a system facilitates efficient fleet management by providing insights into vehicle movements, routes taken, and overall utilization. It enhances vehicle security by enabling authorities to quickly locate stolen vehicles. With GPS tracking, vehicles can be traced to their exact location, aiding in swift recovery. By analyzing historical data collected by the tracking system, businesses can optimize routes, leading to reduced fuel consumption, lower operating costs, and improved delivery times. It helps in managing valuable assets by ensuring they are where they are supposed to be. This is particularly useful for rental companies, logistics firms, and organizations with high-value assets. The system can monitor driver behavior, such as speeding or harsh braking, allowing for interventions to improve driver safety and reduce the risk of accidents.

III. HARDWARE SYSTEM

Block Diagram :


Push Switch
Current Sensor (INA219)
LCD Display (16x2)
Voltage Regulator (LM2596)
Battery 12V
Atmega328P
Mobile
GSM(SIM800C)
GPS(NEO-6M)
Relay Module
LED

Circuit Diagram :


RS
EN
16x2 LCD
10k
+5v
INA219
SW
LM35
GND
22pf
16MHz
Rst SW
10k
AT-328
VCC
GND
/RESET
XTAL1
XTAL2
LM7805
12v
104pF
GND
+5v
PW LED
1k
GPS
TX
RX GSM
+12v
NC
NO
RLY

AT-Mega328P :

The AT-Mega328P is an 8-bit microcontroller chip developed by Atmel, now a part of Microchip Technology. It belongs to the AVR family of microcontrollers and is widely used in various embedded systems and DIY electronics projects due to its versatility, ease of use, and robust feature set. AT-Mega328P IC comes with internal protections and multiple programming methods

LCD Display (16x2) :

A 16x2 LCD is a compact display that shows 16 characters on 2 lines, with each character formed by a 5x7 pixel matrix. It can display 32 characters in total. The display is named 16x2 because it has 16 columns and 2 rows. These displays are widely used for text-based information in electronics, robotics, and embedded systems. They operate at 4.7-5.3V and interface with microcontrollers.

GSM Module SIM800C :

SIM800C is a quad-band GSM/GPRS module that works on frequencies GSM850MHz, EGSM900MHz, DCS1800MHz, and PCS1900MHz. SIM800C features GPRS multi-slot class10/class12 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. With a tiny configuration of 17.6*15.7*2.3mm, SIM800C can meet almost all the space requirements in customers' applications, such as smartphones, PDAs, and other mobile devices. SIM800C is an SMT package with 42 pads and provides all hardware interfaces between the module and customers' boards. SIM800C is designed with a power-saving technique so that the current consumption is as low as 0.6mA in sleep mode.

GPS Module NEO-6M :

The NEO-6M GPS module is a popular GPS receiver with a built-in ceramic antenna, which provides a strong satellite search capability. This receiver can sense locations track up to 22 satellites and identify locations anywhere in the world. With the on-board signal indicator, we can monitor the network status of the module. It has a data backup battery so that the module can save the data when the main power is shut down accidentally.

LM2596 Voltage Regulator :

The LM2596 is a popular voltage regulator/ buck converter IC ideally suited for the convenient design of a step-down, or you can say, step-up switching regulator. With excellent line and load regulation, it can drive a total of 3.0 Amps of load. These power converters are available in fixed output voltages of 3.3V, 5V, 12V, and an adjustable output.

Push Switch :

A push switch (button) is a momentary or non-latching switch that causes a temporary change in the state of an electrical circuit only while the switch is physically actuated. An automatic mechanism (i.e. a spring) returns the switch to its default position immediately afterward, restoring the initial circuit condition.

Relay :

Relay is one kind of electro-mechanical component that functions as a switch. The relay coil is energized by DC so that contact switches can be opened or closed. A single channel 5V relay module generally includes a coil, and two contacts normally open (NO) and normally closed (NC).

INA219 Current Sensor:

The INA219-based Current sensor module is an I2C interface-based zero drift and bi-directional current/power monitoring module. It can sense shunt voltage, current, and power at the same time and submit the data via the I2C protocol. The breakout module can handle the high side of the current measuring up to +26V DC, even though it is powered with 3V or 5V.

IV. RESULTS AND DISCUSSION

A tracking system is a combination of the Global Positioning System (GPS) and the Global System Mobile communication (GSM) technologies via the microcontroller. It is used to detect the GPS location of vehicles or any objects which are attached to the tracking device. GPS is a satellite-based navigation technology that provides accurate location and information. Data from the numerous satellites is received by the GPS receiver in the National Marine Electronics Association (NMEA) protocol form. The NMEA code consists of a combination of information. ATmega328 is linked to the GPS and the GSM module in the serial connection. The GPS receiver sends data to ATmega328. Then, ATmega328 instructs the GSM module to send the location data to the GSM-enabled device in short message form. The conditions of the process of GPS and GSM are displayed on serial monitors. This Project presents a vehicle detection system using GPS and GSM modems. The system can be interconnected with the alarm system and alert the owner. This detection and messaging system is composed of a GPS receiver, an ATmega328 microcontroller, and a GSM Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude. The ATmega328 microcontroller processes this information and this processed information is sent to the user using a GSM modem. A GSM modem is interfaced to the MCU. The GSM modem sends an SMS to the predefined mobile number. When the vehicle switch is on, the entire system will be activated then immediately an SMS will be sent to the concerned person with the location using GSM and GPS.

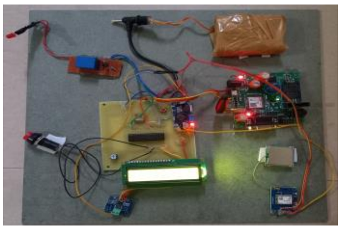
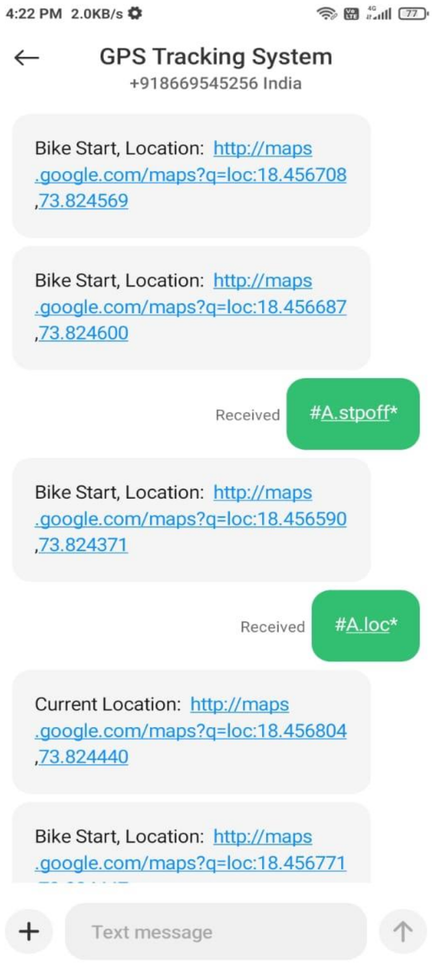


Figure 1: Hardware



Bike Start, Location: http://maps.google.com/maps?q=loc:18.456708,73.824569

Bike Start, Location: http://maps.google.com/maps?q=loc:18.456687,73.824600

#A.stpoff*

Bike Start, Location: http://maps.google.com/maps?q=loc:18.456590,73.824371

#A.loc*

Current Location: http://maps.google.com/maps?q=loc:18.456804,73.824440

Bike Start, Location: http://maps.google.com/maps?q=loc:18.456771

Figure 2: GPS location received on mobile phone

V. CONCLUSION

The development of a vehicle tracking system's hardware prototype has been presented in this project. The system is able to obtain a vehicle's GPS coordinate and transmit it using the GSM modem to the user's phone. The developed vehicle tracking system demonstrates the feasibility of near real-time tracking of vehicles, which can be used for the security of personal vehicles, public transportation systems, fleet management, and many other applications. The system can provide improved customizability, global operability, and cost when compared to existing solutions

ACKNOWLEDGEMENTS

We would like to thank everyone who contributed to this project. First of all, we would like to thank our supervisor Prof. Pooja Menon, her guidance, expertise, and support were essential at every stage of this experiment. We also express our gratitude to our friends and colleagues for their dedication, cooperation, and valuable work. Each member's unique skills and insights support the project's outcomes and create the synergy necessary for innovation.

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e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:06/Issue:04/April-2024 Impact Factor- 7.868 www.irjmets.com

AUTO LOOP CHARGING FOR EVS

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DOI : https://www.doi.org/10.56726/IRJMETS53956

ABSTRACT

Our main objective of this project is to charge the battery of the electric cars as it moves forward with the help of dynamo. Today even though EVs are replacing traditional fuel powered cars and contributing to reduce the emission of Greenhouse gases, they still carry the crucial disadvantage which is concerned with stationary battery charging. If the battery gets completely discharged in the middle of the journey, then it is difficult to get the car to the power station for charging. Here's where this project comes into picture. The project sheds light onto the solution to this problem. The idea is, as the car is driven, its rotating mechanical energy is converted into electrical energy using dynamo which is fed back to the secondary battery. Dynamo is broadly used to convert rotating mechanical energy into electrical energy. The term 'Secondary Battery' here refers to the battery which is a second battery other than main battery which drives the car. This secondary battery will help to drive the car when the main battery is discharged. Hence, using this technique, we can drive the car in such emergency purposes. This also contributes to the lower electricity consumption, since switching of the batteries between main and secondary will help the charging of the either battery when not in use.

Keywords: Dynamos, Emergency Purpose, Electric Charge, Battery, Charging.

I. INTRODUCTION

EVs are driven by the battery installed in it. They are recharged as required and driven again. Electric Cars gain importance during mid 2000s as global Gases emission became a serious issue for harming environment. But practically, use of electric Cars took place in around year 2011-2012. The research is still going as of 2024 for better battery life, low electricity consumption, reduce charging time, increase performance and enhance user experience, etc. Today in India, many electric vehicles have been launches. Companies such as Mahindra, Tata, Land Rover, Mercedes-Benz, Maruti Suzuki, Toyota, Honda, etc have launched various Electric car models. Looking at the advancement of the EVs they are greatly offering a big hand reducing air pollution, greenhouse gases emission etc. Thus, EVs are been evolving at a higher rate since they have been launched in the market for customer use.

II. LITERATURE REVIEW

1. Brief Overview of EV Operation:

- Electric cars work by transforming electrical energy into mechanical energy, which is subsequently used to produce kinetic energy and allow for motion.
- The battery retains electrical energy during the charging process.
- The electric motor and additional accessories/components are powered by the stored energy.
- The electric motor converts battery energy into mechanical energy.
- Moving mechanical energy from the motor to the wheels is the responsibility of the transmission.

2. Regenerative Braking: Regenerative braking is an energy-recovery technique that uses the kinetic energy of a moving object or vehicle to slow it down. This energy can be stored for later use or used instantly.

- This device recovers energy that would otherwise be wasted as heat to the brake discs by using the vehicle's movement to power the electric traction motor.
- When operated backwards, electric motors serve as generators, transforming mechanical energy into electrical energy.
- When using regenerative braking, which stops a vehicle by transferring mechanical energy from the wheels to an electrical load, vehicles powered by electric motors act as generators?

3. Benefits An electric vehicle:

a. Environmentally Sustainable: The biggest benefit of EVs is that they lower air pollution because they don't release any hazardous or greenhouse gases into the atmosphere. There is no fuel consumption since they are not using any to operate the vehicle. Thus, there's nothing to worry about.

b. Noiseless Performance: When driven, electric vehicles produce no noise. lessens noise pollution as a result.

c. Economical and Rechargeable: The car's battery may be readily recharged when it runs low. It is not necessary to replace the battery on a regular basis. Given the rising cost of fuel, rechargeable electric vehicles (EVs) appear to be more cost-effective because they don't require petrol; instead, the only expense to be taken into account is the amount of energy consumed, which is less expensive than fuel.

d. Low Maintenance: Since EVs have fewer mechanically moving components than engine-driven cars, they require less maintenance overall. However, EVs have fewer moving parts than regular vehicles, such as a motor, transmission, etc.

e. Can be conveniently charged at home: Giving the appropriate power supply, the EVs can be charged at home.

4. Disadvantages of EVs:

a. Charging time is more: EVs needs to be charged for long distance travel or as per requirement, but it takes a lot of time to charge them. Hence if in the middle of journey, if the battery gets discharged then it takes a lot of time to recharge the battery again.

b. Limited Driving Range: Since the discharges as the long distance travelled, the driving range is limited since charging of EVs takes a lot of time, therefore the driving range is limited in one go when battery is fully charged.

c. Electricity consumption costs: The charging of the batteries consumes electricity costing electric bills which are much higher.

d. Charging Station: Till of today, charging stations for EVs are still developing, hence the charging station are not feasible to use in emergency situation. The installation of charging point is costlier as compared to the fuel and gas stations, therefore to find one charging station it’s a quiet tricky job.

e. These all-disadvantages points towards the charging of battery being a center of these problems since it takes time for charging and can get discharged while travelling, which makes it difficult for the driver to get past the charging station in such situation.

III. SOLUTION

Here we see that, rate of charging of the battery and its power plays an important role in the problems that we face in the EVs. Therefore, to overcome this problem, we are using dynamo which is fitted at the rotating wheel of the car, as the primary battery drives the car, wheel rotates, its mechanical energy is converted into electrical energy, which is fed to the secondary battery again for charging. Changeover switch is used to switch between the batteries for driving the car and charging simultaneously.

IV. COMPONENTS

1. Batteries

a. We have used Battery 1 (B1) which the Primary battery.

Specification:
Voltage- 12V
Ampere Current- 7.5 Mah
Type- Lead Acid Battery

b. The secondary battery used is Battery 2 (B2)

Specifications:
Voltage- 12V
Ampere Current- 1.3 Mah
Type- Lead Acid Battery

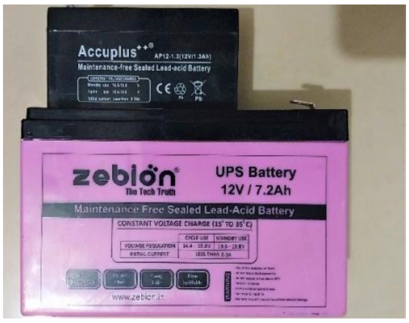

Figure 1: Both the batteries used in the project

2. **Dynamo**: Dynamo is responsible for converting rotating mechanical energy into Electrical energy. Its axle is connected to the rotating shaft of the wheel, and output terminals to the Change-over-Switch.

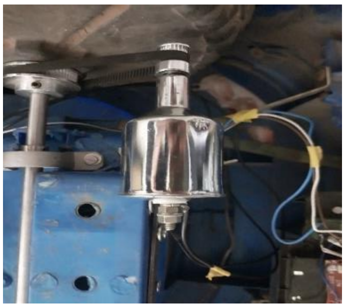

Figure 2: Dynamo used in the car to generate electricity.

3. **Change over Switch:** A changeover switch is a transfer switch which is used to switch a load between two power sources. Various types of Changeover switches are available which are manual, automatic, monetarized, etc. Here we are using manual type of change over switch. They play a crucial role in ensuring continuous power supply by transferring the switch between two power supplies.

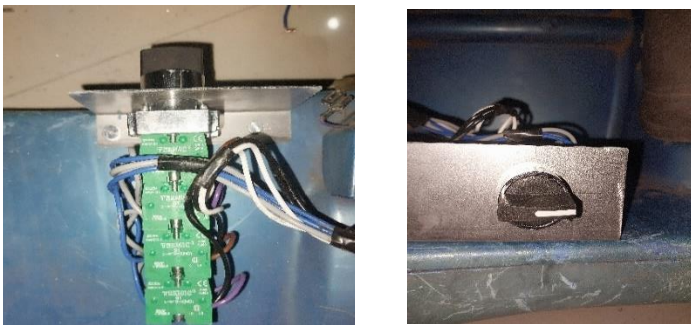

Figure 3: Change over switch used. First one is the side view and second view is the top view.

V. OPERATION

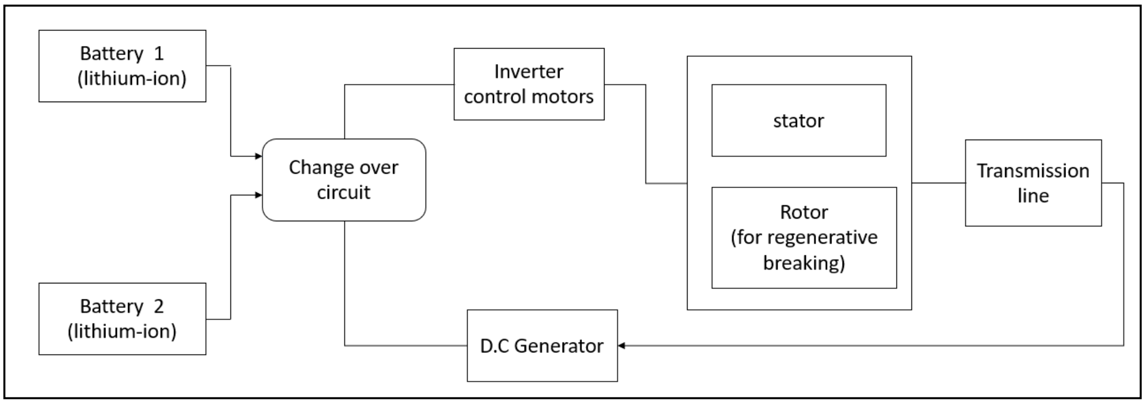
Battery 1 (lithium-ion)
Battery 2 (lithium-ion)
Change over circuit
Inverter control motors
stator
Rotor (for regenerative breaking)
Transmission line
D.C Generator

Figure 4: Block Diagram of real life working of the EVs with Dynamo.

a) Two batteries have been used. Primary Battery as B1 and secondary battery as B2.
b) The dynamo is placed between rotating shaft and changeover switch.
c) When B1 provides supply, the car is started, its wheel's rotational shaft acts as a mechanical shaft that rotates continuously.
d) Just as in the generator, the rotating shaft of the wheel will be connected to the axle of the dynamo.
e) As the wheel rotates, the axle rotates, thus generating current. This current will be fed back to the B2.
f) A change-over-switch has been placed between the 2 batteries, motors and the dynamo.
g) When switched to the righthand side of the driver, it switches the connection of the primary battery to the driver motor, on the other hand, it shorts dynamo to the secondary battery. When switched on the left side of the driver, it shorts the dynamo to primary battery and driver motor to secondary battery.
h) Thus, the two batteries charge and provide supply alternatively.

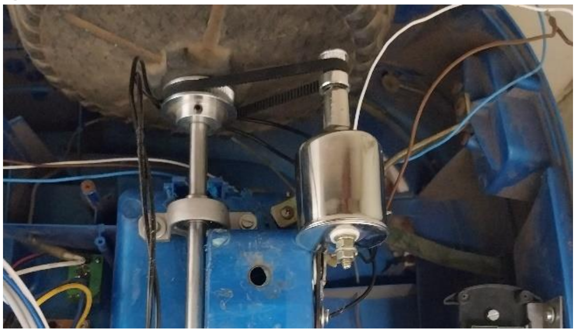

Figure 5: Dynamo's axle connected to the rotating shaft of the wheel using rotating gears.

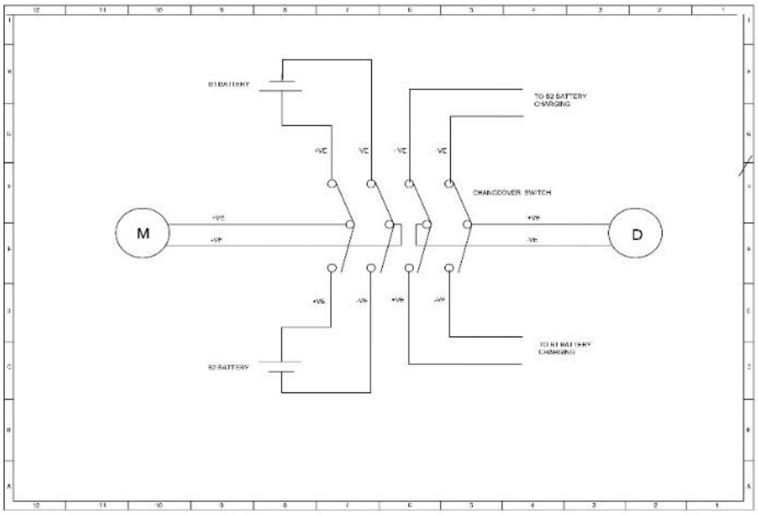

Figure 6: Circuit Diagram of Changeover switch which is responsible for switching in between batteries.

VI. OBSERVATION

At Speed 20 km/hr

Input Voltage : 12 V (B1)

Output Voltage of dynamo : 7.5 V

B1 battery Power = current *voltage

= 7.5*12

=90Wh

Input Power: 90Wh (B1)

Output Power: 11.25

Therefore for charging of the battery, power of 11.25 is fed back to (B2)

Here, 17.5% of the Total Power (Power of B1) is used as secondary battery.

VII. PERFORMANCE ANALYSIS

1. As of this project, the secondary battery has same voltage as the primary battery. But the ampere current rating is changed.
2. This will be responsible for the amount of time the secondary battery will serve to drive the car.
3. Battery Rating:

   Calculations

$$\frac{Powerrating(watts) \times No.of appliances at home \times Avg no.hours used per day}{1000}$$

$$= Total per day in KWH.$$

$$\frac{Powerrating(watts) \times Hoursuse \times 30\ days}{1000} = kwh$$

4. If we use secondary battery as same current rating of the primary battery then the amount of time the battery serves to drive the car will be same. But because of same 2 batteries used, the weight of the components over chasis of the car increases which will degrade the performance of the car
5. Thus we can divide the battery voltages in 75-25 % or 50-50% of the total power.
6. This will not only reduce total weight but also contribute in driving the car efficiently.
7. Practically, 400 Volts to 800 Volts motors are used.
8. Following table shows the distribution of voltages of different batteries used in EVs.

Total Battery Voltage of different EVs	Divided into 75-25 %	Divided into 50-50%
400V	75% of total voltage =300V 25% of total voltage =100V	50% of total voltage =200V 50% of total voltage =200V
550V	75% of total voltage =412.5V 25% of total voltage =137.5V	50% of total voltage =275V 50% of total voltage =275V
800V	75% of total voltage =600V 25% of total voltage =200V	50% of total voltage =400V 50% of total voltage =400V

VIII. FUTURE ASPECTS

1. The EV cars have battery pack at the bottom of the car panel on the chassis. The picture below shows the mounting of the battery pack on the chassis. If we practically implement the idea of auto loop charging, we can place two battery packs one below the other. One will drive the car and other will charge by then. The design change demands the addition of battery packs in two layers.

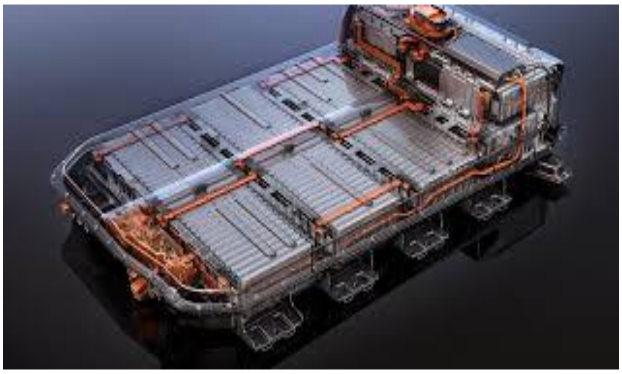

Figure 7: Two Layer battery mounted on the chasis of the EV.

2. Other design which can be implemented is, mounting the batteries as the body of the car. Thus, this can help in multiple use of batteries in driving of the vehicle. These ideas of practical implementation can be helpful in implementing the idea of auto loop charging in real life.

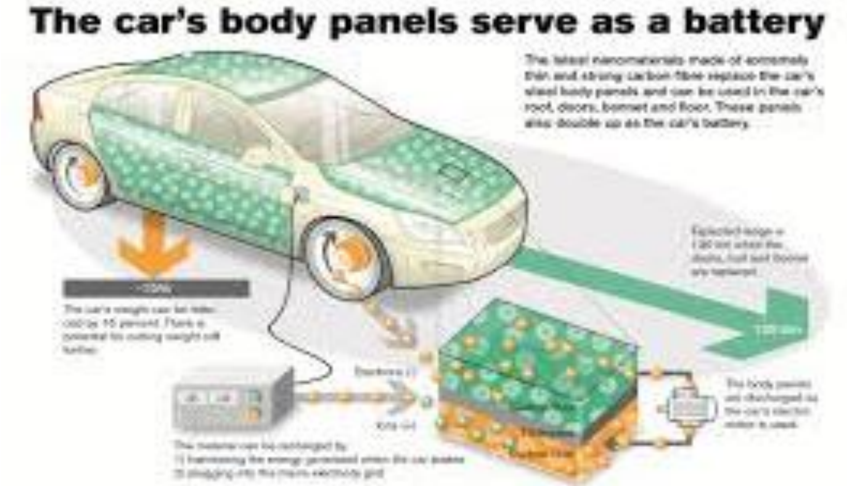
The car's body panels serve as a battery
The latest nanomaterials made of extremely thin and strong carbon fibre replace the car's steel body panels and can be used in the car's roof, doors, bonnet and floor. These panels also double up as the car's battery.

Figure 8: Battery Mounted as the body of a EV

IX. CONCLUSION

This project sheds light into the charging of batteries using dynamo which in turns uses mechanical energy to charge the battery. This analysis of the technology gives deep insights of the challenges and the solutions of EVs that it faces. Today the electric cars consume more electricity and it takes more time of user for charging, therefore we came up with an idea to minimize electricity consumption, and the time required for charging. By recharging the battery as the vehicle moves forward, it makes us easy and helpful within a less time.

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Volume: 12 **Issue:** IV **Month of publication:** April 2024

DOI: https://doi.org/10.22214/ijraset.2024.59649

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue IV Apr 2024- Available at www.ijraset.com

COLOR BASED SORTING MACHINE

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Abstract: In today's world of technology and due to speed running industries, the production rate has increased tremendously. Generally, manufacturing industries keep manufacturing same models with little variation in height, color, weight, shape. And here sorting plays an important role. In such cases industries can't bare human errors for sorting these products. Thus, it becomes necessary to develop Low Cost Automation (LCA) for sorting these products in accurate manner. Industrial automation mainly focuses on developing automations having low cost, low maintenance, long durability and to make systems user friendly as possible. Finally, here we have developed a LCA system for sorting the light weight objects on the basis of color variation using NODEMCU and the conveyor in the system passes the object in front of sensors and thus sorting logic is decided.

INTRODUCTION

Color sorters are used for the food processing industry, such as coffee, nuts, andoil crops. The goal is the separation of items that are discolored, toxic (such as ergot), not as ripe as required, or still with hull after dehulling such as sunflower seeds. As the name suggests, color sorting is simply to sort the things according to their color. It can be easily done by seeing it but when there are too many things to be sorted and it is a repetitive task then automatic color sorting machines are very useful.

These machines have color sensor to sense the color of any objects and after detecting the color servo motor grab the thing and put it into respective pot. They can be used in different application areas where color identification, color distinction and color sorting are important. Some of the application areas include Agriculture Industry (Grain Sorting on the basis of color),Food Industry, Diamond and Mining Industry, Recycling etc. The applications are not limited to this and can be further applied to different industries.

The perfect combination of the hawk-eye recognition technology and the intelligent sensing technology enables three-dimensional sensing that can intelligently identify rice with bran, rice with stripe or rice with embryo, protect discolored rice and defective rice, guarantee the purity of white rice, achieve the goal of less milling and gentle milling, support the real-time analysis of milling efficiency
In the food processing industry, color sorting machines are widely used for applications such as sorting coffee beans, nuts, grains, and oil crops. The main goals are to:
1. Separate discolored, toxic, or immature items that do not meet quality standards
2. Remove foreign materials like hulls after dehulling (e.g. sunflower seeds)
3. Ensure consistent color grading and purity of the final product

The sorting process works by feeding the food items onto a conveyor belt that passes under color sensors. As each item moves along, its color data is captured and analyzed by a microcontroller. Based on predefined color thresholds, the control system activates pneumatic ejectors or mechanical gates to divert the items into designated sorting bins.

Advanced color sorters use a combination of high-resolution CCD cameras and intelligent sensing technology to achieve three-dimensional color recognition. This enables them to identify subtle defects like bran, stripes, or embryos in rice, protecting discolored or damaged grains. By precisely sorting the rice based on color, these machines support gentle milling and real-time monitoring of milling efficiency.

Color sorting machines offer several advantages for food processors:
1. Improved product quality and consistency by removing off-color or defective items
2. Increased efficiency and throughput compared to manual sorting
3. Reduced labor costs and human errors
4. Ability to handle large volumes of food products
5. Suitability for repetitive sorting tasks

I. PROBLEM CONCEPT

In today's fast-paced industrial environment, the need for efficient and accurate sorting of products is crucial. The production rate has increased significantly, and manual sorting methods are no longer sufficient to meet the demands. Color sorting plays a vital role in ensuring the quality of products, particularly in industries like food processing, agriculture, and recycling[1].

However, manual color sorting is prone to human errors, time-consuming, and labor-intensive[1]. Automating the color sorting process can significantly improve efficiency, accuracy, and consistency compared to manual methods. It reduces the need for human labor, minimizes errors, and enables faster processing of large quantities of products[1].

The key challenges in developing an effective color sorting machine include[1]:

1. **Accurate color detection**: Designing a reliable color sensing system that can precisely identify the color of objects passing through the machine.
2. **Efficient sorting mechanism**: Developing a sorting mechanism using servo motors or pneumatic actuators that can accurately divert objects into designated bins based on their color.
3. **Seamless integration**: Integrating the color sensor, microcontroller, and sorting mechanism to create a cohesive system that operates smoothly and efficiently.
4. **Low cost and ease of use**: Developing a cost-effective solution using readily available components while ensuring user-friendliness and ease of operation.
5. **Scalability and flexibility**: Designing the system to be scalable and adaptable to handle different types of objects and sorting requirements in various industries.

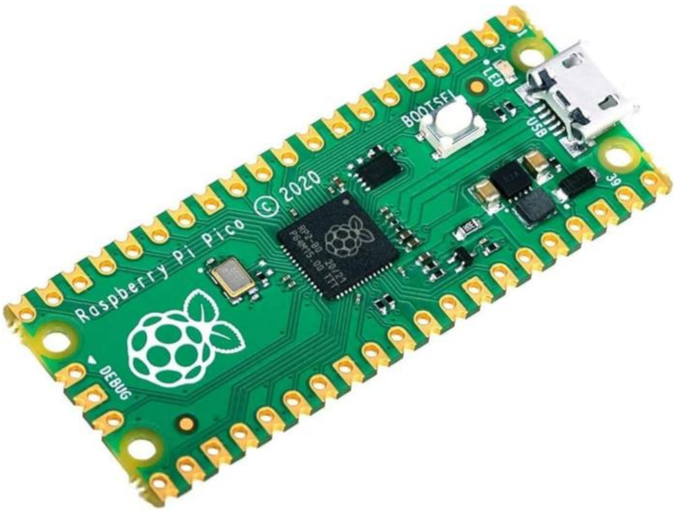
By addressing these challenges, the color sorting machine project aims to design and develop a low-cost, automated system that can accurately sort light weight objects based on their color, addressing the limitations of manual sorting[1]. The expected outcomes include improved efficiency, increased accuracy, reduced labor costs, and enhanced product quality, contributing to the advancement of automation in industrial color sorting applications.

II. THEORETICAL CONCEPT

Color Sorting Machines are automated systems used to separate objects or materials based on their color. These machines employ various sensors, microcontrollers, and actuators to efficiently sort large quantities of items with high accuracy and speed.

Components Used:-

1) *Raspberry Pi microcontroller:*



The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capablelittle device that enables people of all ages to explore computing, and to

learn howto program in languages like Scratch and Python.

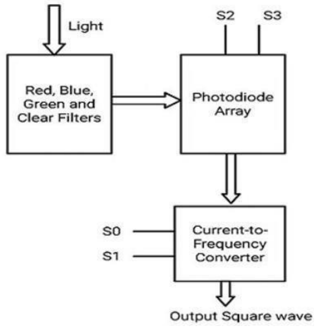
It's capable of doing everythingas expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word- processing, and playing games.The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote teaching ofbasic computer science in schools and in developing countries.

The original model became far more popular than anticipated, selling outside its target market for uses such as robotics.

It does not include peripherals (such as keyboards and mice)or cases. However, some accessories have been included in several official andunofficial bundles. The Raspberry Pi 4 Model B was launched in June 2019.

It uses a 1.5GHz 64-bit quad-core Arm Cortex-A72 CPU, has three RAM options (2GB, 4GB, 8GB),gigabit Ethernet, integrated 802.11ac/n wireless LAN, and Bluetooth 5.0.The new Raspberry Pi 4 has upgraded USB capacity: along with two USB 2 ports and has two USB 3 ports, which can transfer data up to ten times faster.

2) COLOR SENSOR


Light
S2
S3
Red, Blue, Green and Clear Filters
Photodiode Array
S0
S1
Current-to-Frequency Converter
Output Square wave

The TCS230 is a programmable color sensing module equipped with GY-31 light-to frequency converter that combines configurable 8x8 silicon photodiode array as single monolithic CMOS integrated circuit. The output is a square wave (50 percentage duty cycle) with frequency directly proportional to light intensity (irradiance). The full scale output frequency can be scaled by one of three preset values via two control input pins. Digital inputs and digital output allow direct interface to a microcontroller or other logic circuitry. Output enable (OE) places the output in the high-impedance state for multiple unit sharing of a microcontroller input line. The light-to-frequency converter readsan 8 x 8array of photodiodes. Sixteen photodiodes have blue filters, 16 photodiodes have green filters, 16 photodiodes have red filters, and 16 photodiodes are clear with no filters. The four types (colors) of photodiodes are inter-digitated to minimize the effect of non-uniformity of incident irradiance. All 16 photodiodes of the same color are connected in parallel and which type of photodiode the device uses during operation is pin- selectable. Photodiodes are 120 mm x 120mm in size and are on 144-mm center.

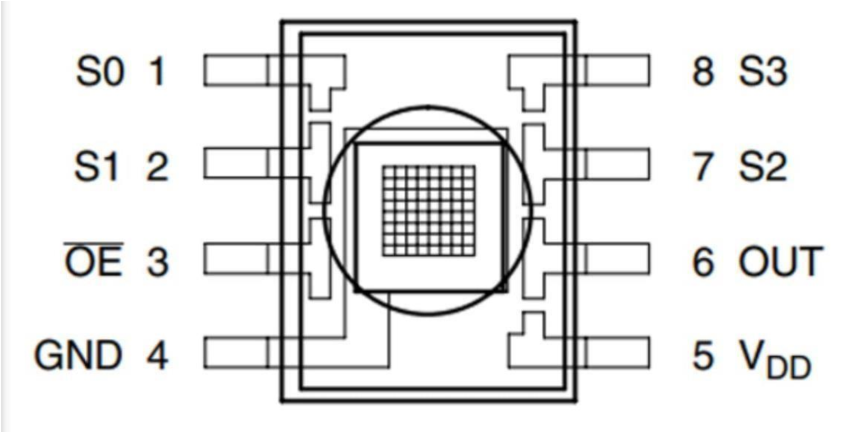
3) Color Sensor Module:-

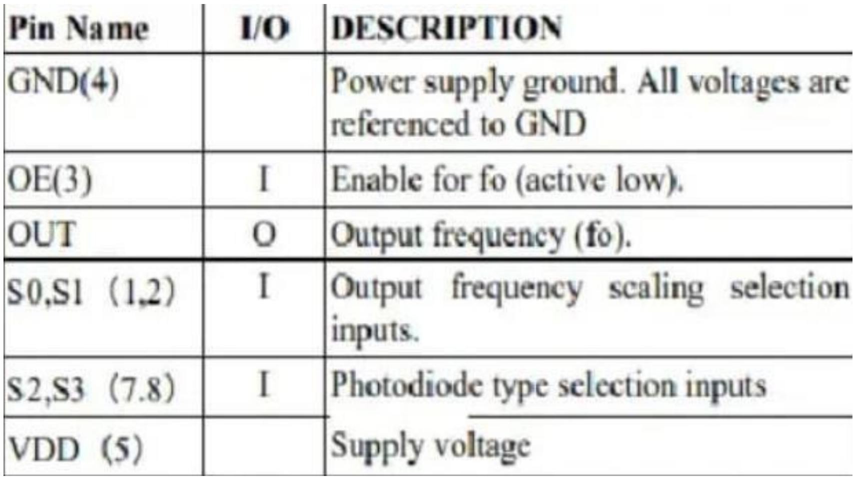
R9
R4
R1
U1
R6
R5
R8
R7
R2
R3
C2
C1
GND OE S1 S0
S3 S2 OUT VCC

The TCS3200 and TCS230 Color Sensor Modules are versatile devices used for color sensing and recognition in various applications. These modules are based on the TCS3200 and TCS230 color sensors, which are capable of detecting and quantifying the intensity of different colors. They operate by illuminating an object with white light and measuring the reflected light's frequency, which corresponds to the color of the object. This information can be invaluable for tasks such as color sorting, product quality control, and color-based automation. One of the distinguishing features of these color sensor modules is their ability to detect a wide range of colors across the visible spectrum. They typically consist of an array of photodiodes, each sensitive to a different color wavelength, allowing them to capture detailed color information. The

TCS3200 module is an updated version of the TCS230 and offers enhanced performance and precision.
To use these color sensormodules effectively, you typically need to interface them with a microcontroller or a development board, like an Arduino or Raspberry Pi. By processing the data received from the sensor, you can determine the color of the object being scanned and initiate appropriateactions based on that information.

These modules are commonly employed in various applications, such as color-based sorting in manufacturing, quality control in printing, detecting color changes in environmental monitoring, and even in educational projects to teach color theory. They offer an accessible and cost-effective solution for adding color sensing capabilities to a wide range of projects, making them a popular choice for both hobbyists and professionals working on tasks that involve color recognition and analysis.
TCS3200 is a color sensor that can detect a wide variety of colors based on their wavelength. It uses a TAOS TCS3200 RGB sensor chip to detect color frequency. This sensor also contains four white LEDs that light up the object in front of it. The TCS3200 chip has an 8 x 8 array of photodiodes (a total of 64 photodiodes).
From these 64 photodiodes, 16 photodiodes have Red filters over them, 16 photodiodes have Green filters,16 photodiodes have Blue filters, and the remaining 16 photodiodes are clearwith No filters.





Pin Name	I/O	DESCRIPTION
GND(4)		Power supply ground. All voltages are referenced to GND
OE(3)	I	Enable for fo (active low).
OUT	O	Output frequency (fo).
S0,S1 (1,2)	I	Output frequency scaling selection inputs.
S2,S3 (7.8)	I	Photodiode type selection inputs
VDD (5)		Supply voltage

4) *Tower Pro Servo Motor*

TowerPro
MG995
DIGI HI-SPEED
Tower Pro

Servo Motor:-

MG995 Metal Gear Servo Motor is a high-speed standard servo can rotate approximately 180 degrees (60 in each direction) used for airplane, helicopter, RC- cars and many RC model. Provides 10kg/cm at 4.8V, and 12kgcm at 6V.
It is a Digital Servo Motor which receives and processes PWM signal faster and better. It equips sophisticated internal circuitry that provides good torque, holding power, and faster updates in response to external forces.

They are packed within a tight sturdy plastic case which makes them water and dust resistant which is a very useful feature in RC planes, Boats, and RC Monster Trucks etc. It equips 3-wire JR servo plug which is compatible with Futaba connectors too.

Working Of The Servo Motor Model:

The Servo Motor on which the product is placed. When the light falls on the product it is reflected back to the color sensor. As mentioned before, color sensor TCS230has 4 color filters for green, red, blue and black (no color), which is opted by its select pins. Filters are selected by the program saved in the microcontroller. Frequency output from color sensor depends on the color of the object as well as the select pin configuration input from microcontroller. Select pin can select one of the four photo diode filters which can give output according to the color of the object. When there is no object in front of sensor it produces an output of330Hz range frequency and when there is an object it produces an output frequency of 7-14 KHz.35I
The microcontroller can find the frequency of the output from TCS230 by counting falling or rising edge of sensor given to its TOCK1 pin using pre- scalar settings set by option register configuration. The pre-scalar was set for 1:16arrangement and the time for counting is 50ms. Hence PIC counts the frequency using its timer at the rate of one increment for sixteen falling edges of input frequency given to TOCK1.When there is no object in front of sensor it produces an output of 330Hz range frequency. Hence we set a break down value of 32H for deciding whether there is an object on the Servo Motor or not. Therefore the PIC can only proceed to the next step after checking this condition. If there is an object the sensor produces an output frequency which is proportional to the color of the object and the selected photo diode configuration in such a way that it provides maximum frequency for the respective color to the respective photo diode. Hence sensor gives maximum frequency for red colored object when red filter is selected, and in the same way other colored object are also sensed by corresponding filters. Frequency received during each filter selection is counted and saved to separate registers and these values are examined for taking the greater one, in order to identify the color of the object. The second DC motor is in contact with another Servo Motor, on which a container is placed. The container has three sections; first section for Green, middle for Black, and third for Red. According to the color, the container will be moved in forward or backward direction by the conveyor belt, which is made possible by connecting the DC motor toL293D hybrid IC. The products will finally fall to the corresponding sections in the container.Fig.2 shows the circuit connections between different components of the model. The PIC, has 18 pins, out of which fivepins are connected to TCS230 color sensor, and two pins are connected.

5) *Power Supply*

A power supply is a device that provides electrical power to a computer or other electronic device. It converts the alternating current (AC) from the wall outlet into direct current (DC) that is used by the computer. The power supply is responsible for providing the right voltage and current to the components in the computer, and it also acts as a regulator to protect the computer from damage caused by excessive power.

Power supplies are used in most electric equipment. Their applications cut across a wide spectrum of product types, ranging from consumer appliances to industrial utilities, from milliwatts to megawatts, and from handheld tools to satellite communications.

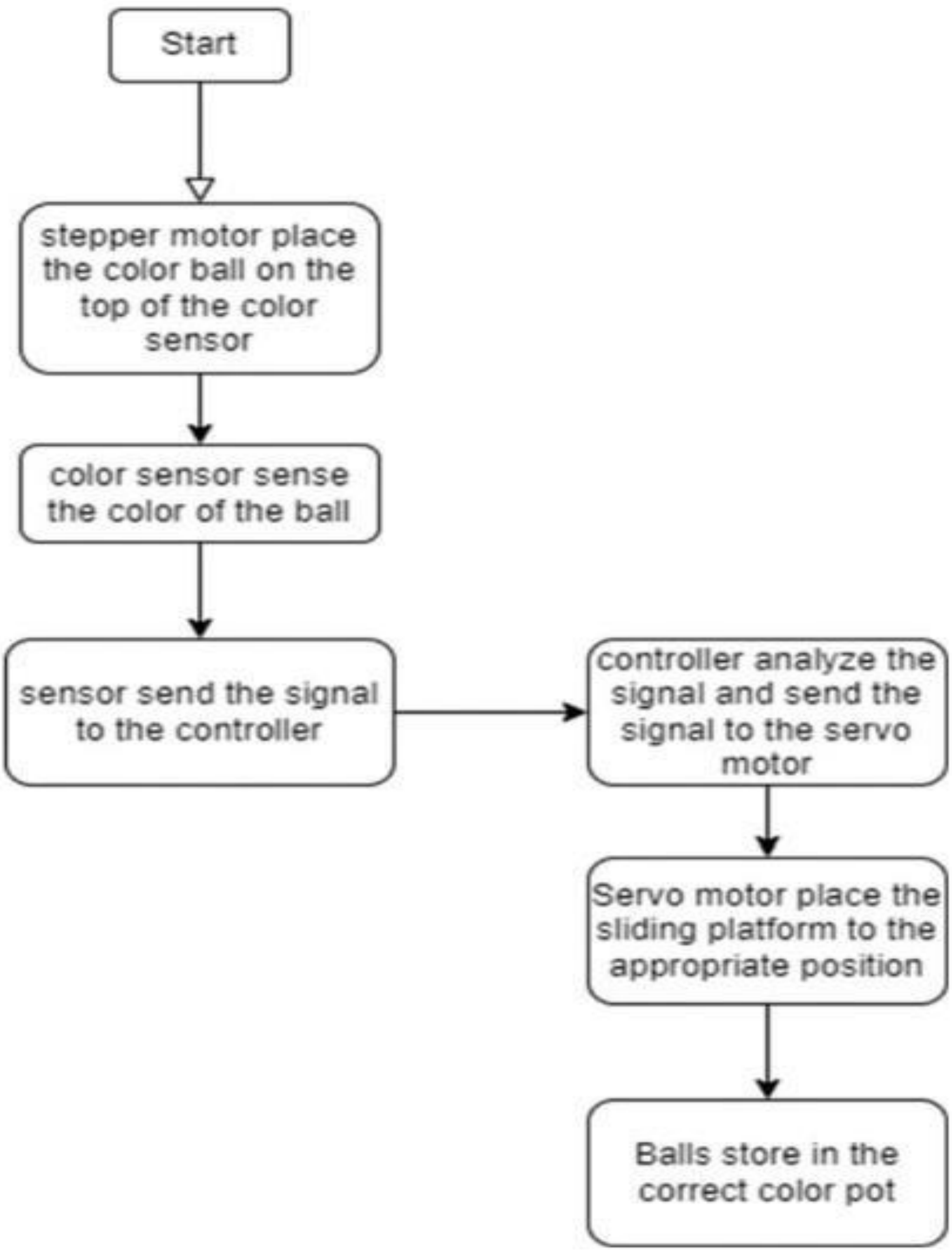
Power supplies are often designed as subassemblies of larger devices. Many power supplies are cooled by natural convection (Meng et al., 2018). The enclosure is usually fabricated from sheet metal or plastic. The enclosure could also have many openings. Power supplies can also be installed to form a separate dedicated power supply unit. This could be as large as a cabinet.

However, power supplies usually experience a relatively favorable corrosion environment according to Hahn et al. (2015). Power supplies are usually kept dry and warm. Unfortunately, some of the power supplies are directly exposed to external airflows as part of the heat management system. Such a situation can alter the power supply's environment drastically as the conditions become contaminating and thus much more corrosive.

High operational temperatures keep power supplies dry. However, this heat can damage the isolation and wiring materials. demonstrate that the load of power varies, thus heat cycling becomes an issue.

III. FLOWCHART DESCRIPTION

This detailed flow chart outlines the key operational steps involved in the use of an Color Sorting Machine


Start
stepper motor place the color ball on the top of the color sensor
color sensor sense the color of the ball
sensor send the signal to the controller
controller analyze the signal and send the signal to the servo motor
Servo motor place the sliding platform to the appropriate position
Balls store in the correct color pot

IV. Conclusion

Sorting of products is a very difficult industrial process. Continuous manual sorting createsconsistency issues. This paper describes a working prototype designed for automatic sorting of objects based on the color. TCS230 sensor was used to detect the color of the product and the PIC16F628A microcontroller was used to control the overall process. Theidentification of the color is based on the frequency analysis of the output of TCS230 sensor. Two conveyor belts were used, each controlled by separate DC motors. The first belt is for placing the product to be analyzed by the color sensor, and the second belt is formoving the container, having separated compartments, in order to separate the products. The experimental results promise that the prototype will fulfill the needs for higher production and precise quality in the field of automation.

The Automatic Sorting Machine works effectively and makes sorting process easy, more precise and reliable and is more advantageous than the conventional methods reducing manual efforts, errors and being much efficient. The proposed prototype allows achievingan economical and a low- cost automation. The sorting action can be made flexible according to the industrial needs. In case of any breakdown, the system can be easily restored and commissioned upon diagnosis.

The Automatic Sorting Machine is a significant innovation in the field of industrial automation, particularly in the context of color-based sorting. The machine uses a combination of electronic sensors, a microcontroller, and conveyor belts to efficiently sort objects based on their color. The TCS230 sensor is used to detect the color of the product, and the PIC16F628A microcontroller is used to control the overall process. The identification of the color is based on the frequency analysis of the output of the TCS230 sensor.

The Automatic Sorting Machine offers several advantages over traditional manual sorting methods. It reduces manual efforts, errors, and increases efficiency. The machine is also more economical and low-cost compared to conventional methods. The sorting action can be made flexible according to industrial needs, and in case of any breakdown, the system can be easily restored and commissioned upon diagnosis.

The Automatic Sorting Machine has the potential to revolutionize the way industries sort products. It can be used in various industries such as food processing, agriculture, diamond and mining, and recycling, among others. The machine can help ensure higher production and precise quality in the field of automation.

In conclusion, the Automatic Sorting Machine is a significant innovation in the field of industrial automation, offering several advantages over traditional manual sorting methods. It is economical, efficient, and flexible, making it an attractive solution for industries looking to automate their sorting processes.

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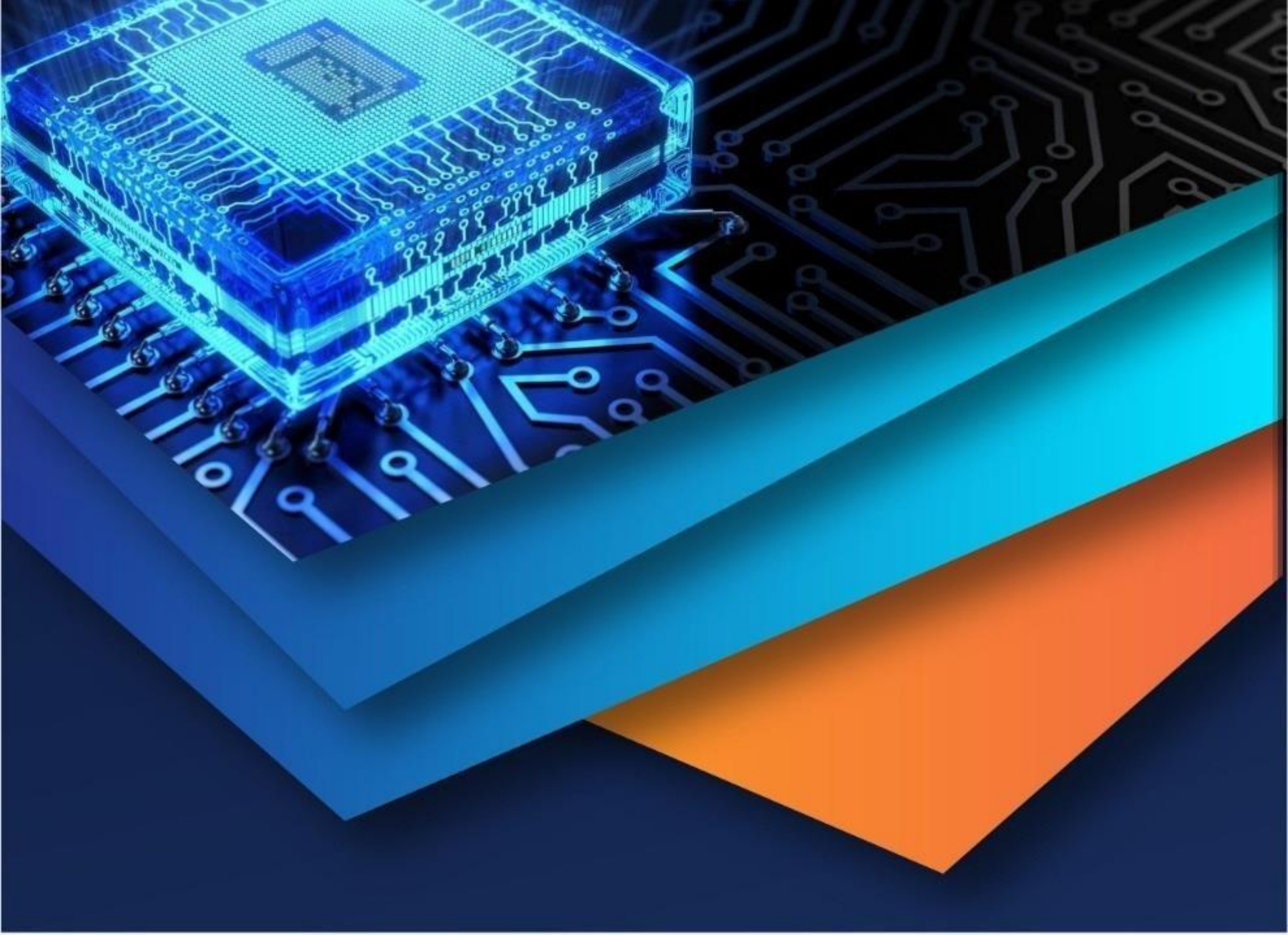

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Volume:06/Issue:04/April-2024 Impact Factor- 7.868 www.irjmets.com

DESIGN AND IMPLEMENTATION OF ADVANCED SECURITY-BASED SYSTEM FOR ATM

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ABSTRACT

The idea of Designing and implementing a Security-Based Automated Teller Machine (ATM) theft project was born with the observation of real-life incidents happening around us. This project deals with the prevention of ATM theft from robbery, to overcome the drawbacks found in existing technology in our society. Whenever a robbery occurs, the laser LDR is used here which senses the motion of the ATM. This system uses an AT-Mega controller-based embedded system to process real-time data collected using the laser LDR. Once the motion is sensed the beep sound will occur for the buzzer. The DC motor is used for closing the door of the ATM. A smoke generator is used to leak the gas inside the ATM to bring the thief into the unconscious stage. The camera is always processing and sending video continuously to the PC and it will be saved on the computer. RTC is used to capture the robber occur time and send the robbery to occur time with the message to the nearby police station and corresponding bank through the GSM. LCD Display board which will show the output of the message continuously. GPS is used to track the location of ATMs continuously. This will prevent the robbery and the person involved in the robbery can be easily caught.

Keywords- ATM, GSM module, DC motor, Laser LDR, Smoke generator, GPS module.

I. INTRODUCTION

Automated Teller Machines (ATMs) have become an integral part of modern banking, providing convenient access to cash and other banking services around the clock. However, their widespread presence also makes them vulnerable to various forms of criminal activity, including theft. One of the most brazen and audacious forms of ATM-related crime is the theft of the entire ATM itself, often carried out by organized criminal gangs using sophisticated methods.

In recent years, instances of ATMs being stolen directly from their booths or locations have garnered significant attention due to their dramatic nature and the financial losses incurred by banks and businesses. These thefts typically involve criminals employing a range of tactics, from brute force methods such as using vehicles to ram into ATM booths to more covert approaches like cutting through security measures with power tools.

The repercussions of ATM theft extend beyond the immediate financial losses incurred by banks and ATM operators. Such incidents also pose a threat to public safety, as they can result in structural damage to buildings and endanger the surrounding community.

Additionally, the stolen ATMs often contain large sums of cash, leading to concerns about the potential funding of further criminal activities.

EASE OF USE

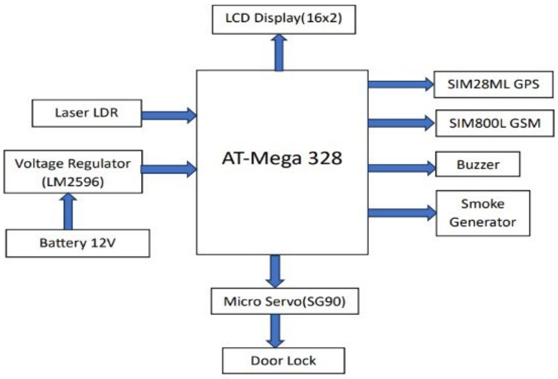
The paper deals with avoiding the robbery of ATMs. Whenever robbery occurs laser LDR is used to detect the movement of ATM.

The laser LDR sensor gives the signal to the AT-Mega. The microcontroller is used for the processing data and the GSM module sends the message to the nearby police station and the nearest bank server. The paper deals with avoiding robbery using a laser sensor and catching the theft inside the ATM center using DC MOTOR. A laser sensor is used to sense the movement and gives the signal to AT-Mega. AT-Mega takes controlling action according to the input signal.

If the signal disturbance is more than the set value then the DC motor activates to lock the door and the smoke generator is used to leak the gas inside the ATM booth.

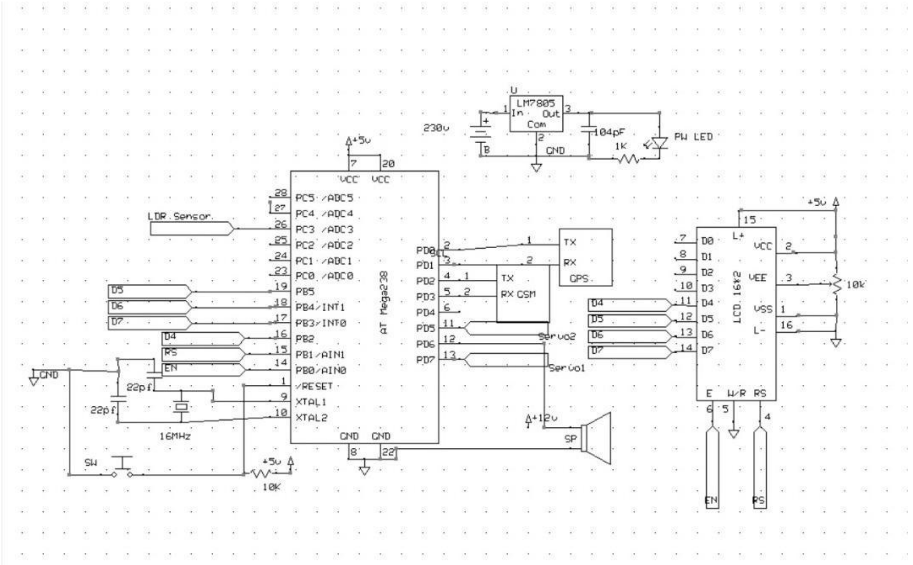
II. HARDWARE SYSTEM

Block Diagram :


LCD Display(16x2)
Laser LDR
Voltage Regulator (LM2596)
Battery 12V
AT-Mega 328
SIM28ML GPS
SIM800L GSM
Buzzer
Smoke Generator
Micro Servo(SG90)
Door Lock

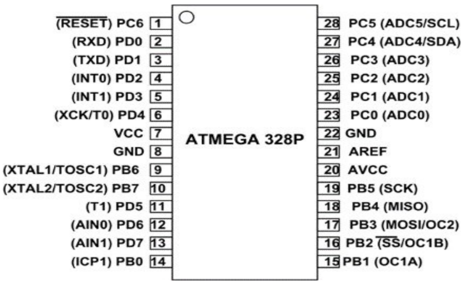
Block Diagram

Circuit Diagram :


LM7805
230v
104pF
1K
PW LED
+5v
LDR Sensor
AT Mega238
TX
RX
GPS
RX GSM
LCD 16*2
10k
Servo2
Servo1
22pf
16MHz
SW
10K
+12v
SP
EN
RS

AT-Mega328P:

The AT-Mega328P is an 8-bit microcontroller chip developed by Atmel, now a part of Microchip Technology. It belongs to the AVR family of microcontrollers and is widely used in various embedded systems and DIY electronics projects due to its versatility, ease of use, and robust feature set. AT-Mega328P IC comes with internal protections and multiple programming methods.


ATMEGA 328P
(RESET) PC6 1
(RXD) PD0 2
(TXD) PD1 3
(INT0) PD2 4
(INT1) PD3 5
(XCK/T0) PD4 6
VCC 7
GND 8
(XTAL1/TOSC1) PB6 9
(XTAL2/TOSC2) PB7 10
(T1) PD5 11
(AIN0) PD6 12
(AIN1) PD7 13
(ICP1) PB0 14
28 PC5 (ADC5/SCL)
27 PC4 (ADC4/SDA)
26 PC3 (ADC3)
25 PC2 (ADC2)
24 PC1 (ADC1)
23 PC0 (ADC0)
22 GND
21 AREF
20 AVCC
19 PB5 (SCK)
18 PB4 (MISO)
17 PB3 (MOSI/OC2)
16 PB2 (SS/OC1B)
15 PB1 (OC1A)

LCD Display(16X2) :

A 16x2 LCD is a compact display that shows 16 characters on 2 lines, with each character formed by a 5x7 pixel matrix. It can display 32 characters in total. The display is named 16x2 because it has 16 columns and 2 rows. These displays are widely used for text-based information in electronics, robotics, and embedded systems. They operate at 4.7-5.3V and interface with microcontrollers.

Buzzer :

A buzzer is a device that is used to generate of sound signal in an emergency for gathering attention. When the buzzer is activated it produces a long beep sound for security purposes.

SIM800L GSM Module:

GSM is an open and digital cellular technology used for mobile communication. It uses 4 different frequency bands 850 MHz, 900 MHz, 1800 MHz, and 1900 MHz. It uses the combination of FDMA and TDMA. It is a wireless system.

SIM28ML GPS :

GPS stands for Global Positioning System. It's a satellite-based navigation system that provides location and time information anywhere on Earth where there is an unobstructed line of sight to four or more GPS satellites. It works by calculating the distance between the GPS receiver and multiple satellites, using the signals transmitted by those satellites.

Laser LDR :

Laser LDR refers to a combination of a laser and an LDR (Light Dependent Resistor).LDRs, also known as photoresistors, are light-sensitive devices whose resistance decreases with increasing incident light intensity. Combining an LDR with a laser could be a part of a system where precise light sensing or detection is required.

III. RESULT AND DISCUSSION

The Laser LDR detector detects any obstruction or movement in the vicinity of the ATM using laser technology. It triggers an alarm or activates security measures when unauthorized activity is detected. The Laser LDR detector adds a layer of security by detecting physical disturbances around the ATM. It helps in identifying and responding to potential theft attempts or unauthorized access. The fog sensor detects the presence of fog or smoke near the ATM. Upon detection, it triggers an alarm or activates security measures to prevent theft. Fog sensors enhance security by detecting environmental conditions that could aid thieves in concealing their activities. By triggering alarms or security measures, they help mitigate the risk of theft during adverse weather conditions. The buzzer is an audible alarm that activates when unauthorized access is detected or triggered remotely. It alerts nearby individuals to the theft and deters further tampering. Its loud sound attracts attention and may discourage thieves from continuing their attempt to steal or tamper with the ATM. The GSM system enables communication with the stolen ATM via cellular networks. It facilitates remote monitoring and control, allowing for status updates and commands to be sent to the ATM. The GSM system complements the GPS tracking by providing communication capabilities. This allows for two-way communication with the stolen ATM, enabling authorities to remotely monitor its status and take necessary actions. The GPS provides real-time location tracking of the stolen ATM. It continuously updates the ATM's coordinates, allowing authorities to monitor its movements accurately. The GPS serves as the primary means of tracking the stolen ATM. Its ability to provide precise location data is invaluable for law enforcement to swiftly locate and recover the stolen asset.

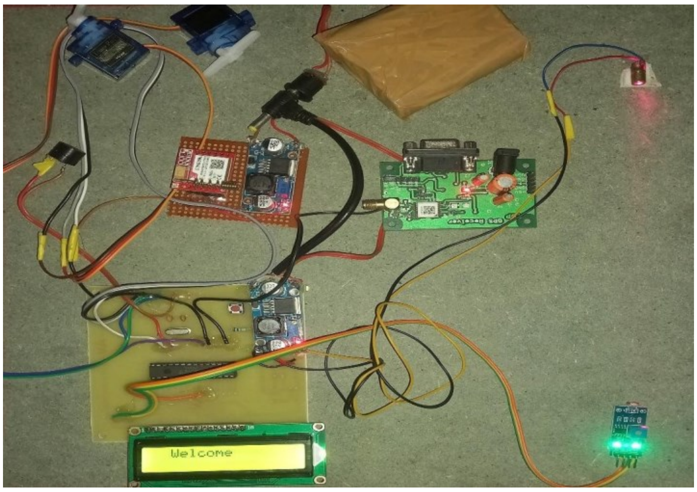


Figure 1: Hardware Working Image

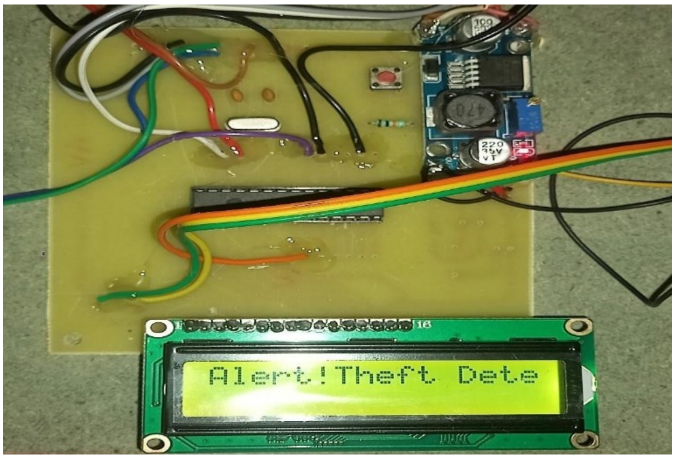
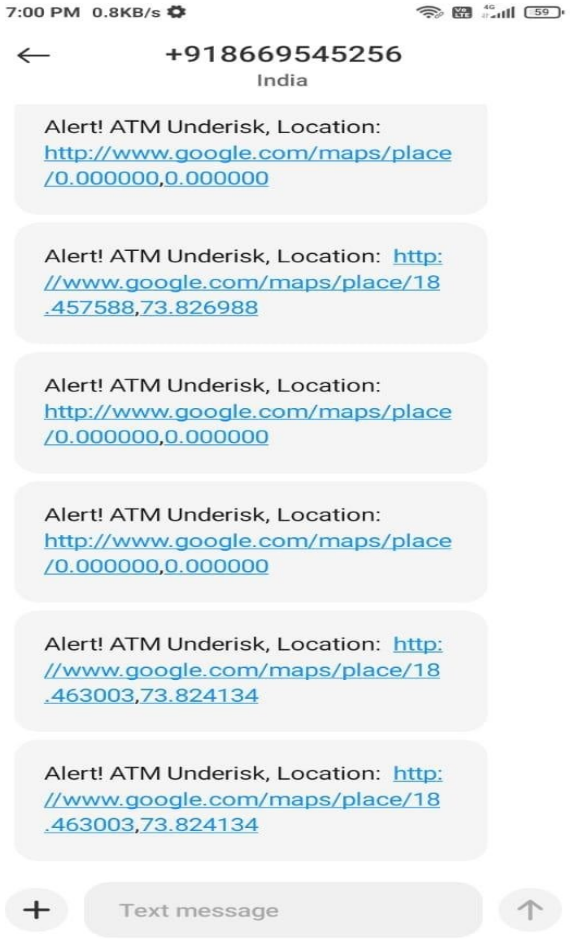


Figure 2: ATM Security Alert



Alert! ATM Underisk, Location: http://www.google.com/maps/place/0.000000,0.000000

Alert! ATM Underisk, Location: http://www.google.com/maps/place/18.457588,73.826988

Alert! ATM Underisk, Location: http://www.google.com/maps/place/0.000000,0.000000

Alert! ATM Underisk, Location: http://www.google.com/maps/place/0.000000,0.000000

Alert! ATM Underisk, Location: http://www.google.com/maps/place/18.463003,73.824134

Alert! ATM Underisk, Location: http://www.google.com/maps/place/18.463003,73.824134

Figure 3: GPS locations received on mobile phone

IV. CONCLUSION

By combining multiple security measures, including both tracking and deterrent systems, the project offers a comprehensive approach to ATM security. It addresses various potential vulnerabilities and threats, enhancing overall security levels. The GSM system enables remote monitoring and control of the stolen ATM, allowing authorities to assess the situation and take appropriate actions from a centralized location. This capability is crucial for managing theft incidents efficiently and minimizing potential damage. While the project demonstrates significant advancements in ATM security, there is room for continuous improvement and optimization. Regular updates and enhancements to the system can further strengthen its effectiveness and adaptability to evolving security threats.

ACKNOWLEDGEMENTS

We would like to thank everyone who contributed to this project. First of all, we would like to thank our supervisor Prof. Tushar Mohite, whose guidance, expertise, and support were essential at every stage of this experiment. We also express our gratitude to our friends and colleagues for their dedication, cooperation, and valuable work. Each member's unique skills and insights support the project's outcomes and create the synergy necessary for innovation.

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1	Sayali S. Dhumal	AnarMitra: Enhancing Pomegranate Farming with CNN Technology	3	Robotics & Automation	International Journal for Research in Applied Science & Engineering Technology (IJRASET)	2023-2024	ISSN: 2321-9653	https://www.ijraset.com/	https://www.ijraset.com/research-paper/anarmitra-enhancing-pomegranate-farming-with-cnn-technology
2		Design & Development of a Prototype of Voice Controlled Mobile Robot for Pick & Place Operation Integrated with Machine Vision System		Robotics & Automation	International Research Journal of Modernization in Engineering Technology and Science(IRJMET)	2023-2024	ISSN: 2582-5208;	https://www.irjmets.com/	https://zcoer.in/wp-content/uploads/2024/10/Paper-No.2.pdf
3		Development of Prototype of Component Cleaning Station Using PLC		Robotics & Automation	International Research Journal of Modernization in Engineering Technology and Science(IRJMET)	2023-2025	ISSN: 2582-5208;	https://www.irjmets.com/	https://zcoer.in/wp-content/uploads/2024/10/Paper-No.3.pdf
4	Bikesh B. Kumar	Design and Development of Agri-bot for Autonomous Seed Sowing and Harvesting	3	Robotics & Automation	International Journal for Research in Applied Science & Engineering Technology (IJRASET)	2023-2024	ISSN: 2321-9653;	https://www.ijraset.com/	https://www.ijraset.com/research-paper/development-of-agri-bot-for-autonomous-seed-sowing-and-harvesting#:~:text=In%20the%20project%20%2C%20typically%20a,compartments%20designed%20to%20hold%20seeds
5		Design and Development of Controllable Water Sprinkler Manual Mobile Robot Prototype Based On Moisture Content of Soil		Robotics & Automation	International Research Journal of Modernization in Engineering Technology and Science(IRJMET)	2023-2024	ISSN: 2582-5208	https://www.ijraset.com/	https://www.irjmets.com/uploadedfiles/paper//issue_4_april_2024/53989/final/fin_irjmets1714055966.pdf
6		Design and Development of a Prototype of Web Controlled Tomato Plucking Robot using IOT		Robotics & Automation	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)	2023-2024	ISSN: 2581-9429	https://www.ijarsct.co.in/	https://ijarsct.co.in/Paper17862.pdf
7	P.P. Chakraborty	Design and Development of Automatic PCB Soldering Machine Using Cartesian Robot	1	Robotics & Automation	International Research Journal of Modernization in Engineering Technology and Science	2023-2024	ISSN: 2582-5208	https://www.irjmets.com/	https://www.irjmets.com/uploadedfiles/paper//issue_5_may_2024/55156/final/fin_irjmets1714830055.pdf
8	Mallesh Chavan	Design and Development of Line Following Tour Guide Robot	3	Robotics & Automation	International Journal for Research in Applied Science & Engineering Technology (IJRASET)	2023-2024	ISSN: 2321-9653;	https://www.ijraset.com/	https://doi.org/10.22214/ijraset.2024.60596
9		Development of Dynamic Image Recognition System for Hand Sign Language into Audio and Visual Output using Artificial Neural Networks		Robotics & Automation	International Journal for Research in Applied Science & Engineering Technology (IJRASET)	2023-2024	ISSN: 2321-9653	https://www.ijraset.com/	https://doi.org/10.22214/ijraset.2024.60828
10		Classification of Simple CNN Model and ResNet50		Robotics & Automation	International Journal for Research in Applied Science & Engineering Technology (IJRASET)	2023-2024	ISSN: 2321-9653	https://www.ijraset.com/	https://doi.org/10.22214/ijraset.2024.60677

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12		Design and Development of Prototype of RoboAGV for Pick and Place Operation		Robotics & Automation	International Journal for Research in Applied Science & Engineering Technology (IJRASET)	2023-2024	ISSN: 2321-9653	https://www.ijraset.com/	https://www.ijraset.com/research-paper/prototype-of-robo-agv-for-pick-and-place-operation
13	A.S. Kotkar	Design and Development of a Prototype ofIndustrial Robotic Arm Controlled by Touch Interface	2	Robotics & Automation	International Journal for Research in Applied Science & Engineering Technology (IJRASET)	2023-2024	ISSN: 2321-9654	https://www.ijraset.com/	https://zcoer.in/wp-content/uploads/2024/10/Paper-No.10.pdf
14		Design & Development of AGV for Enhancing Hospitality		Robotics & Automation	International Journal for Research in Applied Science & Engineering Technology (IJRASET)	2023-2024	ISSN: 2321-9655	https://www.ijraset.com/	https://www.ijarsct.co.in/Paper17583.pdf
15	M.G. Reddy	Effect of Chilling & B4C Content on Machining Efficiency and Surface Quality in Wire-Cut Machining of Aluminum Matrix Chilled Composites	1	Robotics & Automation	Mechanics of Advanced Composite Structures	2023-2024	ISSN: 2423-7043	: https://macs.semnan.ac.ir/	https://zcoer.in/wp-content/uploads/2024/10/Reddy-Sir-Paper.pdf

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Yogesh R. Ingole

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