RESEARCH PAPER

Women Safety and Accident Detection for Mentally Challenged People

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ABSTRACT
This project presents an innovative IoT-based safety and health monitoring system specifically designed to enhance the well-being of women and individuals with cognitive disabilities. The system integrates multiple smart technologies including GPS tracking, GSM communication, fall detection sensors (MPU6050), ultrasonic sensors for accident detection, and wearable devices to offer a robust safety network. The core objective is to provide real-time monitoring, emergency alerting, and continuous tracking to ensure user safety and independence. Upon detecting abnormal activities such as a fall, collision, or if the panic button is pressed, the system immediately triggers an SMS alert through the GSM module, along with the user's real-time location gathered via the GPS module. The geofencing feature adds another layer of protection by notifying caregivers if the user exits a predefined safe zone. This solution reduces response time during emergencies and ensures that assistance is available promptly.
By leveraging compact and cost-effective IoT hardware components like the ESP32 microcontroller, the proposed system is lightweight, portable, and suitable for daily use. It not only enhances the confidence and autonomy of vulnerable users but also provides peace of mind to caregivers and healthcare providers through constant monitoring. The project underscores the transformative potential of IoT in addressing critical social challenges, particularly in supporting mental health and personal safety. It promotes a multidisciplinary approach by combining principles of embedded systems, healthcare, and wireless communication technologies to create a scalable and efficient solution that can be deployed in real-world environments.

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I. INTRODUCTION

Since mentally challenged people sometimes run more danger in different surroundings, their safety and well-being becomes a major issue in our society. These people can find it difficult to express their demands or identify harmful circumstances, which might cause mishaps or crises. This project aims to develop a full safety and accident detection system specifically suited for this sensitive population, therefore enhancing their safety and allowing peace of mind for their families and caretakers.
Modern hardware and software technologies combined in the system provide proactive alerts and real-time monitoring. Using an ESP32 microcontroller, the brain of the operation, the system essentially links many parts and manages data. The GPS gadget constantly monitors user location by allowing caregivers to precisely track her. A GSM module is integrated to guarantee instantaneous contact during crises; it may instantly notify and alert the mobile phones of assigned caregivers. A big benefit of the technology is its geofencing ability, which generates designated safe zones dependent on GPS locations.
When a user crosses these designated areas, the system notifies caregivers automatically so they may respond fast to eliminate any threats. This feature not only increases safety but also provides customers a sense of independence so they may look about under greater security. The system also uses a gyroscope and an MPU6050 accelerometer to drive sophisticated fall detection algorithms. This part tracks user movement and orientation constantly; there are no abrupt changes that could point to a fall. The device detects a fall and instantly alerts caregivers to guarantee quick intervention and help. This project intends to provide a complete solution that not only reduces hazards but also enables mentally challenged people to lead more autonomous life by smoothly integrating various technologies. The strategy is meant to lower family and caregiver stress, thereby creating a safer, more inclusive atmosphere that gives everyone's welfare first priority. Through this artistic approach, we want to help create a society characterized by empathy that recognizes and meets the needs of impoverished communities.

II. RELATED WORK

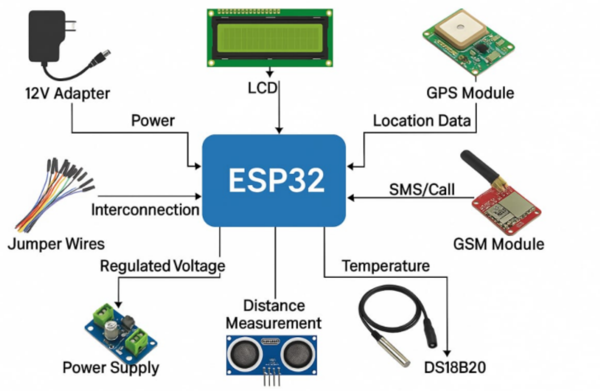
[1] This paper employs IoT technology to develop a robust women's safety system. It addresses rising violence against women. Limitations include potential scalability issues and dependency on network connectivity. [2] The authors review machine learning applications on social media for improving women's safety. The problem is insufficient real-time safety monitoring. Limitations involve biases in social media data. [3] This study utilizes IoT for safety and security analysis for women. It addresses the lack of effective personal safety mechanisms. Limitations include sensor reliability and battery life concerns. [4] The paper proposes a smart wearable device for women's safety, focusing on personal safety in emergencies. Limitations include user acceptance and devices. [5] A Lightweight Wearable Fall Detection System using Gait Analysis for Elderly [6] This research presents a TinyML-based system for fall detection in elderly people. It addresses timely detection of falls. Limitations include the need for continuous power and sensor accuracy.[7] The paper introduces a safe driving system using knowledge distillation. It addresses the challenge of improving driver safety.

Limitations may include model complexity and adaptability in diverse driving conditions. [8] This research combines law enforcement reports with safe navigation and a security system for women. It addresses the safety associated with traveling. One of the constraints is probable system failures and navigation's accuracy. [9] The paper looks at IoT-enabled technologies aimed to increase women's safety. The difficulty here is the sensitivity of IoT systems. Two constraints are implementation complexity and user freedom. [10] Using SMS and GPS tracking, Safe Track keeps women secure. Its primary objective is to provide situational safety for individuals. Two issues are dependability on technology and user privacy of information. [11] This work presents an IoT-based crash monitoring and identification system with alarms. It emphasizes the need for fast emergency communications. Some issues arise from the dependability of the sensors and the extent of the network's coverage. [12] The paper addresses a clever approach to detecting mishaps. It addresses the importance of acting fast should an accident strike. Among the restrictions are the complexity of the system and the likelihood of erroneous conclusions derived from data. [13] This paper offers methods of accident detection grounded on CCTV footage. It fills in for the lack of real-time tracking systems. Two challenges are privacy issues and the need for many cameras.[14] It explores crash alert systems using the Internet of Things and the cloud. Its major objective is to prevent crashes by means of timely advice. Limitations can include network and cloud issues.[15] This paper presents IoT-based sensor network accident detection. It relates to speedy accident reporting. Track accuracy might be lowered by external interference and sensor calibration.[16] Based on machine learning, the study addresses an IoT network accident monitoring and warning system. It addresses how one should react to events efficiently. Two constraints are the need to handle data in real time and train models.[17] This research largely addresses how to monitor the drivers to prevent health-related accidents. It addresses how to identify health issues while behind the wheel. Some issues can include false findings and the requirement of attentive observation.[18] The study offers a framework for identifying unusual group behavior. It addresses concerns about safety for mentally ill persons. One of the limitations is privacy concerns and the possibility of being falsely recognized. [19] This research addresses a means of monitoring elderly and mentally ill individuals who are outdoors. It addresses outer safety concerns. Two limits are acceptance of technology and external dependency.

IV. PROPOSED SYSTEM

This project proposes the potential to significantly improve the quality of life for mentally challenged individuals, enhancing their ability to navigate daily challenges while maintaining a high level of women's safety and support. In this project, we conducted an analysis to ensure the stability of accident alerts, fall detection systems, and safe routing in virtual reality environments.

Fig.1. Working process



ARCHITECTURE DIAGRAM

Initially, we used ultrasonic sensors to detect accidents and monitor the environment for potential hazards.Next, MPU6050 accelerometer and gyroscope for fall detection, accurately identifying falls and their severity. Finally, a virtual reality-based safe routing system provides guided navigation through unfamiliar environments. GPS and GSM modules for location tracking and emergency alert initiation.

1. USER

The user is the primary individual for whom the safety system is designed; typically, they are mentally challenged. The system aims to enhance their independence while ensuring their safety through continuous monitoring and alert mechanisms.

2. ULTRA SONIC SENSOR(HC SR04)

The HC-SR04 Ultrasonic Sensor uses ultrasonic waves to measure distance between the sensor and nearby objects. It works by emitting a sound pulse and measuring the time it takes for the echo to return. This makes it ideal for detecting obstacles, motion, or changes in position—without any physical contact.

3. ESP32 (MICROCONTRLLER)

The ESP32 serves as the central processing unit of the system. It processes data from the sensors, runs the fall detection and geofencing algorithms, and manages communication with the GPS and GSM modules. Its Wi-Fi and Bluetooth capabilities allow for versatile connectivity options.

4. GPS MODULE

The GPS module provides real-time location data, enabling the system to monitor the user's whereabouts. This data is essential for geofencing applications, where the system can define safe zones and alert caregivers if the user moves outside these designated areas.

5. GSM MODULE

The GSM module is responsible for sending emergency alerts to caregivers. When a fall is detected or if the user exits a safe zone, the ESP32 triggers the GSM module to send an SMS or call, ensuring immediate communication with caregivers or emergency service

6. FALL DETECTION ALOGRITHM

This algorithm analyzes data from the MPU6050 to identify fall events based on changes in acceleration and orientation. It employs thresholds and pattern recognition techniques to differentiate between normal movements and falls, ensuring timely alerts are generated.

7. GEOFENCING ALOGRITHM

The geofencing algorithm uses GPS data to monitor the user's location relative to predefined safe zones. It triggers alerts if the user exits these areas, allowing caregivers to respond quickly and effectively to potential safety threats.

8. TEMPATURE SENSOR

Temperature sensors are essential in IoT-based safety systems, as they enable real-time monitoring of body and environmental temperature. This helps in early detection of health issues like fever or environmental hazards such as fire, overheating, or extreme cold. When abnormal temperature levels are detected, the system can automatically trigger alerts to caregivers or emergency services, ensuring quick response and enhanced safety for women and mentally challenged individuals.

V. MODULES INVOLED

1. ACCIDENT DETECTION AND RESPONSE:

Ultrasonic sensors continuously scan the environment. AI algorithms analyze sensor data to detect potential hazards. Automatic alert system sends notifications to caregivers and emergency services.

2. FALL DETECTION

MPU6050 accelerometer and gyroscope monitor movement patterns.Machine learning algorithms differentiate between falls and normal activities.Severity assessment of detected falls.

3. SAFE ROUTING

GPS data combined with map information for location awareness. AI-powered navigation system provides step-by-step instructions.
Virtual reality interface for visual guidance.

4 .LOCATION TRACKING

Real-time GPS tracking accessible via web app.Geo-fencing capabilities for setting safe zones and alerts.

5. CUSTOMIZABLE ALERTS

Personalized notification preferences for caregivers.Continuous learning and adaptation based on user behavior.Insights for improving safety measures over time.

VI. METHODLOGY

1.ONE MAY TRACK REAL-TIME MOVEMENT

These sensors are the MPU6050 Accelerometer and Gyroscope, always detecting human movement and direction.Those who could show a fall particularly pay close attention to any odd or aberrant movement patterns.Using an innovative method, the system examines sensor data to determine if a fall has occurred. Should a fall be detected, the system immediately launches an emergency alert.

2. LOCATION MONITORING WITH GEOFENCING

The GPS module notes user's real-time location. Based on GPS coordinates—known as geofences—the system is designed to generate "safe zones."
The system identifies a user moving beyond the pre-defined safe zone and immediately signals caretakers so they may react fast.

3. ALERTS REGARDING EMERGENCY CALLS

The brain of the system is an ESP32 microcontroller, which processes data from sensors and GPS while regulating device connectivity. The GSM module alerts the caregiver by SMS or phone call when the system detects an emergency such as a fall or leaving the secure zone. This guarantees informed attendants anywhere they are.

4. PASSIVE SECUIRTY

Knowing that the system would be quickly alerted helps family and guardians have peace of mind if the user finds themselves in a possibly perilous scenarioWhen combined with fall detection, geofencing enables prompt action, ensuring the prompt arrival of help in an emergency.

5. ENHANCEMENT OF AUTONOMY

Apart from guarantees of user safety, the system seeks to empower the user by means of independence. While caretakers may keep an eye on their well-being from a distance, users are free to stray within approved safe locations.

6. ACCIDENT DETECTION AND FALL DETECTION

Fall detection is crucial for sensitive individuals who may fall and sustain injuries.By analyzing the movement using state-of-the-art algorithms, the device can rapidly identify falls and instantly alert caregivers, therefore assuring early intervention. The project also incorporates accident detection, a feature that triggers alerts when unexpected accidents occur.

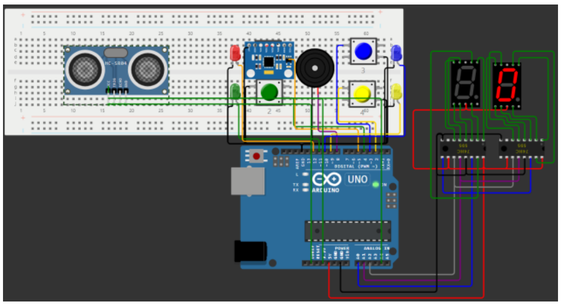


Fig.2 . Implementation using Wokwi

7. RESULTS AND DISCUSSION

Mentally challenged people's safety and accident detection system (implemented in Wokwi) By integrating real-time monitoring, geofencing, fall detection, and accident detection, this initiative sought to improve the safety and wellbeing of people with mental disabilities.
Wokwi, a platform for simulating embedded systems, tested and assessed the system's main components, as shown in Fig. 2, and Table 1 displays the results.

8. GEOFENCING SAFE ZONES

The technology was able to recognize and alert caregivers when a user left a specified safe area. The geofencing feature accurately and successfully simulated real-world scenarios. Caretakers were able to take immediate action in the event that the person wandered, which is a regular issue for those with special needs, thanks to instant alarms.

9. FALL DETECTION

Using motion sensors to detect sudden changes in orientation or movement, the fall detection component accurately identified falls. The simulation incorporated real-world dynamics, such as vertical movement and provided caregivers with real-time notifications. This ensures timely intervention for individuals who are at risk of falling, which is an essential safety component.

10. ACCIDENT DETECTION

By tracking unusual movement patterns, the system was able to spot abrupt, erratic behavior that would indicate an accident. Even though the system was good at identifying accident scenarios, it occasionally misread small motions like stumbling. Accuracy would increase if this feature's sensitivity were adjusted.

11. DESIGN AND DEVLPOMENT

Above the flowchart shows the operational reasoning of a smart fall detection and safety monitoring system designed to protect sensitive individuals, particularly those with mentally challenged conditions. This approach starts with always gathering user mobility and location data. Combining an accelerometer with a gyroscope, the MPU6050 sensor picks up unusual motion patterns suggestive of a fall. Once data arrives, the system looks to see whether a fall has happened. Should a fall be identified, the system uses a fall detection algorithm to verify the occurrence by means of additional analysis. Confirmed, it starts a GPS search to find the user and then sends the caregiver an emergency alert together with the location details. Should the fall remain unverified, the system goes back into monitoring mode to keep track of user activity. In case of precaution, the system nevertheless asks the user for their GPS location even if no fall is first identified. It verifies whether the user follows the location data and falls into a specified safe zone. Should the user show to be inside this safe limit, the system maintains constant observation without any more intervention. The caregiver is immediately alerted, but should the user be found outside the safe zone implying a probable risk or emergency? In non-critical conditions the system loops back to track the user's state; in all alert scenarios the system stops the current process after necessary action. For people who demand specific attention, combining fall detection with geofencing-based warnings ensures constant surveillance, quick emergency alerts, and enhanced safety.

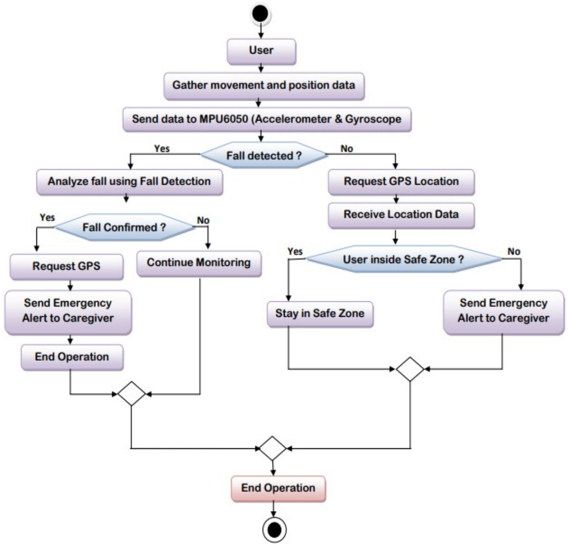


Fig.3 Flowchart

USER EXPERIENCE AND SYSTEM INTERGRATION

Caregivers were able to monitor real-time data, such as location, fall status, and accident alarms, thanks to the Wokwi simulation's user-friendly interface. In an emergency, the system's fast reaction times guaranteed that caregivers would act quickly.

Table.1: Testcase Table

Test Case	Input Parameters	Expected Output
1. Geofencing	**User Location:** (Latitude: 40.7128, Longitude: -74.0060)	**User crosses the boundary.**
	Safe Zone Boundary: (Latitude: 40.7100, Longitude: -74.0040) (within 100 meters)	**Alert Triggered:** Yes
2. Geofencing	**User Location:** (Latitude: 40.7105, Longitude: -74.0020)	**User is within safe zone.**
	Safe Zone Boundary: (Latitude: 40.7100, Longitude: -74.0040) (within 100 meters)	**Alert Triggered:** No
3. Fall Detection	**User's Movement:** Sudden	**Fall Detected:** Yes

	vertical displacement (acceleration > 3 m/s²)	
		Alert Triggered: Yes
4. Fall Detection	**User's Movement:** Slow vertical displacement (acceleration < 1 m/s²)	**Fall Detected:** No

RESULT AND DISCUSSION

Place in a real-time surroundings was successful implementation and testing of the recommended IoT-based safety and monitoring system for women and cognitively challenged persons. Included into the system were key components such the ESP32 microcontroller, GPS and GSM modules, MPU6050 sensor for fall detection, ultrasonic sensor for accident detection, and panic button to offer efficient real-time monitoring and emergency warning systems.

Using the MPU6050 sensor, which tracked fast changes in movement and orientation, the system consistently found fall events during testing. Once a fall was discovered, GSM quickly contacted a registered caregiver. The panic button's dependability was similar; it offered preselected emergency warning messages mixed with instantaneous alert signals when manually pushed. The GPS module tracked user location well and enabled geofencing, that is, it put off "Outside Safe Zone!" warnings should the user go outside a designated safe zone, therefore enabling caretakers to track mobility and safety.

To provide more help in accident detection, surrounding objects or impacts were located using an ultrasonic sensor. Every alert was sent by SMS texts to the caregiver's mobile number, so offering quick communication even without internet access. Effective broadcast of signals including "PANIC BUTTON PRESSED!," "Fall Detected!" and "Outside Safe Zone!" verified the dependability and responsiveness of the system in many surroundings.

The conversation made it quite clear that the system is rather helpful in situations involving vulnerable people who would find it difficult to independently seek help. Strong and easily scalable, the alert system could be added into wearable gadgets to improve mobility. Still, there were a few small restrictions observed: the periodic delay in GSM message delivery in low-signal areas and the necessity of constant sensor recalibration to preserve accuracy.

All things considered, the findings showed that the system offers a reasonable strategy to raise personal safety—especially for cognitively challenged users and women in delicate situations.In the end, it guarantees proactive monitoring, real-time alarms, and quick caregiver reaction; so, it helps to prevent damage and provide comfort to consumers and their families.The system routinely identified fall occurrences during testing using the MPU6050 sensor, which tracked rapid changes in movement and orientation. Once a fall was reported, GSM notified a registered caregiver right away. The dependability of the panic button was similar; it emitted preselected emergency warning messages combined with instantaneous alarms when manually triggered. The GPS module tracked user location well and allowed geofencing—that is, it set out "Outside Safe Zone!" alarms should the user stray outside a defined safe zone, therefore allowing caregivers to monitor mobility and safety.

The ultrasonic sensor was used to find nearby objects or collisions in order to offer greater accident detecting aid. Every alarm was sent to the caregiver's mobile number via SMS texts to provide fast communication even without internet connection. Successful transmission of messages including "PANIC BUTTON PRESSED!," "Fall Detected!" and "Outside Safe Zone!" confirmed the dependability and responsiveness of the system in numerous circumstances.

The discussion made it quite evident that in cases involving vulnerable individuals who would find it difficult to seek aid on their own, the system is really beneficial. Strong and easily scaled, wearable devices could include the alert system to increase portability. Still, there were several minor constraints noted: the need of consistent sensor recalibration to maintain accuracy and the intermittent delay in GSM message delivery in low-signal environments.

All things considered, the results revealed that the system provides a decent approach to increase personal safety—especially for women in sensitive situations and cognitively impaired users. In the end, it provides proactive monitoring, real-time alarms, and quick caregiver reaction; so, it helps to prevent damage and provide peace of mind to consumers and their families.

PANIC BUTTON PRESSED!

Description:

This message is triggered when the user manually presses the emergency panic button integrated into the device. It is intended for situations where the individual feels threatened or unsafe. Upon activation, the system immediately sends this alert via GSM to the caregiver or emergency contact, along with GPS location details (in the full implementation). This feature ensures the user can call for help even when unable to verbally communicate.

FALL DETECTED!

Description:

This message indicates that a fall has been automatically detected by the MPU6050 accelerometer and gyroscope sensor. The sensor continuously monitors the user's orientation and motion patterns. When a sudden and abnormal change is detected — such as rapid downward movement followed by a stationary state — the system interprets it as a fall and sends this alert to the caregiver. It helps ensure rapid response in case the user becomes unconscious or immobilized.

OUTSIDE SAFE ZONE!

Description:

This message indicates that a fall has been automatically detected by the MPU6050 accelerometer and gyroscope sensor. The sensor continuously monitors the user's orientation and motion patterns. When a sudden and abnormal change is detected — such as rapid downward movement followed by a stationary state — the system interprets it as a fall and sends this alert to the caregiver. It helps ensure rapid response in case the user becomes unconscious or immobilized.

Description:

In the proposed IoT-based health monitoring system, the LCD display is programmed to continuously show the current body temperature of the user in real time. When the body temperature exceeds a predefined safety threshold (e.g., 100°F), the system identifies it as a fever or abnormal health condition. In such cases, the LCD immediately displays a warning message such as "High Body Temperature Detected!" along with the current temperature reading.

Simultaneously, the ESP32 microcontroller, integrated with a GSM module, automatically sends an SMS alert to the registered caretaker's mobile number. The message contains a warning (e.g., *"High Body Temperature!"*), the measured temperature value (e.g., *Temp = 109.74°F*), and a location link using GPS coordinates. This enables the caretaker to take immediate action while also knowing the precise real-time location of the user, ensuring timely intervention during potential health emergencies.

VI. CONCULSION

Our concept offers a strong safety and accident prevention mechanism catered for mentally challenged people. The system greatly increases user safety and freedom by using cutting-edge technologies like real-time monitoring, GPS tracking, geofencing, and fall detection; therefore, it offers necessary assistance to caregivers. This creative answer provides families with more peace of mind and enables users to boldly explore their surroundings, thereby addressing current flaws in safety precautions. In the end, our effort helps to create an inclusive society that gives the welfare of underprivileged groups first priority, therefore guaranteeing a higher quality of living for those with mental problems.

VII. REFERNCE

[1] N. V. K. Ramesh, A.Alaparthi, G. Sai Charan, R. Settipalli, P. Velga and B. V. Vani, "Empowering Women's Safety with smart IoT Technology: A Robust Protection System," 2023 4th International Conference on Signal Processing and Communication (ICSPC), Coimbatore, India, 2023, pp. 278-281, doi: 10.1109/ICSPC57692.2023.10125736

[2] A.K, B. Rajalakshmi, K. S. Chaitanya Reddy, G. P. Guggulla and S. K. B V, "A Review on Women Safety in India using Machine Learning on Different Social Media Platform," 2022 Second International Conference on Advanced Technologies in Intelligent Control, Environment, Computing & Communication Engineering (ICATIECE), Bangalore, India, 2022, pp. 1-5, doi: 10.1109/ICATIECE56365.2022.10047377.

[3] S. K. Ayesha, G. Shivani, E. Harika, N. Akhila and B. S. K. Devi, "IoT based Women Safety and Security Analysis," 2022 4th International Conference on Inventive Research in Computing Applications (ICIRCA), Coimbatore, India, 2022, pp. 288-294, doi: 10.1109/ICIRCA54612.2022.9985672.

[4] Manahil, R. Abdulla and M. E. Rana, "Architectural Design and Recommendations for a Smart Wearable Device for Women's Safety," 2023 15th International Conference on Developments in eSystems Engineering (DeSE), Baghdad & Anbar, Iraq, 2023, pp. 215-220, doi: 10.1109/DeSE58274.2023.10099522.

[5] Anitha. N; Vishnu Vardhan R B; Pradeep R; Nazeem A, "A Lightweight Wearable Fall Detection System using Gait Analysis for Elderly," 2024 IEEE International Conference for Women in Innovation, Technology & Entrepreneurship (ICWITE), Bangalore, India, 2024, pp. 539-545, doi: 10.1109/ICWITE59797.2024.10502620.

[6] C. R. Prasad, G. V. Naga Satwik, E. Phaneeshwari, R. Moola, K. Pranith and D. R. Rao, "TinyML-based Real-Time System for Detecting Falls in Elderly People," 2024 Asia Pacific Conference on Innovation in Technology (APCIT), MYSORE, India, 2024, pp. 1-6, doi: 10.1109/APCIT62007.2024.10673501.

[7] D. Yeom, H. Yoon, S. Lee and K. Lee, "Personal Mobility Safe Driving System with Knowledge Distillation," 2023 20th International Conference on Ubiquitous Robots (UR), Honolulu, HI, USA, 2023, pp. 217-222, doi: 10.1109/UR57808.2023.10202355.

[8] A.Chinnasamy, A.Donde and D. Joshi, "Integrated Women's Security System with Safe Route Navigation and Instant Law Enforcement Reporting," 2024 4th International Conference on Pervasive Computing and Social Networking (ICPCSN), Salem, India, 2024, pp. 197-202, doi: 10.1109/ICPCSN62568.2024.00041.

[9] N. T. Singh et al., "Securing IoT-Enabled Web Applications and Enhancing Women's Safety Through Advanced Technologies," 2024 International Conference on

Intelligent Systems for Cybersecurity (ISCS), Gurugram, India, 2024, pp. 1-5, doi: 10.1109/ISCS61804.2024.10581319.
[10] T. Gupta, G. K. Pandit, A.Kumar, H. Mishra and B. Sharan, "SafeTrack: Empowering Women's Security with GPS Location Tracking and Messaging," 2023 Second International Conference on Augmented Intelligence and Sustainable Systems (ICAISS), Trichy, India, 2023, pp. 794-799, doi: 10.1109/ICAISS58487.2023.10250701
[11] S. N. Razali, K. A.Fariza Abu Samah, M. H. Ahmad and L. S. Riza, "IoT Based Accident Detection And Tracking System With Telegram and SMS Notifications," 2021 6th IEEE International Conference on Recent Advances and Innovations in Engineering (ICRAIE), Kedah, Malaysia, 2021, pp. 1-5, doi: 10.1109/ICRAIE52900.2021.9703970.
[12] M. L. S. Kumar, U. S. Ashritha, Y. Sumanth, S. Hafeez, P. P.K and A.Chandran, "Smart Accident Detection System," 2021 Second International Conference on Electronics and Sustainable Communication Systems (ICESC), Coimbatore, India, 2021, pp. 1675-1679, doi: 10.1109/ICESC51422.2021.9532702.
[13] R. Babu and B. Rajitha, "Accident Detection through CCTV Surveillance," 2022 IEEE Students Conference on Engineering and Systems (SCES), Prayagraj, India, 2022, pp. 01-06, doi: 10.1109/SCES55490.2022.9887656.
[14] S. Areef, T. Y. Sai, V. S. Harsha, G. S. S. Deepak, A.K and P. Yellamma, "A Study on Cloud and IoT based Accident Detection & Prevention Systems," 2023 International Conference on Sustainable Computing and Data Communication Systems (ICSCDS), Erode, India, 2023, pp. 1131-1136, doi: 10.1109/ICSCDS56580.2023.10104676.
[15] G. T. Selvi, R. Prabha, G. A.Senthil, S. R. Krishnan V, S. A and J. R, "An Improved Internet of Things Based Accident Detection System Using Sensor Networks," 2022 International Conference on Power, Energy, Control and Transmission Systems (ICPECTS), Chennai, India, 2022, pp. 1-5, doi: 10.1109/ICPECTS56089.2022.10046887.
[16] G. S. Rathod, K. Jajulwar and U. Kubde, "Machine learning-based intelligent accident detection and notification system in IoT network," 2023 11th International Conference on Emerging Trends in Engineering & Technology - Signal and Information Processing (ICETET - SIP), Nagpur, India, 2023, pp. 1-5, doi: 10.1109/ICETET-SIP58143.2023.10151583.
[17] H. Hayashi, M. Kamezaki and S. Sugano, "Toward Health–Related Accident Prevention: Symptom Detection and Intervention Based on Driver Monitoring and Verbal Interaction," in IEEE Open Journal of Intelligent Transportation Systems, vol. 2, pp. 240-253, 2021, doi: 10.1109/OJITS.2021.3102125.
[18] Y. Hao et al., "An End-to-End Human Abnormal Behavior Recognition Framework for Crowds With Mentally Disordered Individuals," in IEEE Journal of Biomedical and Health Informatics, vol. 26, no. 8, pp. 3618-3625, Aug. 2022, doi: 10.1109/JBHI.2021.3122463.
[19] J. P. Lousado and S. Antunes, "PRO2S - System for the Protection and Monitoring of the Elderly and Mentally I11 in Outdoor," 2019 14th Iberian Conference on Information Systems and Technologies (CISTI), Coimbra, Portugal, 2019, pp. 1-5, doi: 10.23919/CISTI.2019.8760634.