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IoT based Women Safety Smart System Development

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Abstract: *Designing an effective system for women's safety is essential for reducing crimes against women and prosecuting the guilty. Women harassment at workplace, public transport etc., has been a rising concern all over the world. An early action and proper mechanism could reduce the number of crimes against women. The development of a Women Safety Smart System within the Internet of Things (IoT) domain represents a significant advancement in leveraging technology to address the pressing issue of women's safety. This paper outlines the design, implementation, and potential impact of such a system, which integrates IoT devices, sensors, and data analytics to create a proactive safety infrastructure. Key components of the system include IoT-enabled wearables, smart surveillance and monitoring systems, a dedicated mobile application, and predictive analytics capabilities. These components work synergistically to provide real-time monitoring, timely intervention, and community engagement in ensuring the safety and well-being of women. By harnessing IoT technology, this system offers a scalable and adaptable solution to mitigate risks, empower women, and foster societal change. The paper discusses the benefits, challenges, and future directions of Women Safety Smart Systems in the IoT domain, highlighting their potential to transform safety paradigms and promote inclusivity and equality in urban environments.*

Keywords: Women harassment

I. INTRODUCTION

In recent years, ensuring the safety and security of women has become a pressing concern globally. Despite various efforts and initiatives, incidents of violence and harassment against women continue to persist, highlighting the need for innovative solutions to address this societal challenge. In response to this imperative, the development of a Women Safety Smart System emerges as a pivotal endeavor aimed at leveraging technology to enhance the safety and well-being of women in various contexts [3]. The Women Safety Smart System is envisioned as a comprehensive platform integrating advanced technologies such as Internet of Things (IoT), artificial intelligence (AI), and data analytics to create a robust safety infrastructure.

The purpose of this device is to safeguard women in the event they might face any danger. The device uses wireless sensor network to communicate and to send alerts to them. The GPS and GSM are used to share the used to share the user's location directly to the relevant authorities and saved contacts [5]. Women empowerment has been a crucial issue in the global development agenda for many decades. The empowerment of women refers to the process of increasing women's economic, social, and political power. The empowerment of women is vital to achieving gender equality and sustainable development.

II. LITERATURE SURVEY

A. Nikhil Kedia entitled "Water Quality Monitoring for Rural Areas-A Sensor Cloud Based Economical Project." Published in 2015 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun, India. This paper highlights the entire water quality monitoring methods, sensors, embedded design, and information dissipation procedure, role of government, network operator and villagers in ensuring proper information dissipation. It also explores the Sensor Cloud domain. While automatically improving the water quality is not feasible at this point, efficient use of technology and economic practices can help improve water quality and awareness among people.

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B. Jayti Bhatt, Jignesh Patoliya, Iot Based Water Quality Monitoring System, IRFIC, 21feb,2016. Jayti Bhatt, Jignesh Patoliya entitled "Real Time Water Quality Monitoring System". This paper describes to ensure the safe supply of drinking water the quality should be monitored in real time for that purpose new approach IOT (Internet of Things) based water quality monitoring has been proposed. In this paper, we present the design of IOT based water quality monitoring system that monitor the quality of water in real time. This system consists some sensors which measure the water quality parameter such as pH, turbidity, conductivity, dissolved oxygen, temperature. The measured values from the sensors are processed by microcontroller and this processed values are transmitted remotely to the core controller that is raspberry pi using Zigbee protocol. Finally, sensors data can view on internet browser application using cloud computing[4].

III. INTERNET OF THINGS(IOT)

IoT stands for Internet of Things. It refers to the interconnectedness of physical devices, such as appliances and vehicles, that are embedded with software, sensors, and connectivity which enables these objects to connect and exchange data. This technology allows for the collection and sharing of data from a vast network of devices, creating opportunities for more efficient and automated systems. **Internet of Things(IoT)** is the networking of physical objects that contain electronics embedded within their architecture in order to communicate and sense interactions amongst each other or with respect to the external environment. In the upcoming years, IoT-based technology will offer advanced levels of services and practically change the way people lead their daily lives. Advancements in medicine, power, gene therapies, agriculture, smart cities, and smart homes are just a few of the categorical examples where IoT is strongly established. IOT is a system of interrelated things, computing devices, mechanical and digital machines, objects, animals, or people that are provided with unique identifiers. And the ability to transfer the data over a network requiring human-to-human or human-to-computer interaction.

IV. EXISTING SYSTEM

To develop an IoT-based women safety smart system, you can start with the following components and functionalities:

1. Hardware Components

- NodeMCU or similar IoT development board for connectivity.
- GPS module for location tracking.
- GSM module for sending alert messages.
- Push button or panic button for manual triggering of alerts.
- Sensors like accelerometer or gyroscope for detecting falls or sudden movements.
- Power supply (battery or mains) for continuous operation.

2. Software Components

- Embedded firmware for NodeMCU to handle sensor data and communication with the server.
- Server-side application for receiving and processing data from the IoT devices.
- Mobile application for users to interact with the system, receive alerts, and view location information.
- Database for storing user information, device data, and alert history

3. Functionalities:

- Alert Generation: When the user presses the panic button or when a predefined safety condition is detected (e.g., sudden fall), the system should generate an alert.
- Location Tracking: Utilize GPS to track the user's location and send it along with the alert message.
- Alert Messaging: Use GSM to send SMS or make calls to predefined emergency contacts with the user's location.
- User Interface: Develop a user-friendly mobile app where users can set preferences, view their safety status, and receive alerts.

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- Emergency Response: Integrate mechanisms for emergency services to respond to alerts quickly.

4. Security and Privacy:

- Implement encryption for data transmission to ensure privacy and security.
- User authentication and authorization mechanisms to prevent unauthorized access.
- Regular security updates and monitoring to address potential vulnerabilities.

5. Testing and Validation:

- Conduct thorough testing of the system to ensure proper functioning of hardware and software components.
- Validate the accuracy of location tracking and the reliability of alert generation.
- Solicit feedback from potential users to improve the system's usability and effectiveness.

V. SOFTWARE USED

The purpose of Thing Speak in women's safety development using pushbuttons and NodeMCU revolves around creating a robust and data-driven safety monitoring and alerting system. Thing Speak is an IoT platform that allows for real-time data collection, analysis, and visualization, making it a valuable addition to safety solutions. Here's how Thing Speak can be utilized:

Data Collection:
Thing Speak can receive and store data from NodeMCU devices connected to pushbuttons. When a user triggers a distress signal through the pushbutton, NodeMCU can send relevant data such as location coordinates, timestamp, and event status to Thing Speak.

Real-time Monitoring:
Thing Speak provides real-time monitoring capabilities, allowing authorities or designated responders to track and monitor distress signals as they occur. This enables quick and efficient response to emergency situations.

Data Analytics:
Thing Speak's analytics features can process incoming data streams from multiple NodeMCU devices. It can analyse trends, detect patterns, and generate insights into safety incidents, helping identify high-risk areas or recurring issues.

Alerting and Notifications:
Thing Speak can be configured to send alerts and notifications to predefined contacts or response teams when specific conditions are met. For example, it can trigger alerts based on the frequency of distress signals or the location of incidents.

Historical Data Storage:
Thing Speak stores historical data, allowing for retrospective analysis and reporting. This data can be valuable for assessing the effectiveness of safety measures, identifying areas for improvement, and documenting response times.

Integration with Other Services:
ThingSpeak can integrate with external services such as SMS gateways, email notifications, and mobile apps. This integration expands the reach of safety alerts and ensures that responders receive timely notifications regardless of their communication preferences.

Visualization:
Thing Speak offers visualization tools such as charts, graphs, and maps to display data in a user-friendly format. This visual representation helps stakeholders understand trends, spatial distribution of incidents, and the impact of safety interventions.

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VI. RESULTS

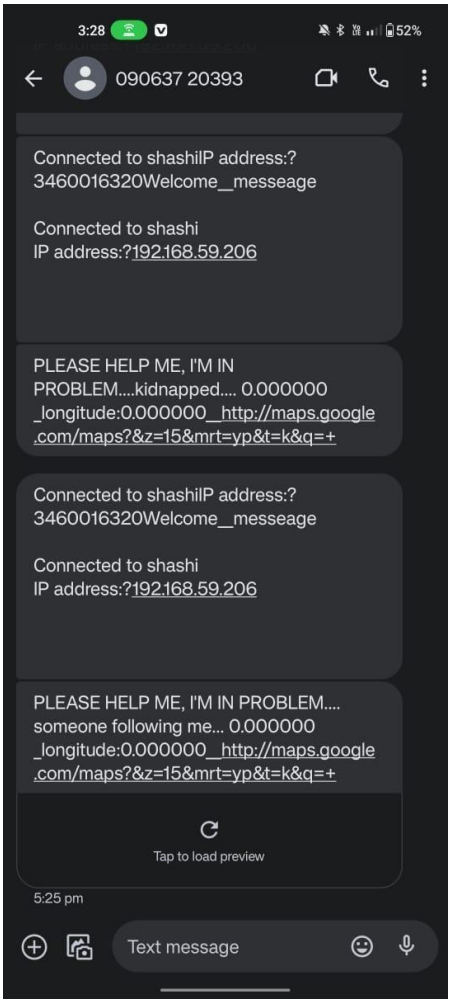

Fig 7.1 Message Alert

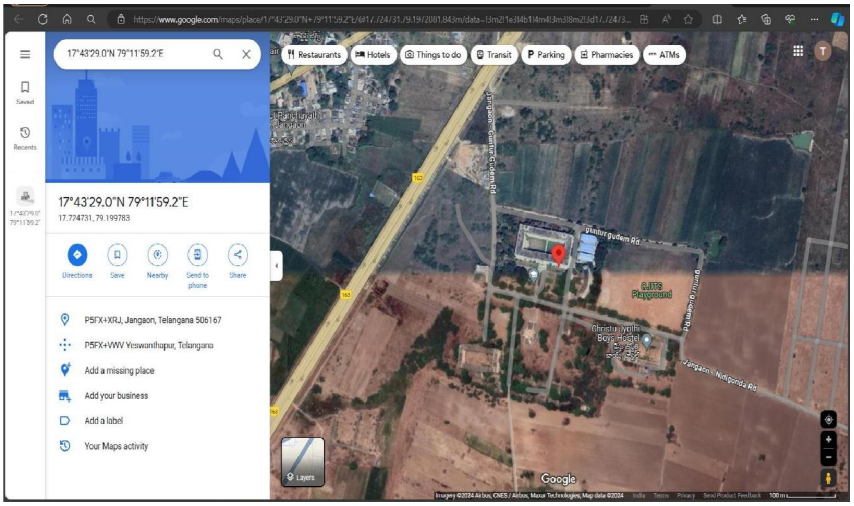

Fig: 7.2 Location Tracing

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Alert Messages:

- Use push buttons or a panic button that the user can press in case of an emergency.
- Connect these buttons to a microcontroller like NodeMCU, which can communicate with the cloud or a central server.
- Write code to detect button presses and trigger alert messages. You can use GSM modules for sending SMS alerts or integrate with a mobile app for notifications.

Location Tracking:

- Utilize GPS modules in the system to track the user's location in real-time.
- Integrate the GPS data with the microcontroller and cloud/server to store and process location information.
- Develop algorithms to analyse location data for safety purposes, such as identifying safe zones or tracking movement patterns.
- Enable location sharing with trusted contacts or authorities in case of emergencies.

VII. CONCLUSION

In conclusion, women safety development using IoT, push buttons, NodeMCU, GSM, and GPS offers significant advantages such as real-time tracking, emergency alerts, two-way communication, and customizable solutions [5]. However, there are potential disadvantages including dependency on technology, privacy concerns, false alarms, limited coverage, cybersecurity risks, maintenance challenges, integration complexity, and user adoption issues. Overcoming these challenges requires careful planning, robust security measures, user education, ongoing maintenance, and collaboration with stakeholders to ensure the effectiveness and acceptance of these safety solutions.

The integration of these technologies enables women to access immediate assistance, share their location during emergencies, and communicate effectively with responders or support networks. By leveraging NodeMCU, pushbuttons, GPS, and GSM modules, developers can create robust, user-friendly, and data-driven solutions that contribute significantly to enhancing women's safety and well-being in various contexts, including transportation, campuses, homes, and digital environments

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