IMPACT OF IOT ON WOMEN'S SECURITY: A SYSTEMATIC REVIEW PROJECT

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1. INTRODUCTION

Women's safety is a fundamental concern worldwide, with millions experiencing threats such as harassment, assault, and domestic violence in both public and private spaces. These issues not only jeopardize their physical security but also impact their psychological well-being, social mobility, and economic opportunities. Traditional safety measures, including policy reforms, legal frameworks, and awareness campaigns, have played a significant role in addressing these concerns. However, they often fall short in providing immediate, real-time protection, particularly in situations where women are unable to seek help manually. As crimes against women continue to rise, there is an urgent need for innovative technological solutions that can proactively prevent incidents, enhance situational awareness, and facilitate timely intervention.

The advent of the Internet of Things (IoT) has introduced a new dimension to personal safety, enabling real-time monitoring and emergency response through connected devices. IoT-based women's safety solutions, particularly wearable devices, utilize a combination of advanced sensors such as pulse rate monitors, pressure sensors, accelerometers, and gyroscopes to detect distress conditions. These devices can automatically sense abnormal physiological or movement patterns and trigger alerts without requiring manual activation. Communication technologies like Global Positioning System (GPS) and Global System for Mobile Communications (GSM) allow for the real-time transmission of location-based alerts to emergency contacts or law enforcement agencies, facilitating a swift response. Additionally, machine learning algorithms play a crucial role in improving the intelligence of these systems by analyzing sensor data, identifying potential threats, and reducing false alarms.

Despite these advancements, IoT-based women's safety devices still face significant challenges. Many current systems rely heavily on manual activation, which may not always be possible in dangerous situations. Accuracy in distress detection remains a concern, as misinterpretation of sensor data can lead to false alarms, reducing the reliability of these devices. Furthermore, integrating multiple sensors and technologies to improve efficiency while maintaining cost-effectiveness and user-friendliness remains a challenge. To overcome these limitations, this study systematically reviews existing IoT-based safety devices developed between 2016 and 2022, identifying their strengths, weaknesses, and technological gaps. Based on these findings, the study proposes a robust architectural model that emphasizes automatic alert generation, sensor fusion for improved accuracy, and enhanced machine learning capabilities for proactive threat detection. By addressing the existing shortcomings, future IoT-based women's safety solutions can offer more reliable, efficient, and intelligent protection mechanisms, ensuring greater security and empowerment for women worldwide.

This project reviews the impact of IoT on women's safety through smart, connected technologies. It highlights devices like wearables, GPS trackers, and emergency alert systems that enable real-time monitoring and quick response. These tools help detect threats and contact emergency services instantly. IoT also collects data to improve safety strategies. Overall, it empowers women with reliable, tech-based protection.

2. ABSTRACT

Women's safety remains a major societal concern, with many facing threats such as harassment, rape, molestation, and domestic violence due to various social and cultural factors. The Internet of Things (IoT) has emerged as a promising technology to address these issues by introducing smart safety devices. This study conducts a systematic literature review of research on IoT-based women's safety devices, analyzing their key features, wearable sensors, and machine learning algorithms. By examining research articles published between 2016 and 2022, the review identifies commonly used sensors such as pulse-rate and pressure sensors, as well as alert transmission technologies like GPS, GSM, and Raspberry Pi. Machine learning techniques, including logistic regression, Hidden Markov models, and decision trees, are used to detect potential threats and prevent harm. Despite notable advancements, the study highlights the need for automated alert systems with minimal human interaction and improved accuracy. Additionally, it proposes a taxonomy categorizing different techniques, wearables, and sensors used in these devices, along with an architectural model outlining essential components for effective IoT-based safety solutions. The study also emphasizes the benefits of integrating multiple sensors to enhance threat detection accuracy and precision while identifying existing gaps and challenges in the field.

3. EXISTING SYSTEM

In Few studies identified the IoT-based devices for women's safety, to the best of our knowledge. The existing system for IoT in women's safety includes various smart technologies, wearable devices, mobile applications, and real-time monitoring solutions designed to enhance security and emergency response. Wearable devices such as smart jewelry, smartwatches, and sensor-embedded clothing allow women to trigger emergency alerts through panic buttons or automated distress signals. Mobile applications with GPS tracking, SOS alerts, and real-time location sharing enable users to notify trusted contacts or law enforcement in case of danger. Additionally, AI-powered surveillance systems, smart streetlights, and public panic buttons contribute to safer public spaces. Cloud-based IoT networks facilitate real-time data transmission, integrating safety devices with law enforcement for quick response. However, challenges such as false alarms, battery dependency, connectivity issues, and privacy concerns still exist. Despite these limitations, IoT-based solutions continue to evolve, offering more advanced and reliable safety mechanisms for women.

The existing IoT-based systems for women's safety utilize a variety of smart technologies, wearable devices, mobile applications, and real-time monitoring solutions designed to improve security and facilitate emergency response. Wearable devices such as smart jewelry, smartwatches, and sensor-embedded clothing enable women to activate emergency alerts via panic buttons or automated distress signals. Mobile applications with GPS tracking, SOS alerts, and real-time location sharing allow users to quickly notify trusted contacts or law enforcement when they are in danger. Furthermore, AI-powered surveillance systems, smart streetlights, and public panic buttons contribute to safer public spaces, while cloud-based IoT networks enable real-time data transmission, integrating safety devices with law enforcement agencies for rapid response.

DISADVANTAGES OF EXISTING SYSTEM

- The complexity of data: Most of the existing machine learning models must be able to accurately interpret large and complex datasets to detect Women's Safety.
- Data availability: Most machine learning models require large amounts of data to create accurate predictions. If data is unavailable in sufficient quantities, then model accuracy may suffer.
- Incorrect labeling: The existing machine learning models are only as accurate as the data trained using the input dataset. If the data has been incorrectly labeled, the model cannot make accurate predictions.

4. PROPOSED SYSTEM

The proposed system works accurately than existing system and the model can efficiently provide the result for the given data. The Decision Tree Decision Tree classifier is used in the project to increase the model accuracy, speed and to increase the model's prediction. The designed taxonomy consists of four primary attributes. These are IoT-based safety sensors, dominating features, machine learning algorithms, IoT-based wearables in which sensors are embedded and IoT-based technologies, which cover most of the findings that are analyzed in this paper. IoT-based technologies monitor, control, and track the different precision attacks and locations of victims and systems. IoT-based technologies used in women's safety devices with their sub-domains have been demonstrated. Sensors produce valuable data by sensing and monitoring multiple variables. The data generated through sensing and monitoring devices are transferred through the communication protocols (Internet,

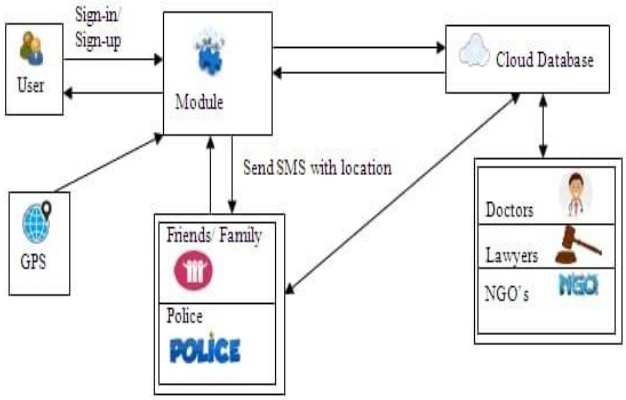
ZigBee, Bluetooth, WIFI) on the other side for a user or guardian of women. The designed taxonomy consists of four primary attributes. These are IoT-based safety sensors, dominating features, machine learning algorithms, IoT-based wearables in which sensors are embedded and IoT-based technologies, which cover most of the findings that are analyzed in this paper. IoT-based technologies monitor, control, and track the different precision attacks and locations of victims and systems. IoT-based technologies used in women's safety devices with their sub-domains have been demonstrated. Sensors produce valuable data by sensing and monitoring multiple variables.

The sensors used in women's safety devices have been discussed in detail. Moreover, the dominating features of loT-based women's safety devices, which make the devices efficient, used by the victim in different situations, are highlighted, Furthermore, to emphasize auto-activation of the alert generation feature, the data is collected through sensors, which on observing the readings that could depict specific state of women's body reflecting potential threat, enables the machine learning modules, after which alerts are generated and transmitted.

ADVANTAGES OF PROPOSED SYSTEM

- The machine learning algorithms are used by training these algorithms on the obtained input values of sensors under different conditions enabling the potential women under threat secretly inform the guardians without making any explicit interactions with the devices.
- The proposed taxonomy also presents the IoT-based wearables used for women's safety in which sensors are embedded to sense the danger and activate the algorithms of machine learning for further processing in terms of identifying the threat. The wearable used to embed the IoT devices for women's safety rely on sensors that fetch the data from the user and make the device automated.
- Real-time Tracking: Real-time tracking of women's location using GPS ensures prompt response in emergency situations.

5. SYSTEM ARCHITECTURE



The System Architecture for IoT in women's safety is designed to provide real-time protection, quick response, and continuous monitoring through a network of interconnected smart devices and cloud-based services. At the core of the system are wearable devices, such as smart bands, pendants, or keychains, embedded with sensors like GPS, accelerometers, gyroscopes, heart rate monitors, and microphones. These devices can detect sudden changes in movement, abnormal heart rate fluctuations, or voice-activated distress signals. In case of danger, the wearer can manually activate an SOS button, or the device can automatically trigger an alert based on unusual sensor readings.

Once activated, the device sends the user's location, health data, and any recorded audio or video evidence to a companion mobile app via Bluetooth or cellular connectivity. The app acts as an interface, displaying live data and allowing users to update emergency contacts or share location details. Simultaneously, the app forwards this information to a secure cloud server, where it is processed to assess the severity of the situation. Machine learning algorithms can analyze the data to filter out false alarms and prioritize genuine emergencies. The cloud server then broadcasts alerts to registered emergency contacts, local law enforcement, nearby volunteer responders, and public safety networks. Each recipient receives a detailed notification with the user's real-time location, personal profile, and live status updates. In parallel, smart city infrastructure can be integrated into the system for instance, IoT-enabled streetlights with built-in cameras and motion sensors that illuminate and start recording upon receiving a distress signal. The footage can be streamed to authorities, providing crucial visual context and aiding in faster rescue operations.

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