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Women Safety Device: A Technological Approachto Personal Security

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Abstract: It is now hard to live in the society these days by women. They feel handicapped in such situations and require help to save them from such dangerous conditions. There are many technologies introduced for women, but unfortunately, words like kidnapping, eve teasing, and sexual harassment are still very much alive in the country. When women encounter such unsafety situations, establishing an automatic detection system that sends up an alert message along with the location of the police department is what has to be done. This may include abnormal sounds, shaking, fearfulness, and heartbeat. These could be detected using appropriate sensors and provided the alert message. This paper surveys the existing mechanism for location detection, communication sending, and parameter collection from the human body via sensors.

I. INTRODUCTION

Personal safety is an issue of growing concern in today's world, especially for women. Reports of harassment, assault, and other forms of violence continue to rise, thus pointing out the need for effective solutions to enhance security and provide real-time protection.

In this regard, women, especially in cities, are more exposed to dangers while traveling or just performing daily activities when traveling alone. Due to these dangers, technology has created innovations that can answer these issues. One inno- vation is the development of women safety sensors, which provide alerts, monitoring, and support immediately when dangerous situations occur.

Women safety sensors are equipped with GPS tracking, motion sensors, panic buttons, and real-time communication. These devices help monitor a woman's location and physi- cal state, therefore responding fast in case of emergencies. Whether through a wearable device like a bracelet or through a smartphone application, the sensors provide an extra layer of security, enabling one to get help at just the click of a button. The introduction of women safety sensors can reduce the time taken to respond to any emergency, enhance personal

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security, and empower women to feel safer at all times during their normal activities. In this presentation, the paper will focus on the various types of women safety sensors, key features of these sensors, and technological novelties associated with such sensors. We will also be discussing the impact of these sensors on women's safety, the challenges they face, and whatthe future holds for these life-saving technologies.

Through the use of technology to ensure safety, we are slowly working towards a world where women can feel more confident and secure, knowing they have the tools to protect themselves when they need it most.

II. LITERATURE SURVEY

A. paper 1: Study on IoT-Based Women Safety Devices with Screaming Detection and Video Capturing

This paper talks about creating smart devices to help keep women safe by using technologys. The main features of this paper were scream detection,video recording, and gps track- ing.These devices work by connecting to mobile apps on cloud services using the Internet of Things (IOT) so that when it detects danger it automatically sends alerts and shares location and video with emergency contacts. Therefore, it helps women feel safer and confident wherever they go. The author uses sensors and cameras to detect danger and information quickly and design to save power so that it can last longer. the author also suggest adding smart features like AI to predict danger and make the device easier for everyone to use.

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B. paper 2: survey on women using Iot

The paper elaborates different IoT-based solutions for women's safety. The authors also suggest how these smart sensors, mobile applications, and even wearable devices could be brought in together to detect hazardous situations and render timely help. The authors review existing safety systems and propose improvements using modern technologies like GPS, GSM, and smart sensors.Importance of Women's Safety Without providing innovative solutions, many of them are left vulnerable and become victims of emergencies.Role of IoT: It allows the creation of smart, interlinked devices that can monitor, alert, and assist women in danger.Examples would be using wearable devices such as smart bands or pendants that can continuously monitor a person's real-time location and send notifications when an abnormality occurs. Components of IoT-Based Safety Systems are GPS Tracks user's real- time location. GSM Sends emergency messages to relevant contacts or authorities. Sensor Discovered anomalies through sudden jerks, voice commands, or physical impact. Emergency Response When the system detects a danger signal, it sends alert messages to family, friends, or emergency services. In such systems, in addition to the emergency signals, there might also be features for audio/video recording to collect evidence at this moment. Existing Solutions The paper reviews the currently available IoT devices and applications for the safety of women and expresses their shortcomings (low battery life, high costs, or lack of real-time monitoring).

C. paper 3: Women Safety Device and Application - FEMME

The paper discusses a safety system designed specifically for women, named FEMME. It combines wearable technology with a mobile application to ensure safety in emergency situations. The system focuses on real-time location tracking and alerting trusted contacts when the wearer is in dan- ger. The device and app are designed to enhance women's safety by providing immediate assistance during emergencies. the author used wearable device, location tracking , mobile app integration and emergency alerts which sends alerts to pre-configured emergency contacts when triggered so if the wearer feels unsafe, they can trigger the device, which sends their location and an alert message to selected contacts. The system ensures rapid response during emergencies. The author Used GPS (Global Positioning System) for real-time location tracking,GSM (Global System for Mobile Communi- cations) which facilitates sending alert messages via mobile networks,Wearable Sensors to detect activation triggers (e.g., a button press or specific gestures). Microcontroller which Controls the device's operations and communication with the app,Mobile Application as an interface to configure the device, manage contacts, and receive notifications.The FEMME sys- tem aims to provide an accessible, easy-to-use safety tool for women, leveraging modern technology to improve personal security and potentially reduce response times in critical situations.

D. paper 4: Automatic Prediction and Identification of Smart Women Safety Wearable Device using Dc-RFO-IoT

The paper focuses on developing an advanced IoT-based safety wearable device for women. This paper addresses the safety issues using a combination of sensors, real-time GPS tracking, and deep learning techniques for emergency situations. the author uses the device which works on the DC- RFO-IoT framework. When an emergency button is pressed, it sends alerts to all contacted numbers and emergency services with GPS coordinates in real time. It reduces the response time to incidents,uses high-frequency alarms that ward off attackers.Location updates are sent continuously for every minute to contacts.Technologies used is IoT and GSM mod- ules for real-time communication.GPS sensors for location tracking.Deep learning algorithms to improve response ac- curacy and efficiency.Applications the wearable is designed for women's safety but also demonstrates potential for future use in healthcare, military, and other monitoring applications where rapid response is critical.

E. paper 5: Design of IoT Based Human Bond Communica- tion in Smart Foam Nanocomposite Sensor Through In-Situ Polymerization Method for Female Child Safety

The author designs a wearable device for enhancing fe- male child safety. A novel compression sensor is presented embedded in a disguised wearable-a decorative hairclip. The smart foam nanocomposite materials designed through the in-situ polymerization method ensure effective and discreet monitoring to alert guardians during emergencies without needing additional devices like mobile phones. Objective: To provide a wearable safety solution for female children against sexual harassment.Compression sensor disguised in the form of a hairclip.Made with metal foams doped with conducting polymers and nanoparticles like Zinc Oxide, Zinc Sulphide, and Copper Oxide Converts mechanical compression to electrical signals Functionality.Activates on compression (e.g., if the hair is grabbed) Transmits real-time location data to guardians through IoT-based communication.Light in weight and non-intrusive without requiring any other apps or devices.Materials and Methods,Nanocomposite prepared by dispersing nanoparticles into non-conducting polymers (e.g., PVP, PMMA). The foam is made conductive by immersing it in the solution to create a strong and sensitive nanocompos- ite.Significance: Tackles the ever-increasing need for women's safety by incorporating IoT and nanotechnology into daily wearables. Technologies Used:IoT Integration This will al- low for the real-time communication of alerts and location data.Nanocomposite Materials: This combines nanoparticles and polymers to increase electrical conductivity and sensitivity.

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III. METHODOLOGY

The methodology for designing a women safety device will be systematic, combining hardware and software technologies to ensure the real-time detection, communication, and response in distress situations. Analyze the critical challenges women face in safety, such as delayed responses, lack of accessible safety tools, and insufficient alert systems.Identify the techni- cal and usability limitations of existing safety devices, such as false alarms, network dependency, and high cost,Below isa detailed methodology framework:

A. Hardware Components

Microcontroller Controls the device, processing signals from sensors and executing commands. Examples: Arduino Nano, Raspberry Pi, ESP32 Core Features: Long battery life through minimal power consumption. Enough memory to run an algorithm or temporary data. Sensors These would be integral for detecting conditions of distress. Some typical types of sensors are: Biometric Sensors:These capture physiological variations like increased rate of heartbeat or stress. Exam- ple Pulse oximeters, heart rate monitors. Accelerometers:To identify rapid changes in movement or the possibility of falling, showing a chance of distress. Example: MEMS-based accelerometers (e.g., ADXL345). Pressure Sensors:Detecting high impacts or pressure changes that would indicate physical struggle. Example: Piezoelectric pressure sensors.

Temperature Sensors:Detect unusual changes in body temperature that may indicate distress. Example: LM35. GPS Module It is used to track the real-time location of the user and send it along with alert messages. Examples: NEO-6M, SIM808. GSM Module This module is used to communicate with emergency contacts through SMS or calls. Examples: SIM900A, SIM800L. It has a Dual purpose of data and voice communication and guaranteed operation in poor internet regions. Emergency Button It Serve as a means of manual triggering of alarms when automatic detection fails. This can be Implemented by Basic push buttons with tactile or capacitive action that can be integrated into the wearable. Power Source It is required to provide Energy for all the parts Examples: Rechargeable Lithium-ion batteries. It should have Enough capacity for 24 hours of continuous usage Connectivity Modules Bluetooth/Wi-Fi: Facilitates short-range communication between the wearable device and the mobile application. Examples: HC-05 (Bluetooth), ESP8266 (Wi-Fi).

B. Software Components

Mobile Application Purpose: Acts as the user interface and manages communication between the device and emergency contacts. Features: Configurable emergency contact list. Real- time location tracking. System status updates (e.g., battery life, sensor activity). SOS alert functionality (manual and automatic). IoT Backend Purpose: Provides cloud storage and processing for data collected from the device. Components: Cloud Database: Stores user details, location history, and dis- tress logs. Server: Processes and forwards data to emergency contacts. APIs: Allow communication between the device, mobile application, and cloud platform. Alert Mechanism SMS Alerts: Transmitted to predefined contacts with live location and a pre-written emergency message. Through the GSM module or mobile application. Call Alerts: Automated calls to authorities or emergency contacts in response to distress signals. Push Notifications: Alerts sent through the mobile application, using internet connectivity.

IV. LIMITATIONS AND CHALLENGES

False alarms caused by sensor sensitivity are still a prob- lem. Dependency on network connectivity can limit usability in remote areas. The primary challenges toward wide-scale adoption are battery life and cost.

V. CONCLUSION

The reviewed research on women safety devices shows the growing role of technology in addressing personal safety challenges. The integration of sensors, IoT, GPS, GSM mod- ules, and mobile applications has transformed safety solutions, providing real-time monitoring, communication, and response capabilities. Every system builds upon its predecessors, aimingto improve reliability, accuracy, and usability.

A. Key Takeaways

Effectiveness of Multi-Modal Systems: Combining manual and automatic alert mechanisms ensures responsiveness in diverse scenarios. Sensor-based detection improves response time, while GPS and GSM ensure reliable communication. Technological advancement: IoT and cloud-based platforms allow for nonstop monitoring while having mobile applicationsas simple interfaces for emergency management.

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REFERENCES

[1]. Study on IoT Based Women Safety Devices with Scream- ing Detection and Video Capturing, Int. J. Eng. Appl. Sci. Technol., vol. 6, no. 7, pp. 257-262, 2021, ISSN: 2455-2143. Available at http://www.ijeast.com.

[2]. Sindhu Bala, M. Swetha, M. Tamilarasi, and D. Vinodha, ”Survey on Women Safety Using IoT,” Int. J. Comput. Eng. Res. Trends, vol. 5, no. 2, pp. 1-7, 2018. Available: http://www.ijcert.org. E-ISSN: 2349-7084.

[3]. Women Safety Device and Application-FEMME, Indian J. Sci. Technol., vol. 9, no. 10, pp. 1-10, Mar. 2016. DOI: 10.17485/ijst/2016/v9i10/88898. ISSN (Print): 0974- 6846, ISSN (Online): 0974-5645.

[4]. K. S. Rao, D. V. Divakara Rao, B. V. Raju Institute of Technology, and D. Vijendra Babu, ”Automatic Prediction and Identification of Smart Women Safety Wearable Device Using DC-RFO-IoT,” BVR Institute of Technology, VinayakaMission’s Research Foundation, Paiyanoor-603 104, TamilNadu, India, 2021.

[5]. Design of IoT Based Human Bond Communication in Smart Foam Nanocomposite Sensor Through In-Situ Polymerization Method for Female Child Safety, Original Article, vol. 18, pp.4389–4397, Apr. 6, 2023.

