

Women Safety Device Using IoT

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Abstract: *Every girl's top concern in today's society is how to stay safe from harassment. The world is become considerably more dangerous for women. In many nations, nefarious practices including molestations, dowries, crimes against women, and—worst of all—rape are on the rise. According to WHO and NCRB social government organization estimates, 35% of women worldwide experience abnormal health suffering in public settings. Every girl's only persistent thought is the day when they would be able to walk freely around the streets at all times without having to worry about their safety. The right to be free from violence, harassment, and discrimination applies to women. Women can be helped by removing the barriers they encounter in this dangerous atmosphere. Women can achieve their full potential as people and contributors to the workforce if the barriers they confront in this hazardous atmosphere are removed. The advanced women safety system presented in this article, called "WOMEN SAFETY SYSTEM USING IoT Technology" will contact and send alert messages to neighboring police stations and family members when a woman is in danger. The location information is delivered as an SMS alert to numbers that have been saved in terms of latitude and longitude when a woman presses the button or it is automatically enabled when she is in distress. The protection and safety of women and children are the main goals of this project.*

Keywords: IoT, Women Safety Device, GPS, GSM, Real-Time Alert System

I. INTRODUCTION

The Internet of Things (IoT) is a network of physical things that are integrated with electronics, circuits, software, sensors, and network connection, such as gadgets, automobiles, and buildings. This network enables these devices to gather and share data while also allowing them to be managed remotely, resulting in increased efficiency and accuracy in computer-based systems.

One use of this technology is a portable gadget meant to combat physical harassment of women. This gadget has a pressure pull button that may be activated when a woman detects insecurity in a stranger. When triggered, the gadget transmits signals of the victim's whereabouts to the phone numbers of their parents or guardians that were previously registered in the device.

II. LITERATURE SURVEY

Several researchers have proposed women safety systems using mobile applications, GPS tracking, and GSM-based alert mechanisms. Smartphone-based safety applications allow users to send SOS messages; however, these systems depend heavily on internet availability, battery life, and user interaction.

Wearable devices integrated with GPS and GSM modules have been developed to provide location tracking and emergency messaging. Some systems incorporate sensors such as heart rate monitors and voice recognition to detect abnormal conditions. However, such systems are often complex and expensive.

Recent advancements in IoT platforms like ESP8266 and ESP32 have enabled low-power, cost-effective solutions for real-time monitoring and communication. Existing research highlights that IoT-based safety systems offer faster response times and improved reliability. The proposed system enhances existing approaches by focusing on simplicity, affordability, and ease of use.



III. PROBLEM STATEMENT

Women face increasing safety threats in public places, especially during travel or late-night situations. In many emergencies, help is delayed because the victim cannot communicate their exact location. Traditional safety apps depend on smartphones, which may not always be accessible or functional during an attack. There is a strong need for a dedicated, reliable, and portable safety device that can instantly alert guardians. The device must provide accurate location tracking and quick emergency communication. Therefore, a smart IoT-based solution is required to enhance women's safety and ensure faster response during critical conditions.

Women often face safety threats in public and private spaces. During emergencies, it is difficult for them to inform family or authorities immediately. Existing solutions like mobile apps are not always reliable or accessible. A dedicated, portable device is needed to provide real-time tracking and instant alerts.

IV. METHODOLOGY

The methodology of the proposed IoT-based women safety device explains the systematic procedure followed for the design, development, and operation of the system. The primary objective of this methodology is to ensure rapid emergency detection and reliable transmission of alert messages with location details.

1: System Initialization

When the device is powered ON, the ESP8266 microcontroller initializes all connected hardware components. This includes configuring the input pin connected to the panic button, establishing serial communication with the GPS module, and initializing the GSM/Wi-Fi communication module. The system also checks network availability to ensure successful alert transmission during emergencies.

2: Standby and Monitoring Mode

After initialization, the system enters standby mode. In this state, the ESP8266 continuously monitors the status of the panic button while consuming minimal power. The GPS module remains active or periodically updated to reduce delay in acquiring location information when an emergency occurs.

3: Emergency Trigger Detection

When the user presses the panic button, an interrupt signal is generated and detected by the ESP8266 microcontroller. This action immediately shifts the system from standby mode to emergency mode.

4: Location Data Acquisition

Once the emergency mode is activated, the ESP8266 requests real-time location data from the GPS module. The GPS module calculates the current latitude and longitude values using satellite signals.

5: Data Processing and Message Formatting

The microcontroller processes the acquired GPS data and formats it into a readable emergency message. The message includes critical information such as emergency alert text, latitude and longitude values, and a Google Maps link for easy location tracking by the receiver.

Step 6: Alert Transmission

The formatted emergency message is transmitted to predefined contacts and authorities using the GSM or Wi-Fi communication module. Depending on network availability, the alert is sent either as an SMS or as an internet-based notification. This ensures reliable communication even in limited connectivity conditions.



Step 7: Continuous Alert and Location Updates

After sending the initial alert, the system continues to transmit periodic location updates at predefined time intervals. This feature enables real-time tracking of the victim's movement until the emergency condition is resolved or the system is manually reset.

Step 8: System Reset and Normal Operation

Once the emergency situation is resolved, the system can be reset manually. The device then returns to standby mode and resumes normal monitoring operation, ready for future use.

V. SYSTEM ARCHITECTURE

The proposed system consists of hardware and software components designed to operate together efficiently during emergency situations.

A. Hardware Components

ESP8266 Microcontroller: Acts as the main control unit and handles data processing and communication.

GPS Module: Provides real-time latitude and longitude of the user.

GSM Module / Wi-Fi: Sends emergency alerts via SMS or internet-based services.

Panic Button: Used to manually trigger the emergency alert.

Power Supply: Rechargeable battery to ensure portability.

LCD with driver: Displays real-time information and status from the device.

Magnetic Switch: Detects opening or closing actions to trigger alerts.

B. Software Components

Embedded C/C++ programming using Arduino IDE.

IoT cloud platform for data transmission and monitoring.

Alert notification system for registered contacts.



Fig 1. ESP8266 Microcontroller



Fig 2. GPS Module

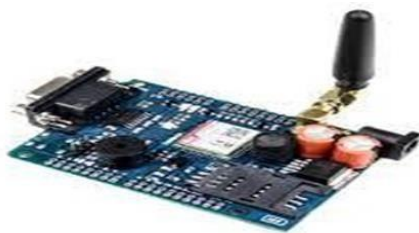


fig 3. GSM Modem



fig 4. Panic Button



fig 5. Power Supply





Fig 6. LCD with Driver



fig 7. Magnetic Switch

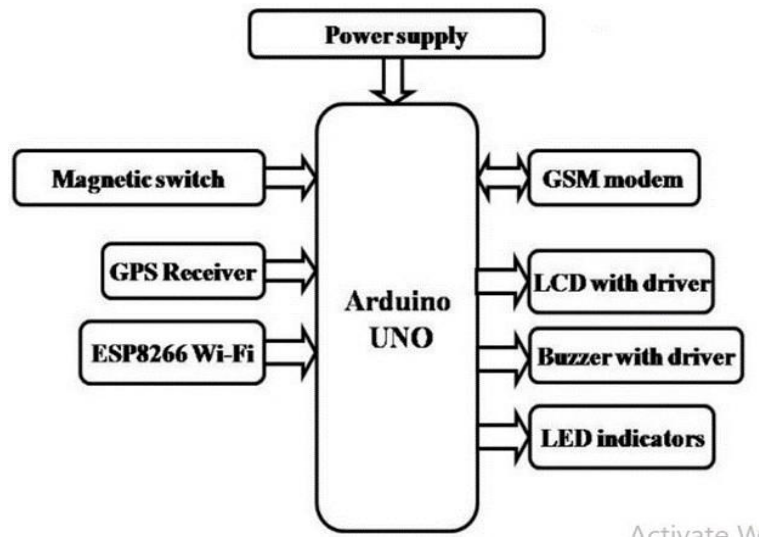


Fig 8. Block Diagram

The women safety device is built using the ESP8266 microcontroller, which acts as the central processing unit and controls all integrated modules. To ensure accurate emergency assistance, the design includes a GPS receiver for real-time location tracking and a GSM modem for sending SOS messages to predefined contacts. Local alerting components such as an LCD display for status updates, LED indicators for notifications, and a buzzer for loud alarms ensure the user receives immediate feedback. The device operates on a Li-ion battery, offering portability and uninterrupted performance, with an adapter supply available for reliable charging during extended use. The overall hardware layout is compact, lightweight, and suitable for wearable integration.

VI.RESULTS AND DISCUSSION

A. Results

The proposed IoT-based women safety device was implemented and tested to evaluate its functionality and performance under real-time conditions. During testing, the panic button successfully triggered the emergency mode in all trials. The GPS module accurately acquired the user's latitude and longitude coordinates within a short time after activation. These location details were transmitted to predefined contacts through the GSM/Wi-Fi module without significant delay. The system demonstrated consistent alert generation with reliable message delivery. The response time between panic button activation and alert reception was observed to be minimal under stable network conditions. Additionally, the device operated efficiently with low power consumption, allowing continuous monitoring and extended usage. The results confirm that the system performs effectively in providing real-time safety assistance.



B. Discussion

The results obtained from system testing indicate that the proposed IoT-based women safety device meets the intended design objectives. Quick activation and accurate location tracking ensure timely assistance during emergency situations. Compared to conventional mobile-based safety applications, the proposed system reduces dependency on smartphones and minimizes user interaction during stress conditions.

The reliability of the communication module plays a crucial role in successful alert transmission, and the observed performance validates its effectiveness. Although GPS accuracy may slightly degrade in indoor environments, the overall system functionality remains dependable. The discussion highlights that the proposed solution offers a practical, low-cost, and efficient approach for enhancing women safety, making it suitable for real-world deployment and paper publication.

VII. CONCLUSION

This paper presented the design, development, and implementation of an IoT-based women safety device aimed at providing immediate assistance during emergency situations. The proposed system integrates ESP8266, GPS, and GSM/Wi-Fi technologies to enable real-time location tracking and automatic alert transmission. When activated through a panic button, the device successfully identifies the user's location and communicates it to predefined emergency contacts, ensuring faster response and improved personal safety.

Experimental results demonstrate that the system operates reliably with minimal response time and stable communication under normal network conditions. The device is compact, cost-effective, and easy to operate, making it suitable for continuous real-world usage. Compared to conventional mobile-based safety solutions, the proposed system reduces dependency on smartphones and manual operations, thereby increasing reliability during critical situations.

VIII. ACKNOWLEDGMENT

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REFERENCES

- [1]. Naemul Islam, Md Anisuzzaman, Sikder Sunbeam Islam, Mohammed Rabiul Hossain, Abu Jafar Mohammad Obaidullah, "Design and Implementation of Women.
- [2]. Chand D, Nayak S, Bhat KS, Parikh S. A mobile application for Women's Safety: WoS App. 2015 IEEE Region 10 Conference TENCON; Macao. 2015 Nov 1-4. p. 1-5.
- [3]. Igneshwari S, Aramudhan M. Social information retrieval based on semantic annotation and hashing upon the multiple ontologies. Indian Journal of Science and Technology. 2015 Jan; 8(2):103-7.
- [4]. Nandita Viswanath, Naga Vaishnavi Pakyala, Dr. G. Muneeswari, "Smart Foot Device for Women Safety", 2016 IEEE Region 10 Symposium (TENSYP), Bali, 38 Indonesia, pp. 130-133.
- [5]. G CHARikiran, KarthikMenasinkai, SuhasShir ol, "SmartSecuritySolutionfor Women based on Internet of Things(IOT)", 2016 IEEE, pp.3551-3554.
- [6]. A. Priyadarshini, R. Thiyagarajan, V. Kumar, T. Radhu, "Women Empowerment towards developing India", IEEE Conference in Humanitarian Technology Conference, 2123 Dec 2016, Agra, India, pp.1-6.



[7].Dantu Sai Prashanth, Goutam Patel, Dr. B. Bharathi, "Research and development of a mobile- based women safety application with real-time database and datastream network", 2017 International Conference on Circuits and Computing Technologies[ICCPCT], pp.1-5.

[8]. Muskan, Teena Khandelwal, Manisha Khandelwal, Purnendu Shekhar Pandey, "Women Safety Device Designed using IoT and Machine Learning", 2018 IEEE, pp

