



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 4, April 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

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Empowering Women with Instant Emergency Alerts using IoT

Mrs. Ayesha Siddiqha, Neha Nadig

Assistant Professor, Department of Computer Engineering, Malnad College of Engineering, Hassan, Karnataka, India

U.G. Student, Department of Computer Engineering, Malnad College of Engineering, Hassan, Karnataka, India

ABSTRACT: The proposed system aims to empower women by leveraging IoT technology to provide instant emergency alerts. It consists of discreet wearable devices equipped with sensors like GPS and accelerometers. In case of an emergency, users can trigger alerts manually or through predefined triggers. These alerts are sent to a centralized platform via wireless connectivity, which analyzes the data to assess the severity of the situation and track the user's location in real-time. The platform then notifies designated contacts and may activate nearby surveillance cameras or alert other nearby users. Through a feedback loop, users can provide real-time feedback to improve the system's effectiveness. Overall, this system offers a comprehensive solution to enhance women's safety and provide them with a sense of security in their daily lives.

KEYWORDS: Women's Safety, IoT, Wearable Devices, Emergency Alerts, Real-time Tracking, Sensor Technology, Centralized Platform, Machine Learning Algorithms, Surveillance Integration, User Feedback Loop.

I. INTRODUCTION

Leveraging technology, particularly the Internet of Things (IoT), is essential for addressing critical social issues such as safety, with a particular focus on combating crimes like rape, especially against women and children. Utilizing technology to enhance security measures can serve as a crucial step in tackling these challenges head-on. Developing projects that serve as security systems specifically designed to protect women can provide them with a sense of safety and empowerment, especially in situations where they may feel vulnerable. By establishing connectivity among various devices and systems, IoT can play a significant role in creating a safer environment and enabling timely intervention in case of emergencies. Projects aimed at leveraging IoT for women's security should prioritize their safety and privacy, ensuring that these technologies are not only effective but also ethical and respectful of individual rights. Additionally, raising awareness and education about the potential of technology in addressing social issues concerning women's security can further amplify the impact of such initiatives. Overall, integrating technology like IoT into solutions for enhancing women's security can contribute to creating a more secure and supportive society, where women feel empowered and protected, particularly in vulnerable situations.

II. RELATED WORK

In today's global landscape, women's safety remains a paramount concern, resonating deeply with individuals worldwide [1]. The pervasive fear of harassment and violence casts a shadow over their daily lives, restricting their mobility and sense of security, especially during unconventional hours. Recognizing the urgency of addressing this pressing issue, our research introduces an innovative wearable solution, akin to a wristwatch, featuring an easily accessible button for women to activate when sensing discomfort or danger [2]. This system is intelligently designed to respond automatically to changes in sensor data, further enhancing its effectiveness. Upon activation, it seamlessly integrates GPS technology to precisely pinpoint the woman's location and swiftly dispatches an emergency email to predefined contacts [3]. Additionally, a distinctive screaming alarm function, synchronized with real-time clock functionality, emits an audible distress signal, rallying immediate assistance [4]. Notably, this groundbreaking system boasts smartphone-free operation, ensuring inclusivity and ease of access for all individuals [5]. Through the integration of sophisticated components, it guarantees unparalleled accuracy and reliability, even in the most challenging terrains or exigent circumstances [6]. Our pioneering approach seeks to instill a profound sense of security in women, empowering them to navigate their daily routines without succumbing to fear [7]. Moreover, by curbing crimes against women, it endeavours to create a safer environment conducive to the well-being of all members of

society [8].

III. METHODOLOGY

Creating a women's security system using NodeMCU ESP8266 and a push button for emergency alerts linked with GPS and Telegram is quite feasible. Here's a simplified overview of how it could work:

A. Hardware Setup:

- NodeMCU ESP8266: Acts as the main microcontroller for the system.
- Push Button: Used as an emergency trigger.
- GPS Module: Provides location data.
- Internet Connection: Required for sending alerts via Telegram.

B. Software Components:

- Arduino IDE: Used for programming the NodeMCU.
- Libraries: Utilize libraries for GPS and Telegram API integration.

C. Functionality:

- When the push button is pressed, the NodeMCU triggers an emergency alert.
- The GPS module retrieves the current location data.
- The NodeMCU connects to the internet and sends the location data along with an alert message to a pre-configured Telegram bot via the Telegram API.
- The Telegram bot receives the alert message and forwards it to the designated contacts or groups.

D. Telegram Integration:

- Set up a Telegram bot using the BotFather.
- Obtain the bot token and chat ID to enable communication between the NodeMCU and Telegram.

E. Security and Privacy:

- Ensure that sensitive data such as GPS coordinates are securely transmitted and stored.
- Implement encryption and authentication measures to prevent unauthorized access to the system.

F. Testing and Deployment:

- Test the system extensively to ensure reliable functionality.
- Deploy the system in the intended environment, considering factors like power source, network connectivity, and accessibility

A. Block Diagram

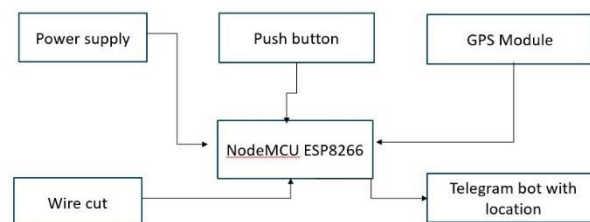


Fig.1 Block Diagram of Project

IV. EXPERIMENTAL RESULTS

The NodeMCU ESP8266 microcontroller serves as the system's central intelligence, seamlessly orchestrating the interplay between hardware components like the push button, GPS module, and internet connection. In moments of crisis, when the push button is activated, the NodeMCU springs into action, swiftly gathering precise location data from the GPS module. Leveraging its internet connectivity, it then dispatches an alert message via the Telegram platform, ensuring swift communication. This seamless integration with Telegram, facilitated through BotFather, ensures that communication channels remain secure and reliable. With robust encryption and authentication measures in place, sensitive data transmission is safeguarded against potential threats. Thorough testing of the system's functionality, considering factors such as power sustainability and network robustness, is conducted to validate its reliability before deployment. This meticulous approach guarantees that the system stands ready to deliver prompt and effective responses in critical situations, offering reassurance and safety to users in times of need. In addition to dispatching alert messages, the system can provide notification functionalities through the Telegram platform. Once the NodeMCU retrieves location data and initiates communication with Telegram, it can send notifications to designated contacts or groups, alerting them to the emergency situation. These notifications serve as immediate updates, ensuring that relevant parties are informed promptly and can take appropriate actions as necessary. By incorporating notification features, the system enhances its effectiveness in keeping users informed and facilitating swift responses to emergencies.

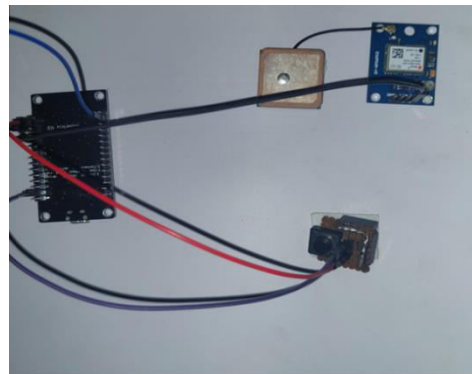


Fig: Project Model



Fig: Screenshot of alert message

V. CONCLUSION

In conclusion, the integration of IoT technology into instant emergency alert systems marks a pivotal advancement in empowering women and enhancing their safety. Through wearable devices equipped with sensors and real-time connectivity, women gain immediate access to assistance in threatening situations. These systems enable quick activation of alerts, whether manually or automatically, facilitating rapid responses from designated contacts or authorities. The incorporation of machine learning algorithms ensures accurate assessment of emergencies, while GPS tracking guarantees precise location identification. Additionally, the feedback loop mechanism ensures continual refinement of these systems, enhancing their reliability and effectiveness over time. By addressing women's safety concerns head-on, IoT-based emergency alert systems contribute significantly to fostering a safer and more supportive environment for women worldwide.

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