International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 07 | July - 2023 SJIF Rating: 8.176 ISSN: 2582-3930

WOMEN SAFETY DEVICE

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Abstract - The issue of women's security has emerged as a significant concern in many countries. Surveys indicate that approximately 25,000 crimes against women are reported in India each year. Sexual harassment and abuse have been on the rise for the past 10 years. It is now essential to create a strategy that protects women from becoming victims and lowers such assaults. This project aims to design and implement a highly dependable system for women's protection. The project introduces a women's safety device integrated with GPS tracking and alerts, utilizing Raspberry Pi 3. The GPS receiver gives location in the form of latitude and longitude. The Raspberry Pi 3 processes this data and transmits it to the server (Google Firebase) via the built-in Wi-Fi on the Raspberry microcontroller. From the server, alert messages along with GPS coordinates are sent to predefined mobile numbers. In times of danger and when assistance is required, a woman can activate the device by pressing a given switch. Once activated, the device tracks the current location through GPS and sends an emergency message to the predetermined mobile number. Additionally, the system captures the overall situation and stores an image on the SD card and server.

Key Words— GPS, RaspberryPi3, Firebase Server

1. INTRODUCTION

The safety of women in India has emerged as a significant concern, particularly due to the alarming increase in incidents of sexual harassment, which saw an 82% rise in 2016 compared to previous years, according to the National Crime Records Bureau. Shockingly, 95% of these crimes involve perpetrators who are not strangers, but individuals from the victim's own family, friends, or neighbours. In response to these distressing trends, discussions have largely centered around public outrage, calls for stricter laws, and punishment. However, it is evident that legislation alone cannot fully protect women in every situation; empowering them to defend themselves is crucial. Therefore, the development of a self-defence device is a pressing need.

Women play a pivotal role in any economy and are essential in shaping the future of a country. Regrettably, many crimes against women go unreported due to society's hypocritical attitudes. Victims who gather the courage to report their assaults often face humiliation and mistreatment from people. It is crucial to take proactive measures to develop an effective solution to this problem.

This project aims to address women's safety concerns through a smart portable device. The device can automatically detect critical situations and notify the appropriate individuals. Its purpose is to help women escape dangerous circumstances and provide them with the support they need, ensuring justice. While there are already several women safety Android applications available, it is not always practical to carry a mobile phone at all times or one may forget to bring it. This system endeavours to solve the challenges associated with women's safety. Its scope involves developing a smart device that can assist women in emergencies.

The proposed system involves integrating multiple devices, with the hardware comprising a portable Smart band that maintains constant communication with a smartphone connected to the internet. The device consists of several components, including a trigger button, Raspberry Pi 3 A+, TP4056 Lithium Battery Charging Module, GPS module (Neo-6M), Raspberry Pi Camera Module, SD card, and a power battery.

The project operates on a simple principle: when a woman perceives danger, she activates the device by pressing the button. Once activated, the device utilizes GPS (Global Positioning System) to determine the current location and sends emergency messages along with GPS coordinates to a registered mobile number. Furthermore, the device records the overall situation by capturing an image, which is then transmitted to the server (Google Firebase) for storage. This project offers a distinct advantage as it is compact and can be conveniently carried anywhere.

2. LITERATURE REVIEW

The project presents a wearable safety device designed specifically for women, utilizing Arduino technology. Its main purpose is to ensure the safety of women by providing a reliable means of protection in times of danger. The device incorporates a wireless sensor network to enable communication and send timely alerts to the user. It leverages GPS and GSM technologies to accurately share the user's location with relevant authorities and pre-defined contacts. Additionally, the device features a switch that can be manually activated in emergencies, serving as a panic switch to trigger immediate assistance. When activated, the device also activates a buzzer and laser diode for added security measures [1].

This project presents a safety device that integrates GPS tracking and ARDUINO-based alerts for enhanced personal security. The system is designed to work alongside an alarm system and can promptly notify nearby neighbours in case of emergencies. It comprises a GPS receiver, an ARDUINO microcontroller, and a GSM modem for communication purposes. The GPS receiver plays a crucial role by gathering location information in the form of latitude and longitude coordinates from satellites. The ARDUINO microcontroller then processes this data and utilizes the GSM modem to transmit it to the user. By establishing a connection between the ARDUINO and the GSM modem, the system can send SMS alerts to a preconfigured mobile number [2].

This study describes a smart device that automates the emergency alarm system to improve women's safety. Through the use of outlier detection techniques, the device uses a mix of pressure, temperature, and pulse-rate sensors to look for potential signs of danger. By employing these sensors, the system can automatically identify critical situations without requiring the active interaction of the woman. Once a potential threat is detected, the device promptly sends alerts to the woman's loved ones and the nearby police station. The alerts include the woman's location coordinates, ensuring that help can be quickly dispatched to her aid in times of emergency [3].

The proposed system introduces a comprehensive device that integrates multiple hardware components, with a focus on the wearable "Smart band". The device has various elements, including a trigger, microcontroller (ATmega2560), GSM module (SIM900), GPS module (Neo-6M), IoT module (ESP-12E), Neuro Stimulator, Buzzer, and Vibrating Sensor. When a woman senses danger, she can activate the device by holding down the trigger. Once activated, the device uses GPS technology to track the woman's location. In case of an emergency, it sends an emergency message using GSM to the registered mobile number. The IoT module makes sure that the position is continuously tracked and updates the information on a webpage. To enhance personal safety, the Neuro Stimulator is incorporated, which can generate non-lethal electric shocks to deter potential attackers. The buzzer serves as an audible alarm to alert nearby individuals, drawing attention to the woman in need. Additionally, the vibrating sensor can transmit the last known location in the event of device malfunction or damage [6].

Previous systems had limitations when it comes to monitoring features and portability. Some systems lacked camera recording capabilities, which meant they couldn't capture visual data for monitoring purposes. This could be a drawback in situations where video evidence or real-time surveillance is essential. Additionally, some earlier systems were bulky and inconvenient to carry around, requiring users to transport them in bags or cases. This lack of portability made them less reliable for quick and easy access. In scenarios where immediate assistance or intervention is necessary, having a bulky system can hinder response times and effectiveness. To overcome this, we have designed a compact wearable device that is equipped with camera recording capabilities and is more lightweight, making them more reliable and convenient for users.

3. BLOCK DIAGRAM AND DESCRIPTION

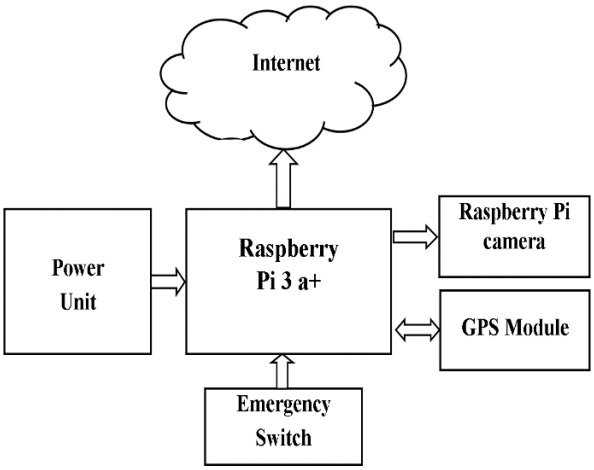


Figure 1. Block Diagram for Women Safety Device

The primary purpose of the women security device is to ensure the safety and security of women. This device consists of essential components including the Raspberry Pi 3 A+ microcontroller, Raspberry Pi Camera, GPS module, voltage regulator, battery charging module, and battery cell.

The Raspberry Pi 3 A+ microcontroller plays a crucial role in the device, providing built-in wireless LAN and Bluetooth connectivity. Additionally, it has a dedicated micro-SD card slot for data storage.

The device utilizes a high-quality 5MP Raspberry Pi Camera Module that captures clear and detailed images. It incorporates a camera serial interface (CSI) for seamless integration and communication.

To establish accurate location tracking, the device incorporates a GPS module. The chosen module, NEO-6M, includes an external antenna and built-in EEPROM. It also features an automatic power-down mode to optimize energy consumption.

Rechargeable batteries power the device, with the TP4056 Lithium Battery charging module enabling convenient charging through a micro-USB port. The captured images by the camera module are stored both on the SD card and sent to the server, Google Firebase.

Firebase, a comprehensive set of cloud computing services, is utilized for storing predefined numbers and images. In case of distress, the device sends GPS coordinates to predefined mobile numbers, ensuring timely assistance.

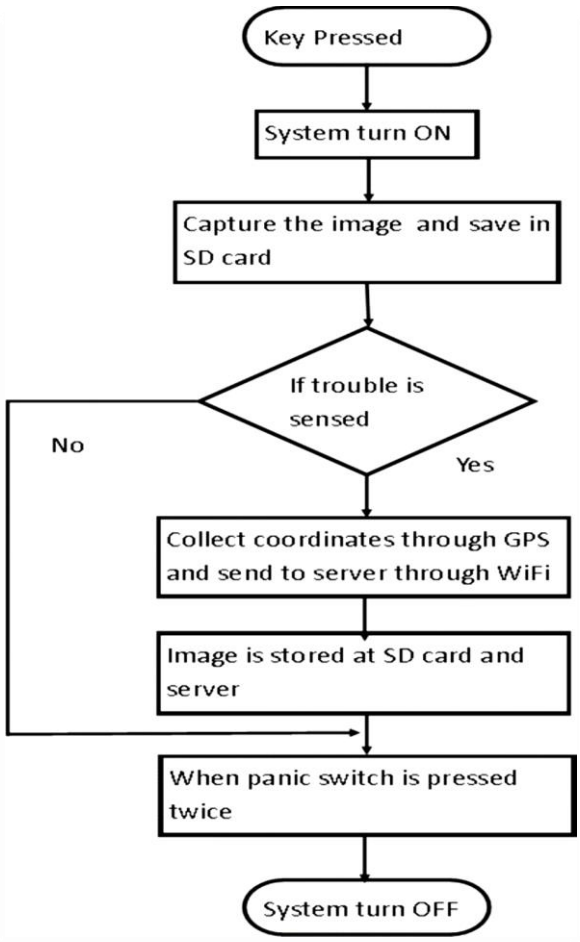
When the button on the device is pressed, a message is sent to the designated mobile number, and an image is captured and stored on both the SD card and server, facilitating documentation of critical situations.

4. SOFTWARE DESIGN

A. ALGORITHM

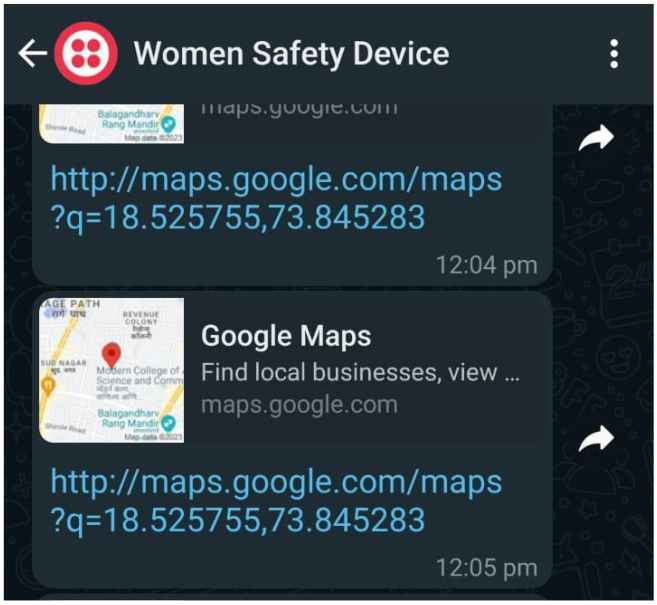
1. The system is powered on when the woman manually presses the switch during an attack.
2. The switch serves as a trigger for the microcontroller in the system.
3. Once triggered, the microcontroller activates the camera and GPS module to capture the image and retrieve the location.
4. The captured images are stored securely in a micro-SD card as evidence.
5. When the handheld controller is triggered, it receives the GPS coordinates from the GPS receiver and transmits them as an SMS to a pre-defined phone number.

B. FLOWCHART

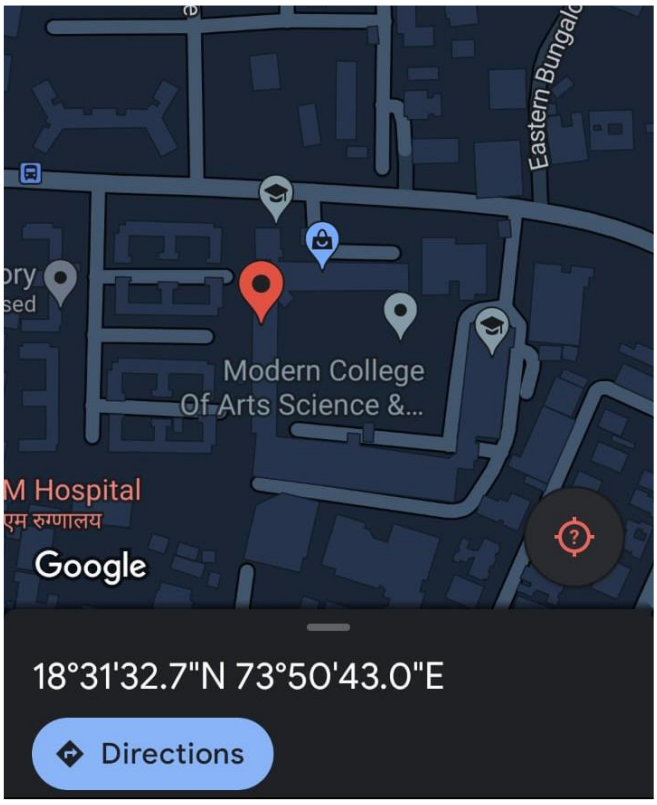


5. RESULT AND DISCUSSIONS

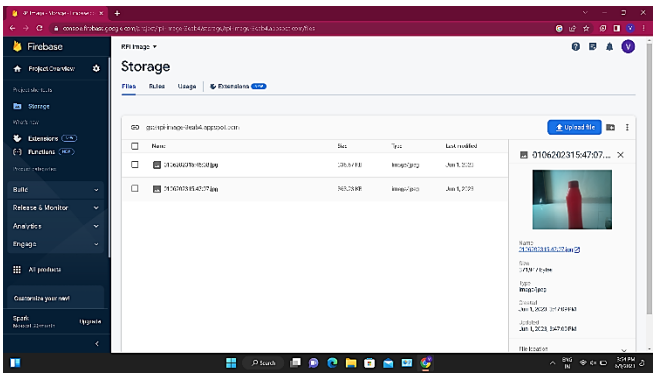
The proposed design integrates both hardware and software components to create a system that sends location information and captures images, utilizing a Firebase server for data management.



When the button is pressed, the system initiates the process of sending the location to registered phone numbers. Following that, the victim's location is continuously sent with a one-minute delay, and this process repeats as long as the circuit remains on.



To handle the collection, storage, analysis, and visualization of the overall situation, the design incorporates the use of a Firebase server.



In this case, the captured images are displayed on the Firebase server. This means that when the system captures an image, it will be stored on the Firebase server, allowing authorized users to access and view these images remotely.

6. CONCLUSION AND FUTURE SCOPE

The project is dedicated to ensuring the well-being of women. Unlike other devices, our project focuses on portability and compactness, making it convenient to carry along with other personal items. With this device, women can quickly inform their trusted contacts and escape challenging situations, providing them with a sense of security and peace of mind.

In the future, we aim to work on enhancing the security of the system to significantly reduce crime rates.
We intend to introduce a feature that allows users to mark unsafe places. If a user feels that a certain location is unsafe, they can tag it as an "unsafe zone." This information will be shared with other users, providing valuable insights and awareness to those in the vicinity. This feature aims to create a collaborative and supportive community, where users can help each other stay informed and protected. By incorporating these additional features, we aim to make the application more useful, reliable, and tailored to the specific safety needs of women.

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