Empowering Women with Raspberry – PI Powered Smart Ring using IOT Technology

S.Francis Shamili, Dhananjay Kumar Suryesh, Raushan Kumar, Akilan .V, Vengatesan .R

Dhanalakshmi srinivasan engineering college

Abstract - The Women Safety Smart Device System addresses the escalating issue of personal safety, particularly for women, by introducing a smart solution solution equipped with advanced sensors and communication functionalities. This project aims to provide women with a reliable means of seeking assistance during times of distress or danger. The system consists of a smart band or watch integrated with sensors and a panic button, Raspberry Pi for data processing, GSM and GPS modules for communication and location tracking respectively, and a USB web camera for capturing images of assailants and surroundings. When activated, the device sends crucial information including location, body posture, and pulse rate to predefined contacts via SMS alerts, facilitating swift intervention by authorities. Additionally, images captured by the camera are sent as email alerts to emergency contacts, aiding in identifying perpetrators. This innovative solution empowers women to navigate public spaces with increased confidence and security, ultimately contributing to the mitigation of violence and harassment against women. The integration of privacy measures, predictive analytics, and the effectiveness and reliability of the system, ensuring a comprehensive approach to women's safety. Integration with social media platforms enables users to share their experiences and provide feedback. The device's modular design allows for future upgrades and expansions, ensuring its longevity and relevance in an ever-changing technological landscape. This Project facilitates research initiatives aimed at understanding the root causes of violence against women and developing preventive strategies. Regular audits and evaluations assess the system's performance and compliance with regulatory standards, ensuring accountability and transparency. Through these concerted efforts, the Women Safety Device System emerges as a multifaceted solution poised to make significant strides in ensuring the safety and well-being of women worldwide.

Keywords—Raspberry Pi3, IoT, GPS, GSM, E-mail alert, Smart Ring

I. INTRODUCTION

The present generation is striving for equal rights, where men, women and every person is getting equal rights, responsibilities and work load is shared equally too. With this, the working schedule for women are also changing and they are being allocated with different working shifts, in the daytime or even in the nighttime. So, improving the security of women and children is very important, especially during the night times. Women may have to use various available means of transport to reach their offices or home during late night. The smart safety device system presented here consists of a push button switch used as a panic button. Whenever the person wearing the device gets into trouble, he or she pushes the button. Soon after pushing the panic button, GPS module interfaced with the system locates the user and seds the location of the user (person wearing the device) to emergency contact and police using the GSM module. The USB camera captures the image of the surroundings of the user and Pi sends an E- mail with the captured image and alert message to the emergency contact.

In the present scenario, women are keeping pace with men in every walk of life but unfortunately at cost of being subjected to abuse, harassment, and violence in public and even at their own houses. They cannot step out of their houses at any time of the day, cannot wear clothes as per their will, nor can they even go for work in peace. There is some kind of inhibition that women are subjected to which not only takes away their sense of freedom but also shatters their confidence and dreams. Due to the above said reasons, it is quite apparent that there is a striving need for women security in the country. However, it is a point worth to note that advancement in technology has paved its path in almost all walks of life. As such, it is now possible to intelligently apply the benefits of current technology to resolve societal issues. This paper, therefore, aims to apply the current trend in technology, i.e., Internet of Things (IoT) to eliminate fear filled lifestyle of female folks. The Internet of Things (IoT) is an ecosystem of connected physical objects that are accessible through the internet.

II. LITERATURE REVIEW

Dhruv chand - A mobile application for women's safety has been proposed. This initiative proposes a smartphone application called **WOSAPP** (women's safety app), which gives women a dependable way to contact the police in an emergency, to help remove the restrictions. By shaking her phone or directly interacting with the application's user interface by pressing the panic button on the screen, the user can easily and covertly activate the calling feature. The user's geographic position and the contact information for a preselected list of emergency contacts are promptly provided to the police in a message.

[1] Md. Imtiaz hanif − He made a recommended iot-based embedded self-security system implementation. A (li-poly) rechargeable battery with a two-push button option will power the device first, long-press the panic

button to automatically dial emergency mobile numbers as well as pre-saved contacts like friends and relatives. The (GSM) worldwide system for mobile communication sim800l modules and GPRS (general packet radio services) sim800l modules will be able to access the victim's current position if the single push is activated. The data will then have been transmitted via http to the corresponding application using the server coordinates and the (at) attention command the data will then have been transmitted via http to the corresponding application using the server coordinates and the (at) attention command.

[2] Wasim akram - A safety measure has been put in place. The device scans and initially stores the user's fingerprint. The user's finger is scanned for a minute after he or she starts. If the fingerprint is not scanned, the device sounds the public alert buzzer and sends the position and the msg to the family and authorities. Another improvement is the addition of a shock wave generator and the dispatch of group messages for her protection. A sound sensor records audio, and the captured audio is sent to all contacts that have been saved on the mobile device. It involves an app that, if downloaded and saved on the victim's smartphone, will use maps to guide the victim from their current location to the safest place.

[3] Dr. Srinivas – He proposes their application as an android app for women safety. When the user feels threatened, she only needs to click the "help" button to activate the app. This application sends messages informing the registered contacts of the user's location every few seconds. SMS- based continuous location monitoring information makes it easier to locate the victim promptly and rescue them securely. This application sends messages informing the registered contacts of the user's location every few seconds. As a result, it functions as a sentinel who stays in the background until the user feels secure. When the root device's mobile network is unavailable or if the root device is turned off, this app will receive an upgrade. Therefore, this app might be a huge assistance in saving the ladies or men from dangerous situations.

[4] N. Penchalaiah - Female-specific technology has been created and deployed. When attacked, the victim is instructed to click a button that activates the GSM and GPS devices. Additionally, the device has a voice command mechanism that enables the victim to activate it even if she is unable to click the device's function button by simply saying the word "help." when a message or a call is sent, a safety security device is activated, and the message is delivered using a voice command method. The victim may select between two activation phases according on the circumstances. The voice command phrase "help" is frequently used, which could lead to a false warning.

III. Raspberry HARDWARE DESCRIPTION

IV. Pi3 Model B+

Raspberry Pi is a mini card sized computer that can be connected to your TV, or computer and is capable of doing what a mini computer can do. It has a Broadcom BCM2837 Quad Core Processor running at 1.3GHz with 1GB SDRAM and 4 USB 2.0 ports. There is no inbuilt storage in Raspberry Pi. The operating system for the Raspberry Pi is loaded into the SD card whose storage can range from 8GB to 64GB. It has 40 pins, out of which 26 are GPIO pins including UART, four PWM channels, I2C bus, SPI bus, 5V and GND. It has a BCM43143 Wi-Fi onboard and Bluetooth Low Energy (BLE) onboard and also has a Camera Serial Interface port to connect Pi camera through which we can take HD videos and still photographs.

Fig. 1. Raspberry Pi3 Model B+ Board

V. User Location estimation using GPS Module

Global Positioning System (GPS) is a satellite-based navigation system consisting of 24 satellites and is developed by the U.S. Department of Defense. A GPS receiver computes the user location in three dimensions, viz. latitude, longitude and height by using the signals from minimum of four satellites. Each satellite transmits two PRN codes (Pseudo Random Noise Code), viz. Coarse Acquisition (C/A) code and Precision (P) code along with navigation data which comprises of the satellite ephemeris. The PRN codes are used to obtain the range or distance between the satellite and the receiver. The ephemeris data are used to compute the satellite position. By using the signals from four satellites and the corresponding ranges (pseudo range), a GPS receiver estimates the four unknowns, i.e. user position (x, y, and z) and the satellite receiver

clock offset. The GPS signals are transmitted on two L-band frequencies L1 (1575.42 MHz) and L2 (1227.60 MHz).
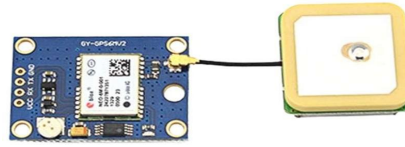

Fig. 2. GPS Receiver Module

A. Features of GSM Module

Global System for Mobile Communications (GSM) is a standard used for 2G cellular networks. The SIM 900A mobile communication modem is used here. A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. It uses Time Division Multiple Access (TDMA) technique for communication purpose. It will have a SIM slot where the SIM card is inserted and by using AT commands, SMS messages can be sent to the registered mobile number. It operates on a supply voltage of 9-12 V DC.

Fig. 3. SIM900A GSM Module

B. USB Web Camera

USB Web camera is used to capture image, videos and also for live streaming. It can be connected to the device used by the USB port. It allows data rate up to 400 Mbytes per second and consumes less than 1 W of power through USB. A webcam usually consists of a lens, an image sensor and electronic circuitry, may also include one or two microphones.

Fig. 4. USB Web Camera

C. Buzzer

A buzzer is an audio signaling device which may be mechanical, electromechanical or piezoelectric. It converts electrical energy into sound. When power is applied to the buzzer it causes the ceramic disk to contract or expand, thus it causes the surrounding disc to vibrate and that is the sound that we hear.
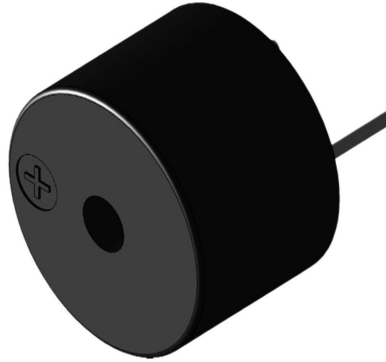
Fig. 5. Buzzer

VI. EXISTING SYSTEM

This Project proposed that it will intimate the parents and police about the current location of the women. A GPS system is employed to trace the present position of the victim and a GSM is employed to send the message to the pre- defined numbers. This work had proposed about new model for women security, Once the switch is pressed the current location of women is collected and sends through GMS to the numbers registered in the Raspberry – Pi or smart band, L293D is used to drive dc motor, buzzer and shock system also used in this device. The Device had proposed in order to track the location and find the identity of the child a GPS module and a RFID card is used in the proposed system. All the entire flow of operations are control and manage by the mail Glassfish server. If the pressure sensing element sense the physical pressure the message are send to contacts with the live recording through GSM. Buzzer is provided within the device, when the device gets activated the buzzer produces high sound in the surrounding. So, that the people in the surrounding may hear the sound and come for rescue. Spy-camera starts functioning when device activates and capture the video of present location and the data is stored in SD card.

VII. PROPOSED SYSTEM

A women's safety system which provides the current location details of the women in danger using GPS and GSM modules. IoT module will track the current location of the victim and update in the webpage. In this proposed system we will talk about methodology.

- **Step 1:** Start.
- **Step 2:** Switch ON the 12 Volt power supply.
- **Step 3:** Emergency button (Panic Button) is pressed by user as in trouble?
- **Step 4:** If GPS receives signal, GPS will start calculating the current latitude and longitude values of the victim and send it as SMS to the registered mobile number using GSM module.
- **Step 5:** If any vibrations detected by vibration sensor, get the last location from GPS and send to GSM module.
- **Step 6:** IoT module tracks the last location of the victim and that location is updated in the Webpage.
- **Step 7:** Camera module captures the image of the culprit and sends as an email to emergency contact.
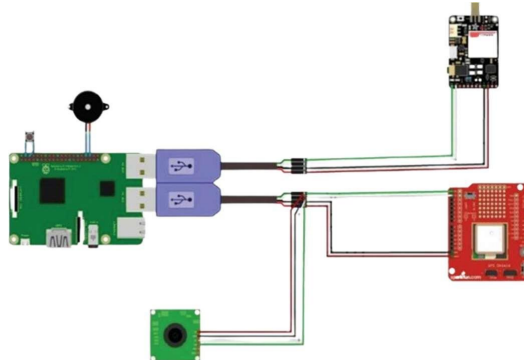- **Step 8:** Buzzer ON.
- **Step 9:** Stop.

Fig.7. System design

CONCLUSION

In this project, a Raspberry Pi based smart safety device system for Women safety is implemented using GPS and GSM technology. The system provides safety and security not only for women, but also for other people (especially elderly persons and children) in every walk of their life. The advantage of using Raspberry Pi3 Model B+ is that it has an in-built Wi-Fi module Camera Module Captures the images of the victim and send to an email and emergency contact that can connect to the internet, without use of an external router. It can thus send an email alert to the predefined contact. The system can be made portable by fixing all the components inside a small enclosure and making it battery operated.

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