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Creating a Smart Safety Device for Women using IoT

Dr. Gholap P. S.[1], Saurabh Pansare[2], Shrikant Khote[3], Rushikesh Ambalkar[4], Vedant Nalawade[5]
Department of Computer Engineering[1,2,3,4,5]
Sharadchandra Pawar College of Engineering, Dumbarwadi, Otur, India

Abstract: *Would it be moral if I said that even in today's 2020, women in our society cannot live independently? Every day there is a lot of news of physical violence, rape and violence against women, and this number is increasing, especially in big cities. The presence of CCTV helped to some extent but the suspect could not be identified at the time of the attack. The aim of this article is to enable women to use technology to become self-sufficient, thereby reducing crimes against women and girls in India. The application proposal reveals a practical, effective and portable product that can help women live safe, independent lives. The goal of the Internet of Things is to integrate everything we have created and implemented with SIM 800 GSM modules, force sensitive resistors, impact sensors, Bluetooth modules, LCDs, resistors, transistors, diodes, LEDs, Arduino UNO, buzzer, etc., PCB, breadboard, transformer, switch, Arduino compiler and Neo6mv2 GPS module. The proposed system has dual security where a sick woman can seek help and share her location through the emergency number. It can activate the system in three different modes depending on the situation required, and sometimes it seems to appear at strange or bad times. The victim can activate the device using the alarm button or Bluetooth module. The internal heart rate sensor, GPS module and GSM module will be automatically activated when the device is turned on. The device will constantly beep so neighbors know what's going on, police said. The device is equipped with a force-sensitive resistor to protect the device from any external force during any misbehavior or misuse. In the age of pepper spray and smart bracelets, such tools have become powerful and effective in separating women's lives from bad behavior.*

Keywords: Women Safety Device; IoT; Beat sensor,A9G board, Ladies Security, GPS module, GSM module, Drive resistive sensor

I. INTRODUCTION

In the current scenario we can observe that the women safety has become a common issue, women are more worried about their security and safety, different application are designed and implemented to provide security. smart applications are designed which consists of all the latest technologies to provide safety measures to the women. Smart bands are designed to provide security to women which are connected to smart devices which helps family members to get the current location of the women. The strategy is to switch to an independent hardware is main focus of this project. Here we have implemented a system which ensures the safety of women. This system is designed using IOT devices which consists of sensors i.e. pulse, temperature, motion, vibration, ultrasonic which are integrated with Arduino A9G board which results according to the situation of the women. GPS is integrated with this sensor which sends the current location of the women so that the family member can tack them. This helps to identify the location and call all the available resources to help the women. The sensor gets activated and sends values to the training dataset. If the analysis shows the abnormal results it will popup message on an application.

Main aim of this device is to provide security and safety to women dealing with different issues. Leaving in an independent world still women safety is the biggest concern, women are not safe even today. There should be some effective solutions which can provide security and safety to women. Many devices are designed which provides the essential feature for the safety of women but they come up with a drawback that the application requires initial interaction of women and that condition is not possible

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II. RELATED WORK

This section discusses various efforts to improve safety equipment for women.Suraksha[2] is an independent object that can manifest itself through sound, change and impact/force. The voice is the sacrifice. The device will recognize it and automatically send the message. The key is simple on/off trigger and pulse/force; Once launched, the device starts working using energy sensors and provides the victim's location information to their family and friends.

Poonam et al. [5] developed a security device that uses ATmega 328 microcontroller and does not require an Android application, making it standalone. It uses GPS and GSM modules to track the location and then sends it to family and friends, giving them information about the woman's current location. Security [7], resulting from this change and received Cov. The victim's location is sent to personnel. Additionally, the device will use audio circuitry to pre-record text to alert the environment.

The device proposed by the author (FEMME) [4] has a robotic application. Its main mission is to deliver distressing messages and record audio and video of the entire incident as evidence. It also has a module for detecting hidden cameras using an RF receiver that collects/detects the electromagnetic waves emitted by spy cameras.

Kumar et al. [3] proposed a monitor-shaped device that works with the concept of GEOFENCE, a virtual boundary that makes requests when people are in a certain area. There are also two ways to communicate with the victim's family or friends. The device also allows women to make a loud sound when they receive the last message, even if their device is in silent mode.

SMARISA [6] is a portable device to keep women safe. Raspberry Pi Zero includes hardware components such as Raspberry Pi camera, buzzer and button to launch the program. The victim opens the door by pressing the button. Once clicked, the victim's location is now returned and the camera captures an image of the attacker, which is then sent from the victim's smartphone to the police or emergency line.

The smart bracelet security device[1] can be activated by double-tapping the screen. Once activated, it sends the GPS location to the front communicator and police control room. It also has a heart rate monitor and a thermometer to measure a person's heart rate and body temperature. When the device is thrown, the energy sensor is activated and transmits the victim's current location. The piezoelectric buzzer will also activate. Two metal points on the top of the screen emit electric current, causing electric shock.Almost all of the current safety devices for women require human intervention, such as pressing a button to activate the device or holding the device after hearing it. Danger. However, the proposed device relies on fingerprint-based cell connectivity.

III. ARCHITECTURE

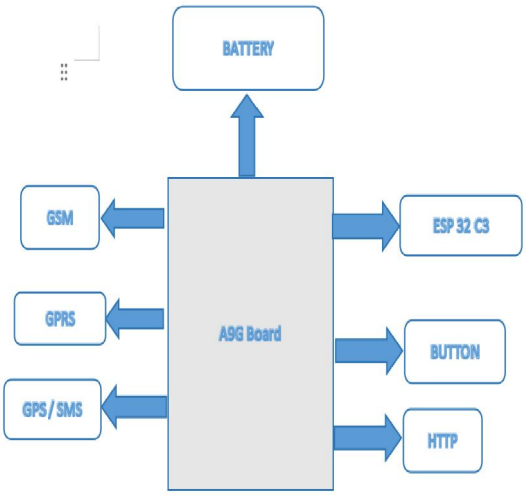

Fig. System Architecture

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IV. PROPOSED METHODOLOGY

Step 1 : Start
Step 2 : Registration
Step 3 : Press switch Buttom
Step 4 : Real time location is send.
Step 6 : Select the Location to registered number.
Step 7 : End

V. FLOWCHART

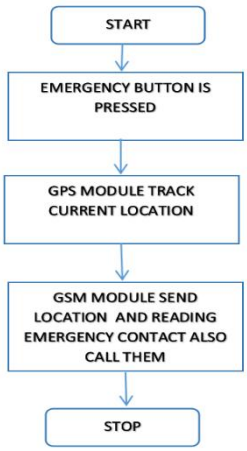

Fig. FLOWCHART

VI. PROPOSED DESIGN FOR WOMEN SAFETY DEVICE

The mentioned women's safety equipment aims to help women who may experience negative problems. The device is ready for any situation that may arise against the woman's will. Figure 1 shows the hardware configuration of the security device. It uses the Atmega 328 microcontroller. The design includes GSM (Global System for Mobile Communications) to send alerts, a ringtone to alert the surroundings, and shock absorbers for self-defense.

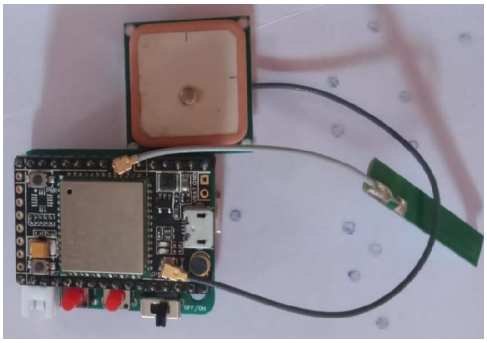

Fig. Proposed Hardware Design for Women Safety

Working of the device is as follows:

1. Define the Project Requirements: Clearly define the functionalities you want your device to have, such as an SOS button, GPS tracking, sending alerts, etc.
2. Assemble the Hardware: Gather the necessary hardware components, including the ESP32-C3 microcontroller, GPS module, buttons, battery, and other sensors or peripherals you need.
3. Set Up the Development Environment: Install the necessary software tools and libraries, such as the Arduino IDE with ESP32-C3 support.
4. Design the Circuit: Create a circuit diagram for your hardware setup. Connect the ESP32-C3, GPS module, SOS button, and other components according to your design.

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5. Write Firmware/Software: Write the firmware for your ESP32-C3. This involves programming the microcontroller to handle button presses, interact with the GPS module, and send SOS alerts.Implement power management to ensure efficient battery usage.
6. SOS Button Functionality: Implement the SOS button functionality. When pressed, it should trigger an alert, which could include sending a distress message and/or activating a loud alarm.
7. GPS Tracking: Integrate the GPS module to obtain location information. You can use the NMEA sentences provided by the GPS module to get latitude and longitude data.
8. SOS Alerting Mechanism: Decide how you want to send SOS alerts. You can use Wi-Fi, mobile networks, or both. Implement protocols like MQTT or HTTP for communication.
9. Server-Side Backend: Create a server-side backend to receive and process SOS alerts from the device. This could be a cloud-based server or a self-hosted server.
10. Alert Notifications: Set up a system to notify designated contacts when an SOS alert is received, such as sending text messages, emails, or push notifications.
11. Power Management: Optimize power consumption to prolong the device's battery life. This may involve putting the ESP32-C3 into sleep mode when not in use.
12. Testing and Debugging: Thoroughly test the device to ensure that all functionalities work as expected. Debug and fine-tune the code as needed.
13. Enclosure Design: Design or select an appropriate enclosure for the device to make it portable and durable.
14. User Interface: Create a user-friendly interface for configuring the device, setting emergency contacts, and checking the status of the device.
15. Compliance and Certification: Depending on your region, you may need to meet regulatory requirements for safety and wireless communication.
16. Deployment and Distribution: Prepare your device for deployment, whether it's a commercial product or a personal project. The circuit consists of three main stages

- Power supply
- The oscillator
- Voltage amplifier

When the battery is fully charged, voltage is applied to the oscillator stage. The transformer increases the oscillation frequency and acts like an inverter. The transformer's output is then transferred to the capacitor, where current is stored and used to shock the attacker.
Shows Android interface for women's safety. The design also encompasses an android application that provides an additional safety features as listed.
1. Use this app to send group messages from the device to the victim's mobile phone.
2. The recorded information can be used by the victim as evidence against the perpetrator.
3. The safe location of the victim's current location will be displayed on the map via the mobile application, allowing women to reach the safe place from their current location.
Figures show the uniqueness of the design in solving women's sensitive security-related issues; because other devices are based on women pressing certain buttons or performing certain movements of the vehicle. But he failed because he didn't have time to respond. With this button method, if a woman is attacked from behind, she will also inform the neighbors and the police because the idea here is; If our devices use IoT authentication for one minute, it will automatically notify neighbors. and police. In addition to sending notifications, the Android app can easily list victims and suggest nearby safe places

VII. RESULTS

This section presents the results of the experiments conducted on the hardware and the Android application. First, verify that the GSM module is connected and configured. After installing the GSM module, the device prompts the user to enter button; so access the device and verify the credentials. When the user turns on the device with the button, continuous monitoring begins and the sensor is constantly checked for inputs. If the finger is not lifted, an audible warning will sound after one minute. When the bell starts ringing, the GSM module sends a message to all Emergency

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(ICE) numbers with the latitude and longitude values received from the GPS module. It also makes the Android app. Show the safe place for the victim as shown in the picture.

Fig. Android Application showing the Details and Map of Safe Location

VIII. CONCLUSION

The safety equipment recommended for women is designed to provide complete safety to women in the current situation. The Button is used as a unique identifier for the user to ensure that no one can create false information and that alerts are only issued when there is stress. In order to ensure complete security, a buzzer has been added to the design to alert all neighbors to the error that has occurred. Sending messages to ensure next of kin and police are informed of the victim's current location. If the woman feels the need to defend herself, she can use an electric shock to temporarily incapacitate the offender. An Android application has also been created that will provide additional security features based on the hardware, such as sending group messages, recording audio, identifying nearby safe places on the map. This article presents a model of smart equipment for women's safety, which should be further evaluated with performance indicators to prove its effectiveness.

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