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Women Safety Device Using IOT

Neha Jadhav
Electronics and Telecommunication
Student of Sinhgad Academy of engineering Kondhawa, Pune.

Shruti Nalage
Electronics and Telecommunication
Student of Sinhgad Academy of engineering Kondhawa, Pune

Chhaya Tambe
Electronics and Telecommunication
Student of Sinhgad Academy of engineering Kondhawa, Pune

Prof – S.T. Sawant-Patil
Assistant Professor
Sinhgad Academy of engineering, Pune. dept of E&TC.

Abstract **- Addressing the safety concerns of women in society is a critical issue, and the application of technology offers a promising avenue to enhance their protection. A prime example of this technological application is the deployment of a GPS-based safety mechanism. This system, specifically designed for the assistance of women, features a GPS module capable of tracking the user's location. In emergency situations, the device quickly alerts a preselected emergency contact. Users can activate the system either through a smartphone application or by pressing a dedicated button on the device itself. Through the use of satellite technology, the GPS module in the device precisely locates the user and facilitates communication, ensuring timely assistance when needed.**

Keywords—At mega 328, GPS, GSM Module, Wi-Fi Controller

I. Introduction -

Women play a major role in society as equal to men. It is pathetic that in this modern era too, there is still a threat to women's safety in most of the countries in the world. [20]. Although with the strong criminal punishing laws, it's sad that the safety measures taken are not hundred percent effective. Adding to this, we can't change the mentality of all humans. to build confidence and a sense of safety in women, an effort has been made to build a project that creates a safer environment for women wherever she wishes to perceive.

A tool created to assist women in need is a women's safety system. It is a wearable gadget that tracks the woman's whereabouts and, in the event of an emergency, sends a message to a saved emergency number using electronic components such GPS modules, microcontrollers, sensors, and wireless communication modules.

The gadget can be started by either pressing a button or using an app on a smart. The device's GPS module uses satellite signals to pinpoint the woman's where abouts, and it can also connect to the mobile network to exchange extra location related data.

In the present era, ensuring the safety of women has emerged as a critical concern due to the prevalence of physical and sexual abuse. This unfortunate reality creates an atmosphere of fear and restricts their ability to freely navigate public spaces. Despite notable technological progress, women and girls in numerous locations still encounter a range of challenges, with a distressing number becoming victims of physical and sexual violence on a daily basis.

A wearable security device designed for women's blazers contains an embedded microcontroller, emergency switch, GPS receiver, GSM modem, buzzer, shock circuit, and voice recorder. The device can alert parents and police of the user's current location via text message in case of an emergency. The device captures GPS location information, which is then used to generate a message containing location information and sent to the police and a pre-programmed mobile number. The GPS location can also be tracked on Google maps, allowing users to feel safe and secure.

When a woman feels unsafe, she can activate the system by using the fingerprint sensor. This triggers the system to send the woman's real-time location and a message to her registered contacts to inform them that she is in danger. Additionally, the micro-controller activation allows the camera to take pictures. By utilizing these technologies, we can improve the safety of women.

One of the most prevalent criminal offenses in the country currently is sexual harassment, which is increasing at an alarming rate. Women are known for their ability to mobilize people from different backgrounds, such as ethnic, religious, political, and cultural, for a common goal of promoting freedom.

Recognizing the crucial importance of women's safety, it is imperative to ensure their adequate protection. Regrettably, schools often overlook imparting basic life skills, including essential safety precautions, while working hours can extend into late evenings or involve night shifts. Consequently, numerous sectors are advocating for the implementation of projects that teach young girls self-defence techniques.

II. Motivation:

Motivated by the pressing challenges facing women today, I embarked on developing a security device aimed at empowering women to pursue their passions without fear. This application offers a means for women to navigate their daily routines freely and securely. The primary objective of this endeavour is to safeguard women from instances of abuse and violence, recognizing the pervasive nature of such threats in their lives

III. Proposed Model-

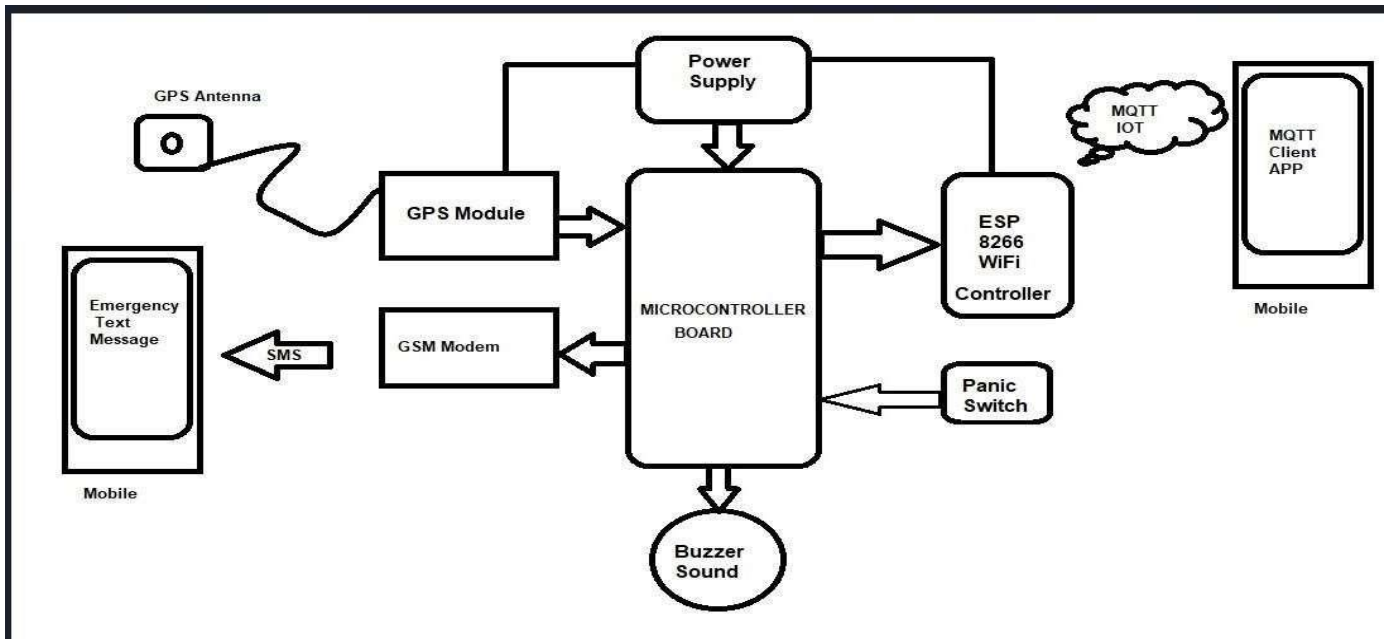


Fig.1Proposed Architecture

The system's design consists of the following steps:

Step 1: Write a program in embedded C according to the problem statement.

Step 2: Convert the .c file to .hex file by exporting the program to binary code.

Step 3: Create a .hex file for all the modules.

Step 4: Add respective .hex file to each module.

Step 5: Start the simulation by clicking the play button.
Step 6: Check for the status of SOS button Status.

Step 7: Send the alert message and GPS Coordinates along with the message “I’m in trouble” to the concerned phone number.

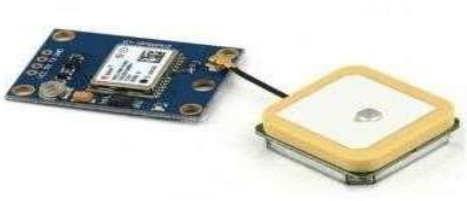
Step 8: If the status of the button is closed then notify by stating “I’m women to carry multiple devices for protection. This comprehensive system integrates GPS tracking, audio recording capabilities, and automated emergency messaging to pre-stored contacts in the event of low battery situations, ensuring women's safety in various circumstances.

IV. **Hardware Components—**

1 GSM Module:

GSM modules play a crucial role in various applications, including remote monitoring, asset tracking, telemetry, and mobile communication devices. They offer a reliable means of connectivity, especially in areas with limited or no access to WiFi or wired networks. Additionally, advancements in GSM technology have led to the development of faster data transmission rates (e.g., with the introduction of 3G, 4G, and now 5G networks), further expanding the capabilities and potential applications of GSM modules.

2. GPS Model:



the function of a gps (global positioning system) module is to determine the precise geographical location, velocity, and time information for a device.The function of a GPS module is to provide accurate positioning, velocity, and timing information, enabling a wide range of applications across industries such as transportation, logistics, agriculture, public safety, and outdoor recreation.

Here's a breakdown of its main functions:

- **Receiving Satellite Signals**:

GPS modules receive signals broadcasted by satellites orbiting the Earth. These signals contain precise timing information and data about the satellite's position.

- **Velocity Calculation**:

By tracking changes in position over time, the GPS module can calculate the device's velocity (speed and direction of movement).

- **Navigation and Mapping**:

GPS modules enable navigation by providing real-time location information. They are commonly used in navigation systems for vehicles, ships, aircraft, and outdoor activities. They can also be integrated into mapping applications to display the device's location on digital maps.

- **Tracking and Monitoring**:

GPS modules are used for tracking the movement of vehicles, assets, and individuals. They can transmit location data to a central server, allowing real-time monitoring and historical tracking.

- **Emergency Services**:

GPS modules are crucial for emergency services, enabling precise location information for emergency calls (such as E911 services). This helps responders locate individuals in need of assistance quickly and accurately.

3. **ATMega328P Microcontroller**

The atmega328 is a popular 8-bit microcontroller from microchip technology (formerly atmel corporation). it's widely used in various embedded systems and diy projects due to its versatility, ease of use, and extensive community support. here are the specifications of the atmega328 microcontroller:

1. **CPU**: 8-bit AVR microcontroller running at up to 20 MHz clock frequency.
2. **Memory**:
   - Flash Program Memory: 32 KB (32,768 bytes) with 0.5 KB used by the bootloader.
   - SRAM (Static Random-Access Memory): 2 KB (2,048 bytes).
   - EEPROM (Electrically Erasable Programmable Read-Only Memory): 1 KB (1,024 bytes).
3. **I/O Pins**: 23 General Purpose I/O (GPIO) pins, including:
   a. 14 digital I/O pins that can be used as input or output.
   b. 6 analog input pins (ADC channels) with 10bit resolution.
   c. 6 PWM (Pulse Width Modulation) output pins.
4. **Operating Voltage**: 1.8V to 5.5V, making it compatible with a wide range of power supplies.
5. **Clocking Options**:

Internal RC Oscillator: 8 MHz.
External Crystal Oscillator: Supports external clock sources up to 20 MHz

6. **Communication Interfaces**:
   a. USART (Universal Synchronous/Asynchronous Receiver/Transmitter).

b. SPI (Serial Peripheral Interface).
c. I2C (Inter-Integrated Circuit) / TWI (Two Wire Interface).

7. Timers/Counters:

a. Two 8-bit Timer/Counters (Timer/Counter0 and Timer/Counter2).
b. One 16-bit Timer/Counter (Timer/Counter1).

8. Analog-to-Digital Converter (ADC):

- 10-bit ADC with up to 6 multiplexed channels.

Conversion time typically 13 ADC clock cycles.

4. **Wi fi Controlle**r –

When referring to a "Wi-Fi controller," it usually means a microcontroller or a specific chip that integrates Wi-Fi connectivity. These Wi-Fi controllers are widely used in IoT devices, home automation, industrial automation, and various other applications where wireless connectivity is required. They offer a combination of processing power, connectivity options, and low cost, making them popular choices for embedded Wi-Fi projects.

V. Methodology:

Once the circuit setup is done, each component should be added with its .hex file. A hex file pertaining to a GPS module is typically a firmware or software update file that contains hexadecimal code used to update the module's firmware. Hexadecimal code is a representation of binary data in base-16 format. When working with an Arduino Nano and a GPS module, the term "hex file" refers to a compiled binary file that contains the machine code required to program the Arduino Nano microcontroller. To achieve the goal of sending the GPS location when a button is pressed, you would need to develop or find an Arduino sketch (code) that incorporates the necessary libraries for the GPS module and button input. The Arduino sketch would define the behavior of the Arduino Nano when the button is pressed, including reading the GPS coordinates and transmitting them to a designated destination. Once the sketch is ready, you can use the Arduino Integrated Development Environment (IDE) to compile the code, generating a hex file. This hex file contains the machine code that can be uploaded to the Arduino Nano to execute the desired functionality. It's essential to consider that the specific implementation and code will vary depending on the GPS module, button input, communication protocol, and destination you intend to use for transmitting the location data. Consequently, you must tailor the code or find suitable code that fits your specific hardware and requirements. Compiling it using the Arduino IDE will produce the corresponding hex file, enabling you to program the Arduino Nano accordingly. Further, add hex file for gps module, when updating the firmware of a GPS module, one would typically acquire the appropriate firmware file (often in the form of a hex file) and employ a manufacturer-provided tool or software to transfer the hex code to the module. This process enables bug fixes, feature enhancements, or performance improvements for the GPS module. www.ijcrt.org © 2023 IJCRT | Volume 11, Issue 5 May 2023 | ISSN: 2320-2882 IJCRT2305910 International Journal of Creative Research Thoughts (IJCRT) www.ijcrt.org h437 It's worth noting that the content and structure of a hex file for a GPS module can differ based on the manufacturer and module model. The hex file is designed to be compatible with the module's programming interface, facilitating the flashing of the code onto the module's memory. If you possess a GPS module and need to update its firmware, it is advisable to refer to the manufacturer's documentation or seek their support for instructions on acquiring the correct hex file and conducting the firmware update process specific to your module. When referring to a GSM module, a hex file typically represents a compiled binary file containing the machine code necessary for programming the module. However, to enable the functionality of sending an SMS when a push button is pressed, you would need to acquire or develop specific code or firmware designed for your particular GSM module. To implement this functionality, you would typically create or find an Arduino sketch or code that incorporates the required libraries for the GSM module and button input. This code would define how the GSM module behaves when the button is pressed, including initializing the module, establishing a cellular connection, and sending an SMS message with the desired content to a designated phone number. After preparing the Arduino sketch or code, you can compile it using the Arduino Integrated Development Environment (IDE), resulting in the generation of a corresponding hex file. This hex file contains the machine code that can be uploaded to the GSM module, enabling it to execute the desired functionality. It is important to note that the specific implementation details and code may vary depending on the GSM module used, the button input method, and the specific GSM library employed. Therefore, you must ensure that you obtain or develop the appropriate code that matches your GSM module and requirements. Compiling this code with the Arduino IDE will produce the corresponding hex file, allowing you to program the GSM module accordingly.

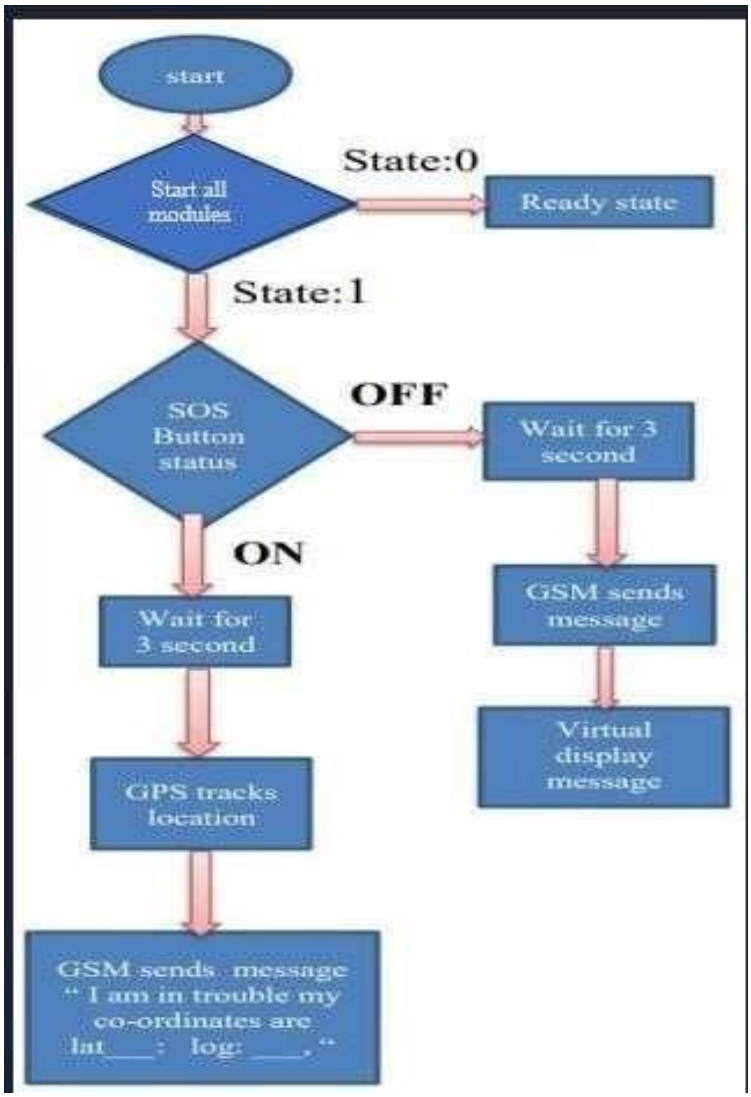


Fig 2: Flow Chart

The **procedural steps can be observed in Fig 2** that highlights the states of start all model proceeded with the states of push button respectively. When the simulation begins the start all model activates the system. The status of the push button is taken into consideration only after the start all model is made 1. If the push button is released it sends a message to the number stored stating that the person is in trouble along with the present location using the satellite connection read by the GPS module. When the person presses the button, the message stops and notify that the person is alright.

- When the device is turned on using power source, the start all model keeps the device activated in order to be ready to face the emergency.
- The relay model keeps running to indicate that the device is active.
- Once the start all model is turned on the device will now be ready to send the message to the stored number
- When the push button status is release or open it starts sending the coordinates of the person reading the current location using satellite signal.
- When the push button is turned on or closed the message stops and notify that the device carrier is now alright.

VI. Future scope –

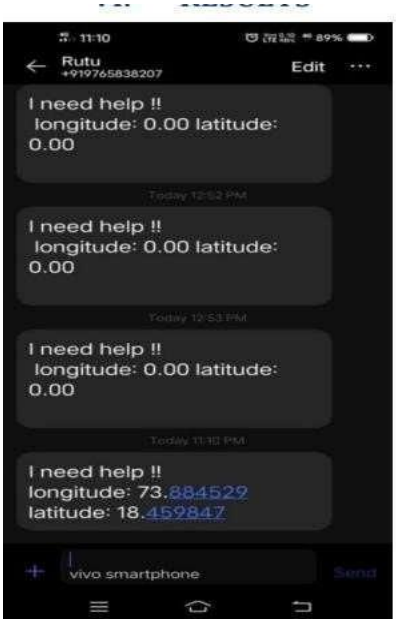
This device can integrate with existing safety systems, such as those in police stations, emergency services, and hospitals, potentially reducing the time it takes for emergency responders to arrive. It enables the creation of community safety networks by linking various devices to a central server managed by a security team, which can then quickly send help to the location of any device in distress.

It ensures the safety of remote employees, such as field workers and delivery drivers, by monitoring for deviations from their planned routes.

The gadget is also compatible with wearable Technology, like Fitness band and smartwatches, allowing for continuous monitoring of the user's safety.

Furthermore, it can be connected to extra sensors that track environmental conditions such as temperature, humidity, and air quality, enabling it to detect hazardous situations and advise the user to take precautions.

VII. RESULT:



VIII. CONCLUSION-

The proposed solution aims to address the critical challenges women face today by leveraging advanced technology and innovative approaches to enhance their safety and security across India. This cost-effective device is designed to tackle the issues women confront, enabling them to share their location with trusted contacts and send distress messages to prevent further harm. By incorporating an Arduino Uno, the device can be made compact and wearable, easily integrating into clothing for convenience. It operates on low-power rechargeable batteries, ensuring portability. The device utilizes a combination of GSM and Arduino technology to create a safety system for women that aligns with smart city initiatives, featuring Arduino UNO, GSM, GPS, and sensors. In emergencies, it employs GSM and GPS to send the victim's location and distress message to an authorized network for swift and accurate response, though its effectiveness might be reduced in areas with poor connectivity. Future enhancements should aim at improving GPS accuracy and enabling danger message broadcasts to nearby individuals based on location.

The urgency of enhancing women's safety is underscored by increasing reports of sexual harassment and assaults, with media outlets regularly reporting disturbing incidents. To combat this, innovative technologies such as Arduino and GSM are being utilized to make women feel safer, especially in unfamiliar environments. These technologies underpin the development of safety apps and devices, including those for tracking. Alternatives might include cameras for recording events, hidden cameras in clothing or accessories, and loud alarms or buzzers for immediate alerts.

Apps specifically designed for women's safety, which activate an emergency button to notify a pre-set list of contacts including family, friends, and local police stations, represent a promising solution. Voice detectors that recognize distress in a user's voice and alert authorities are also a key feature. As technology advances, these solutions will continue to evolve and improve, offering better protection for women.

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