Smart Wearable for Women Safety

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Abstract: The design of a smart wearable bag that provides security for women is presented in this paper. The GSM Module, Touch Sensor, Emergency Switch, LCD, GPS Module, and Node MCU are all included in the smart bag. Shaking the device initiates the system. Automatic alert messages and alert calls with the location and the circumstances are sent to pre-registered cell phone numbers when an alarming situation is identified.

Keywords: Node MCU, Alert Call, Alert Message, Pre-Registered Cell Phone Numbers

1. INTRODUCTION

Small India is an independent country and one of the safest travel destinations in the world. However, a few incidents in recent times have drawn attention to the significance of women safety. Although there are several women safety systems on the market now, advanced technologies are still needed to offer more safety and security. Due to numerous incidents of violence against women, many women in affluent nations still feel afraid to go outside alone. Many measures have been made to make women lives safer, but there is still more to be taken to ensure safety on public transportation and in general. Women are not always safe in the current global environment. The level of harassment against women is rising alarmingly. The newspaper regularly features headlines about violence against women. In order to defend themselves against harmful persons, women must learn self-defense. There are many different methods of self-defense, including martial arts education, conventional karate techniques, Aikido Defense, etc. For the safety of women, a lot of study has been performed. In our work, we present an innovative system for self-defense. To provide protection, many electronic components have been integrated into the system. When a woman senses an emergency, she activates the system automatically by pressing the emergency switch, shaking the device, or touching it. The technology creates an SMS signal and a call signal that is immediately forwarded to a select group of registered mobile numbers advising them of the attack and its location. In this paper, a technique that may enhance security and safety is proposed. In their daily lives, women will benefit from this project's assistance in preventing harassment of any form in situations including workplaces, educational institutions, public transportation, etc.

2. LITERATURE SURVEY

For the safety of women, a lot of study has been conducted. Numerous papers can be found, as indicated in the reference list. [1] to [5]. In [1] this research paper describes a GSM-based one-touch alarm system for women's security. A PIC microcontroller, a GSM module, and a GPS module complete the gadget. This device which resembles a wristwatch, and when active, it uses the GPS to track the whereabouts of the women and the GSM to transmit emergency alerts to contacts and the police control center. In [2] the author's proposed document, an immediate response, cost-protection system is provided that enables anyone, but particularly women, to call for assistance by simply pressing a button on a smart device. The woman who is wearing this device as a watch or band presses a switch on the device the when she observes a dangerous environment. An SMS alert is issued as soon as a woman falls, containing details on the incident, the victim's body position, and their location. And help will arrive soon. In [3] the paper suggested a quick-response mechanism that supports women in difficult situations. She only needs to push the button to send latitude and longitude-based SMS alerts to a few pre-defined numbers when someone is about to harass her. In [4] the device resembles a wristband and has a pressure switch built into it as an input that, when active, indicates the outcome. To defend oneself, loud alarms and tear gas cannons are used. These devices also transmit messages and location data to the emergency contacts, as well as live video that can be used to identify the assailant. In [5] this proposed system presents a safe and secure gadget for women that includes an Arduino controller and sensors like a flex sensor, pulse rate sensor, and temperature LM35 sensor. In this project, the use of an LCD, GSM, and GPS is implemented. In [6] Cellular phones are used when combined with safety devices. When one gadget is turned on, the other is turned on as well. Voice commands or a switch are used to activate. Upon activation, a message to a registered emergency contact is sent asking for assistance at the current location. Additionally, the smartphone begins capturing audio and video, which is also included in the data provided to the emergency contact person or service. To prevent potential attackers, the personal protective equipment is also built into a unit that may include deterrent tools like a Taser, protective spray, strobe light, dye pack, siren, etc. In [7] the bag is developed in which the energy utilized to make the bag was renewable. The solar panel on the front of the backpack will power the entire system in addition to charging electronic gadgets like laptops and phones. Our cyber-physical device, which includes sensors and microcontrollers, is activated with the help of this energy. The microcontroller uses an Android-based application to send the information to the user as soon as the bag's zip is opened. Additionally, it uses the solar panel on the backpack to notify the user via their mobile of the battery's level of charge. In [8] Embedded hardware and software were jointly developed for this specific use to make up this system. As soon as the trigger key on the belt is pressed, the technology enables the person's precise location by immediately giving the police the location of the frightened victim so that the incident could be stopped and the offender could be found. Additionally, it has a system that can deliver an electric shock which is not fatal in an emergency.

3. PROPOSED WORK

Our proposed block diagram consists of a microcontroller Node MCU, GPS module, GSM module, Touch sensor, Vibration sensor, LCD, and Emergency Switch. The sensor used in the device acts as an activator which activates the device. The Sensors and the emergency switch act as input for the device. The LCD acts as an output that displays the information. The GSM and GPS modem act as both input and output.

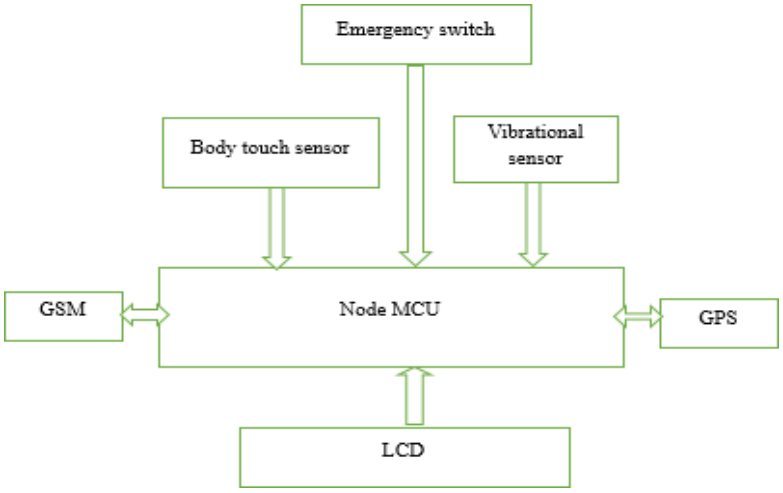

FIGURE 1. Block Diagram of Proposed Work

WORKING PRINCIPLE

For the security of women, this system is provided. Through notifications, this system's security tools may help women who are in trouble by tracking down and sending information about incidents. Using a GPS monitoring device, family members and police will monitor the victim's location. With all the modern technology at our service, creating a safety device for women that will send an emergency message and call our friends or family is not difficult. The location will be sent by SMS on this smartphone, and the victim can be saved using this information. The location is sent using the GPS modem, and the message and call are sent by GSM. The GSM will receive the data constantly. The data will be transferred continually to the microcontroller's GSM modem. A microcontroller is connected to an LCD, which will display the information related to tracking. When a woman is in danger, she can shake the gadget, touch the switch that is nearby, or push the switch. The device is turned on by the touch and vibration sensors, which function as an activator. The person will then receive an SMS with a location and alert message using GSM and GPS, which can be tracked via Google Maps after the device has been activated. Additionally, a call for help is placed to the registered mobile number.

4. RESULTS AND DISCUSSION

INTERFACING OF GPS WITH NODE MCU

The GPS module is interfaced with the Node MCU in the digital pins D2 and D3 (GPIO4 and GPIO0). GPS is used to find out location, altitude, speed, date, and time in UTC. GPS module tracks the location using latitude and longitude. It communicates with the microcontroller using the UART communication protocol. The module receives information from the satellite in the form of an NMEA string.

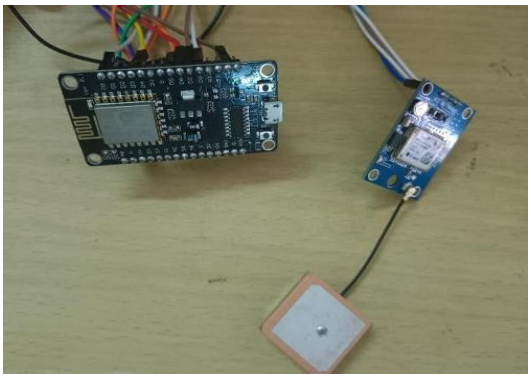

FIGURE 2. Interfacing of GPS with Node MCU

INTERFACING OF GSM WITH NODE MCU

The GSM is interfaced with Node MCU in the digital pins D0 and D1 (GPIO16 and GPIO5). The main advantage of using the Node MCU with a GSM Module is that, if you have an internet connection and the Node MCU module is connected to the Wi-Fi**,** then you can monitor the data in real-time from anywhere around the world using the Blynk application, and you will also be able to receive the alert messages via GM network**.**

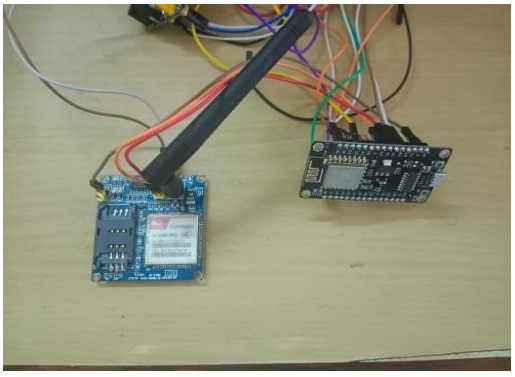

FIGURE 3. Interfacing of GSM with Node MCU

INTERFACING OF TOUCH SENSOR WITH NODE MCU

The touch sensor is interfaced with Node MCU in the digital pin D4 (GPIO2). The touch sensor acts as an activator. Whenever the device is touched message and call is sent to the pre-registered mobile number. The sensor consists of the TTP223 IC which is based on the capacitive sensing principle. It consists of a sensing electrode and an oscillator circuit. When a conductive material i.e., finger comes in contact with the sensing electrode, it changes the capacitance of the electrode. This change is detected by the oscillator circuit, then the oscillator circuit generates a digital output signal. This indicates the touch or proximity of the object. It is widely used in various electronic devices such as toys and touch switches.

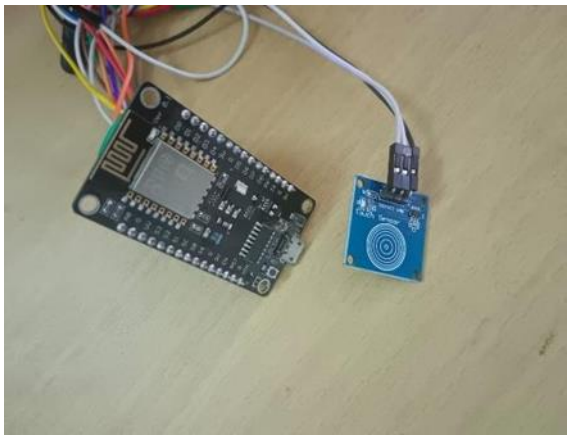

FIGURE 4. Interfacing Of Touch Sensor with Node MCU

INTERFACING OF VIBRATION SENSOR WITH NODE MCU

The analog pin A0(ADC0) of the Node MCU is used to interact with the vibration sensor. The

+5V terminal of the sensor is wired to the Node MCU's 5V port. The sensor's GND terminal is connected to the Node MCU's GND terminal. The sensor now has power, because of this. This sensor detects vibration and acts as an activator. Any angle of vibration can be detected using this vibration sensor. Every time the device shakes, they turn the entire system on, Then the message signal and call signal is delivered to the pre-registered mobile numbers.

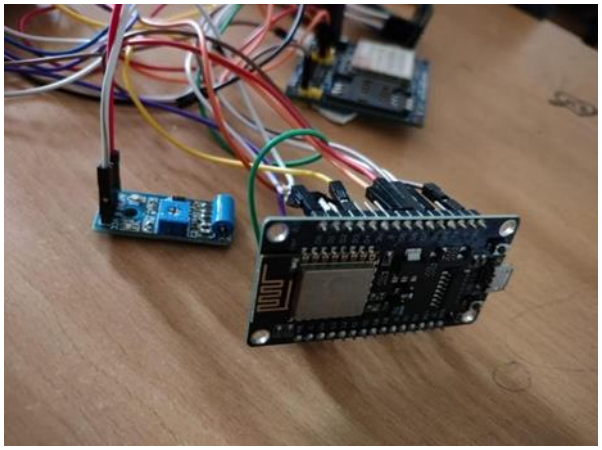

FIGURE 5. Interfacing Of Vibration Sensor with Node MCU

INTERFACING OF EMERGENCY SWITCH WITH NODE MCU

The emergency switch is interfaced with Node MCU. The emergency switch acts as an activator. Whenever the emergency switch is pressed the device gets activated, and messages and calls are sent to the registered mobile number. An emergency switch is used to send an emergency signal to the police or nearby people in an emergency where you are attacked by someone or thieves break into a house etc.

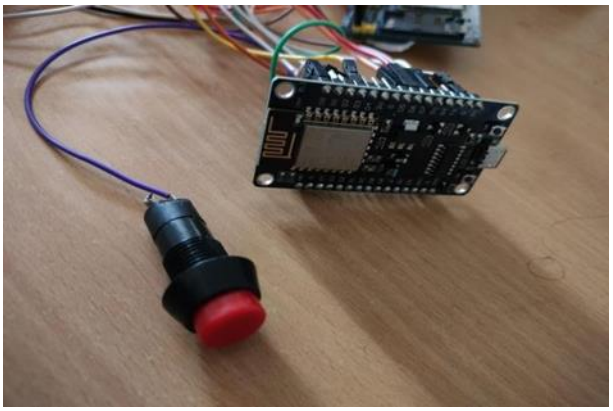

FIGURE 6. Interfacing Of Emergency Switch with Node MCU

PROTOTYPE MODEL OF THE SMART WEARABLE FOR WOMEN

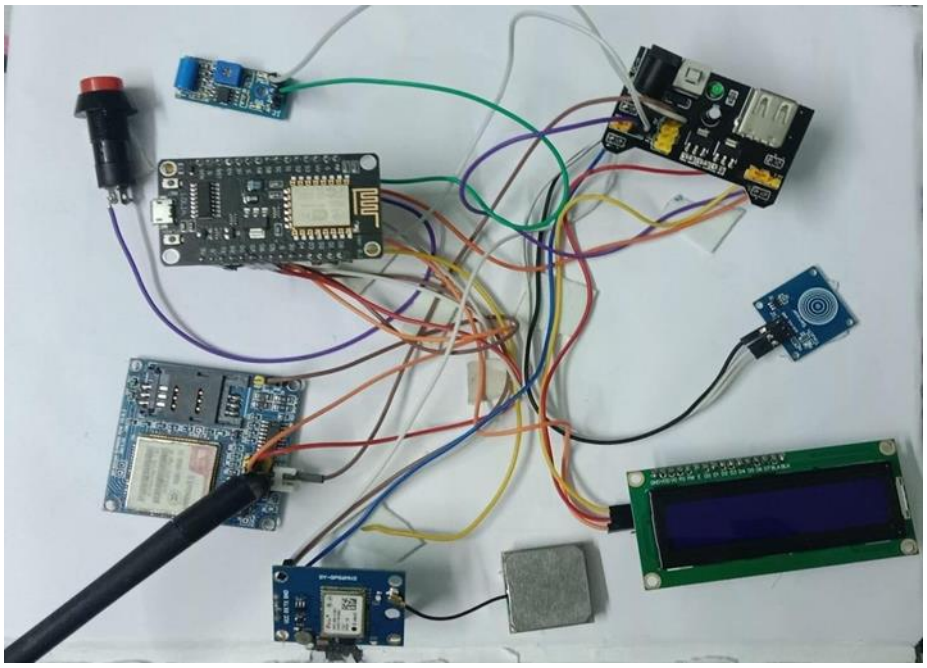

FIGURE 7. Prototype Model of The Smart Wearable for Women

5. CONCLUSION

We have studied and developed a prototype model using Node MCU in this work. During the execution of this work, programming and interface with the Node MCU were successfully done. The project involves using sensors to monitor the GSM and GPS modems. The main benefit of this prototype is that whenever we shake or vibrate the device and the user touches it, the location is received from the GPS modem to the mobile numbers that are stored in the GSM network to save the women who are in danger. Besides that, the call is automatically generated to registered mobile numbers. Most issues can be resolved by using our device. Further research and innovation, will be proceeded where this project can be used as a Wearable Device like wristband, Handbag, Back Bag, Purse, etc.

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