Smart Self Defense System for Women Safety Using IoT

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Abstract: **The world is becoming so much more unsafe for women. Social evils like molestation, dowry, crime against women, and worst of all rape are on the rise in many countries. Incidents of crime against women have been increasing at an alarming pace in Indian cities, the most common incidents being rape, kidnapping, sexual harassment, and even teasing. Security for women is still a major issue as the number of crimes against women and girls is increasing day by day. In case of any harassment or when she finds that someone is going to harass her, she presses a switch that is located on the watch or band or when the woman has fallen the information about the attack along with the body posture and location information is sent as SMS alert to a few predefined emergency numbers and soon help is on its way! The system will consist of embedded hardware and software co-designed for this dedicated application.**

Keywords: **GSM, SMS, GPS, location, SIM, IoT.**

1. Introduction

The system allows for knowing the exact location of the individual, as soon as the trigger key on the belt is pressed. By providing the instant location of the distressed victim to the police so that the incident could be prevented and the culprit apprehended. In case the caretaker wants to know the present location of the lady, he/she can do so by sending an SMS to the SIM number of the lady which contains a secret password. Then this system responds to such requests by sending back an SMS containing location information in terms of Latitude and Longitude. This would help reduce crime against women.

A. Objective of Project

The main objectives of this project are:
- To provide security to women.
- To reduce the crimes against women.

B. Scope and Limitation of Project

The scope of this project is to provide security to women. In every way, the world is getting more dangerous for women. Women's crime is on the rise. Due to an increase in crime, employed women are feeling unsafe. When someone is going to harass a woman, she can press the button, and her current location information is transmitted as an SMS alert to the pre-defined numbers based on latitude and longitude. The controller used is Arduino Uno. It is interfaced with a push button, a GPS module, a GSM modem, and an LCD Display (16×2). When the switch is hit, the controller uses a GSM modem to transfer the current location data from the GPS module to the predetermined phone number.

2. System Design

A. DFD Diagrams

A Data Flow Diagram (DFD)is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically, it can be manual, automated, or a combination of both. It shows how data enters and leaves the system, what changes the information, and where data is stored.
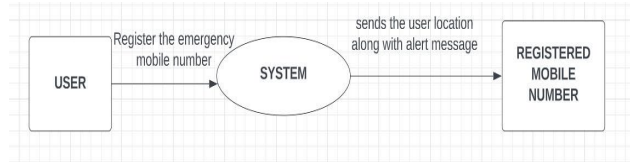
B. Level-0 DFD

Fig. 1. DFD Level-0

The above diagram Fig. 1 describes the DFD Level-0 diagram of the system. The DFD Level-0 diagram describes briefly the system. Firstly, a user has to register an emergency mobile number. Whenever the user is in a critical situation the system automatically sends the user's location along with an auto-generated alert message to the registered mobile number.
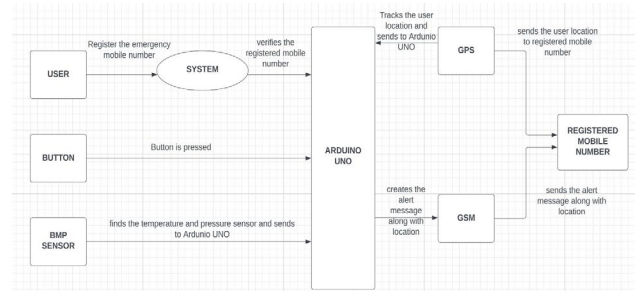
C. Level-1 DFD

Fig. 2. DFD Level-1

The fig. 2 describes the DFD Level-1 diagram of the system.

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DFD Level-1 means it explains the detailed information of the system. Firstly, the user needs to register the emergency mobile number. Then, the BMP Sensor evaluates the temperature and pressure values. Either the button is pressed or the temperature and pressure values are more than the user location and an alert message is sent to the registered mobile number.

3. Key Functions

This system is wearable for women and contains pressure, temperature, and Push-button. To automatically detect any atrocity, three sensors i.e., pressure, temperature, and pulse rate sensors are used. The pressure sensor is used to detect if any pressure is being applied to the woman beyond an acceptable limit. The temperature sensor is used to detect any deviation in the temperature. The reading from these two sensors is combined and used to detect any critical situation. The device also provides a push button for the woman to press when she feels unsafe. When any of the two above-mentioned events occur, the buzzer is activated to alert the people around her that the woman is in a dangerous situation and then the location of the woman is detected using the GPS module and GSM is used to send the message to the relatives.
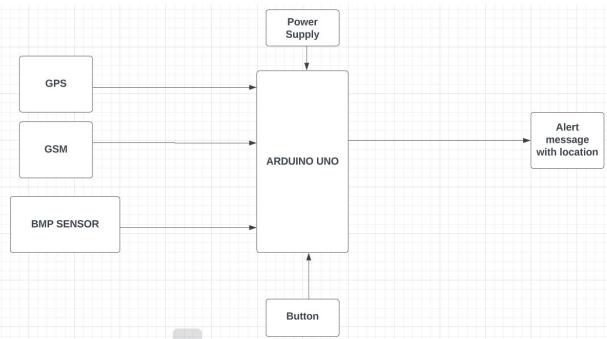
A. Architecture

Fig. 3. System architecture

In this project, we included various modules and those models are as follows
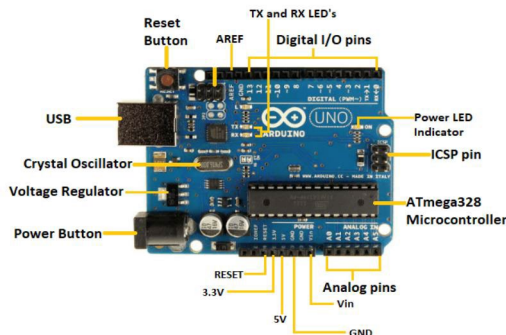
1) Arduino Uno

Fig. 4. Arduino Uno

In this system, we used Arduino Uno for the communication between sensors, GPS, and GSM with the microcontroller of ATmega328P.

2) GPS module

Fig. 5. GPS module

GPS is a Global Positioning System it usually identifies or tracks your current location. This GPS Module can be used in any mobile, computer, and other integrated devices.
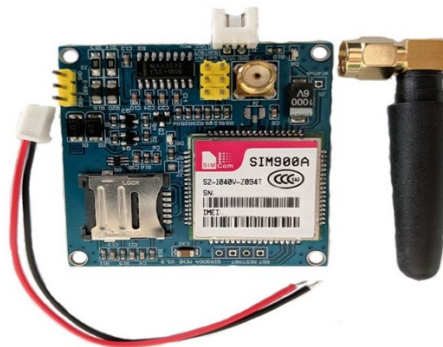
3) GSM module

Fig. 6. GSM module

GSM is Global System for Mobile Communication it is used to send or receive messages. In this system, we have used SIM900A GSM Module.
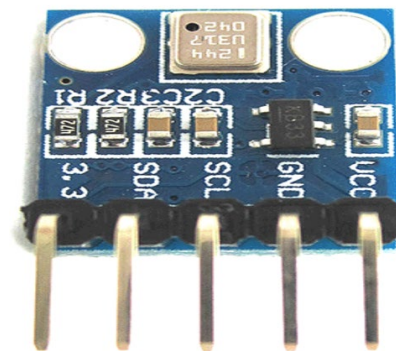
4) BMP 180

Fig. 7. BMP 180

BMP is used to Measure Barometric pressure and Atmospheric pressure. In this system, we have used BMP 180 to measure the temperature and pressure of the user.

4. Result

Provide the connections to the board according to the figure shown above. And, then activate the power supply. Connect the Arduino UNO board to the system or PC with the help of a USB cable. And also provide the power supply to GSM with the help of a socket. The detailed connections to the Arduino UNO are
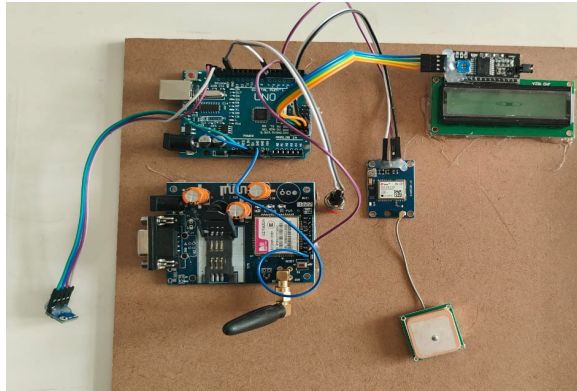
shown below.

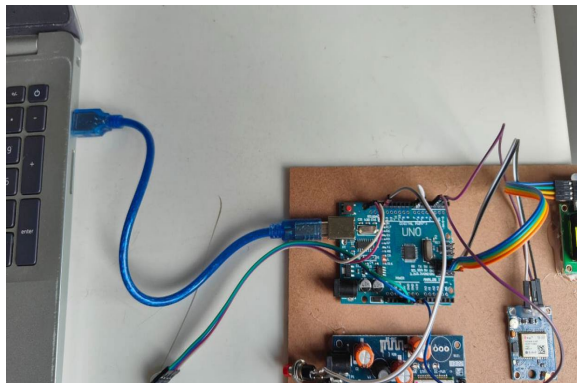Fig. 8. Connections to the board

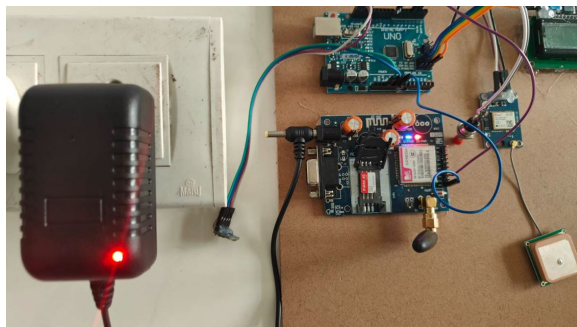Fig. 9. Power supply to Arduino Uno
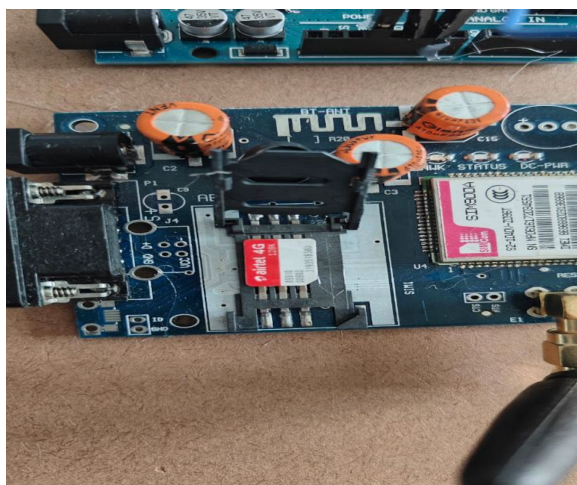

Fig. 10. Power supply to GSM

Fig. 11. Insert a SIM card

After the insertion of the SIM card. When the button is pressed, it tracks the user's location and sends it to the registered mobile number along with the alert message. After pressing the button, the board activates. It displays the message "Emergency Help Me". After activation of the board. It tracks the user's location, it displays the message on LCD as "Sending location to user…". After sending the location to the user. It displays the message as "Message sent" on the screen.
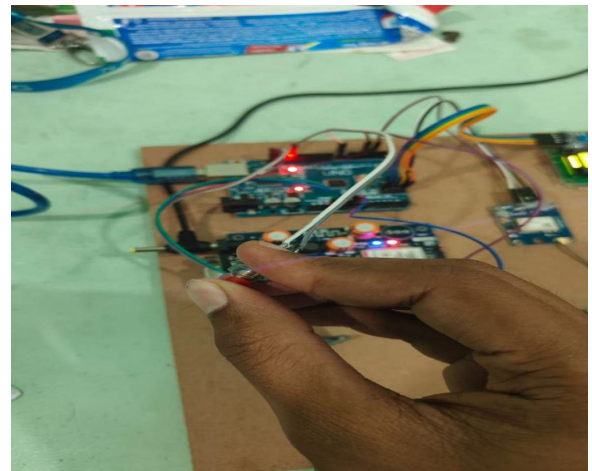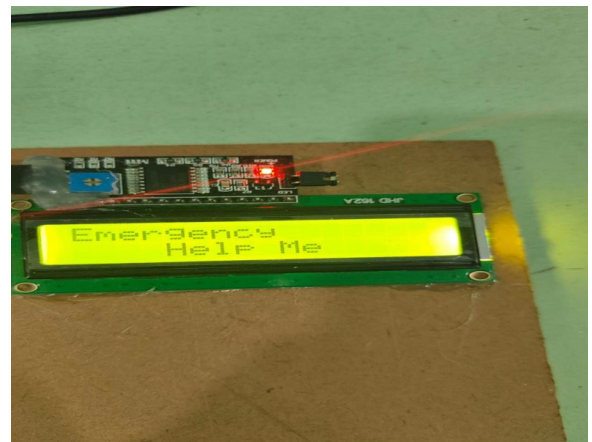

Fig. 12. Button is pressed
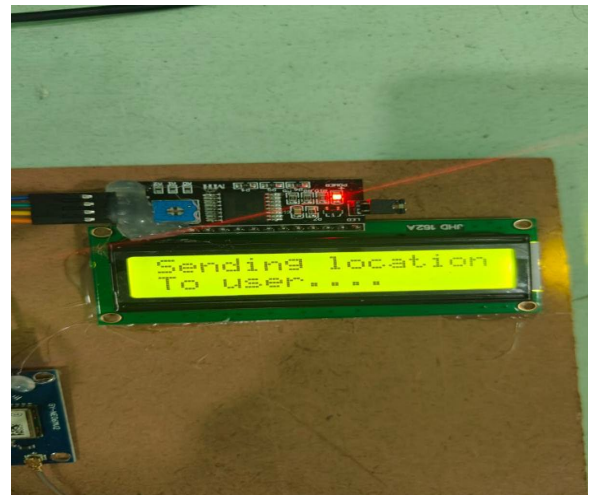

Fig. 13. Activates the board

Fig. 14. Sends the location

Fig. 14. Confirm the message is sent

If the user press the BMP Sensor, then it measures the temperature and pressure values. After detecting the high pressure it displays the "high pressure detected" on the screen. It shows the sending of the location to the registered mobile number along with blood pressure. If the temperature value is more then it displays the "temp condition abnormal" on the screen. If the temperature value is more then it tracks the user's location and sends it to the registered mobile number along with the alert message.
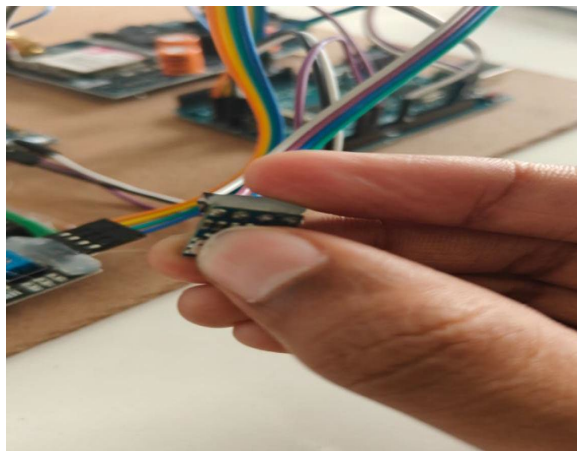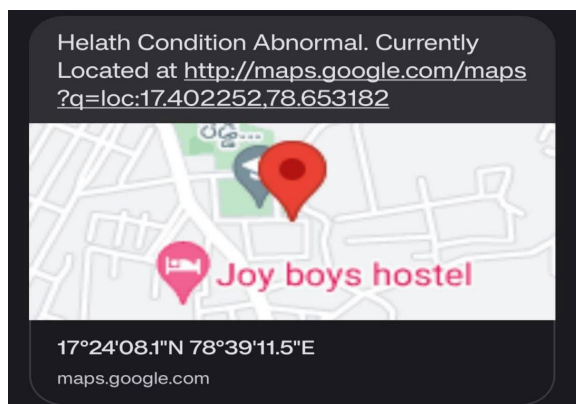

Fig. 15. Press the BMP sensor

Fig. 16. Sends location along with temperature

5. Conclusion

The main purport of building a woman's safety device is to act as a rescue and prevent any harm at the time of hazard especially for women.

This system detects and sends alerts for the dear ones with the location coordinates of the women without the requirement of her interaction in critical times. It sends an emergency message automatically to the relatives.

6. Future Enhancement

Through the process of customization, this prototype can be modified into wearables like smartwatches, bracelets, necklaces, etc. The proposed system can be further developed with capabilities like recording audio, and video of the culprit when the alert mechanism is activated which can be produced as a piece of evidence in the court.

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