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Safety or Emergency system for the use of Women or Elderly people to alert the Guardian or Caretaker

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ABSTRACT:

The rise in violence against women in recent years has prompted us to propose a security system that uses GPS and GSM via an Arduino controller to keep women safe. When a woman is in trouble, she can use the emergency button to activate the system. As soon as the button is pressed, the victim's location is captured by GPS and the same will be sent to the pre-programmed contact using GSM module. The LEDs indicated in green and red color are used to detect the women's safety. Green indicates the woman is safe and red indicates she is in trouble. The proposed system has a rechargeable battery along with a solar panel, where the solar panel converts sunlight into electricity to charge the battery. When the battery is turned ON, the GSM module and GPS module are activated. Initially, the system will be in idle state and consumes very less power, indicator LED will be green during this state. If the user pushes the emergency button, the entire system gets activated, indicator LED will be RED during this state, LCD displays the latitude and longitude of the user's location and the same is sent to the registered mobile number as an SMS for tracking the location of the user. Simultaneously at the guardian's location, GSM module-2 which is connected to Arduino nano provides an alert through the buzzer to ensure the response of guardian even if he/she missed the SMS alert. This project is very useful for saving lives and preventing atrocities against women. Similarly in case of an emergency, the elderly people may use emergency/panic button, which immediately sends a message to designated contacts. This feature can be useful for elderly people who may have difficulty reaching a phone or calling for help.

KEYWORDS: *Arduino, GPS, GSM, Women Safety, Maps.*

1. INTRODUCTION:

The safety and security of women and elderly people are crucial concerns in today's world. There is a growing need to develop advanced and effective safety systems to ensure their protection. The use of Arduino UNO controller has emerged as a promising solution to address these issues. The Arduino UNO controller is a powerful and versatile microcontroller board that is widely used in various applications. It offers numerous features and capabilities that make it an ideal platform for developing safety and emergency systems. By leveraging its functionalities, it is possible to design a reliable and efficient safety system that can provide timely assistance to women and elderly people in times of distress.

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In this paper, we propose a safety and emergency system for women and elderly people using the Arduino UNO controller. The system comprises of modules, push button switch and buzzer alert that are interconnected to detect and respond to potential threats or emergencies. The system includes a push button switch that can be easily activated by the user to send an immediate alert to the designated emergency contacts. The system also integrates a GPS module that enables the tracking of the user's location, ensuring that the response team can quickly locate the individual in distress. Overall, the proposed safety and emergency system using the Arduino UNO controller offers a comprehensive and reliable solution for the safety and security of women and elderly people. Its advanced features and capabilities make it an ideal platform for designing efficient and effective safety systems that can address the growing concerns regarding the safety of vulnerable individuals.

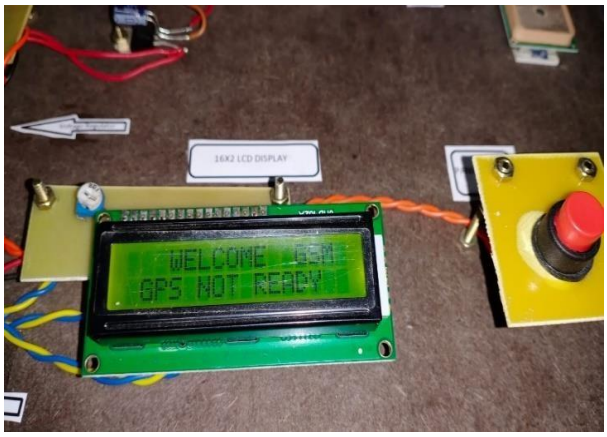
2. METODOLOGY:

The methodology of women/elderly safety emergency system using Arduino Uno:

Power on the system: To power on the system, the battery is kept on. Main unit batteries can be charged in two ways either using DC adaptor or solar panel.

Obtain GPS signal: The system will take some time to obtain a GPS signal. Wait until the GPS module acquires a stable signal and the latitude and longitude coordinates are displayed on the system.

When GPS module is not ready, LCD displays the following:



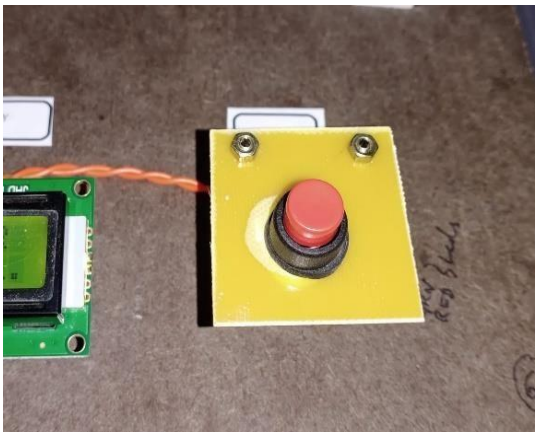


Fig 2.1: LCD displays the GPS not ready **Fig 2.2: Emergency push button switch**

Check the GSM module: Make sure that the SMS is sent to the user's guardian and they receive the SMS with the correct GPS coordinates.

Test the panic button: Press the panic button to test the system. The system should trigger an alert and send an SMS to emergency contacts with the GPS coordinates.

Test the buzzer at the receiver: Test the buzzer by pressing the panic button again. The alarm should sound, drawing attention to the user in case of an emergency.

Check the battery level: Make sure that the battery level is sufficient for the system to operate for a reasonable amount of time. Solar panel is connected to battery, which acts as a power backup to the batteries.

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Ensure the system is ready for use: Once the system has been tested and is functioning correctly, the user can carry the device. In case of an emergency, the user can press the panic button to alert the user's guardian and triggers the buzzer at the guardian's location.

Fig 2.4(a) (b): Main unit

In case of emergency: If the user is in an emergency, the user pushes the push button switch then the complete system is activated i.e., Arduino Uno and LCD. Then Red LED is turned on, LCD displays the latitude and longitude of the user's location and an SMS is sent to the registered mobile number for tracking the exact location of the user through GSM and GPS modules. At the guardian's location, the alerting system is connected to the power supply. When the push button of main system is pressed, the caretaker gets the buzzer alert through GSM module- 2, which is connected to Arduino Nano controller.

Wait for assistance: The emergency contacts will receive the SMS with the GPS coordinates along with the buzzer alert at guardian's location. They should contact the user or alert the authorities to provide assistance.

3. EXISTING APPROACHES:

There have been various prior approaches to developing safety and emergency systems for women and elderly people. Some of the traditional methods include whistle blowing, pepper spray, and self- defense training. However, these approaches have limitations and may not be effective in all situations. In recent years, technology has emerged as a promising solution to address safety concerns. Various safety apps have been developed for mobile phones that provide immediate assistance in times of distress. However, these apps require a working internet connection and may not be useful in areas with poor network coverage. Other safety systems use GPS tracking to locate the user's location and alert emergency services in case of an emergency. However, these systems may not be affordable or accessible to all individuals, particularly those from low-income backgrounds.

In this paper, the use of the Arduino UNO controller has emerged as a cost-effective and reliable solution to develop safety and emergency systems. The Arduino UNO controller offers numerous features and capabilities that make it an ideal platform for developing safety systems that can provide timely assistance to women and elderly people in times of distress. The proposed safety and emergency system using the Arduino UNO

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controller builds upon the existing technology to provide a comprehensive and reliable solution to address safety concerns for vulnerable individuals.

The following literature has been reviewed to understand the current state-of-the-art in safety and emergency systems using the Arduino UNO controller.

- Design and Development of a Wearable Safety Device for Women using Arduino: This research study by J. Divya and K. Sumithra presents the design and development of a wearable safety device for women using Arduino. The device includes an accelerometer, GPS module, GSM module, and a panic button. The device is worn on the wrist and when the user presses the panic button, it sends an SMS to the emergency contacts with the user's location. The device also sends an alert to the emergency services.
- Smart Walking Stick for Elderly People using Arduino: This research study by S. R. Biju and G. Giridharan presents the design and development of a smart walking stick for elderly people using Arduino. The walking stick includes an accelerometer, GPS module, GSM module, and a panic button. The walking stick also includes a fall detection sensor that sends an alert to the emergency services if the user falls. The device also sends an SMS to the user's emergency contacts with the user's location.
- Smart Helmet for Women Safety using Arduino: This research study by S. Balaji and S. Karthik presents the design and development of a smart helmet for women's safety using Arduino. The helmet includes an accelerometer, GPS module, GSM module, and a panic button. The helmet is worn by women while riding a two-wheeler. If the user presses the panic button, the device sends an SMS to the user's emergency contacts with the user's location. The device also sends an alert to the emergency services.
- Arduino-based Smart Watch for Elderly People: This research study by M. Alfarhan and A. Al- Fuqaha presents the design and development of an Arduino-based smartwatch for elderly people. The smartwatch includes a heart rate sensor, a blood pressure sensor, and a fall detection sensor. The device sends an alert to the emergency services if the user falls. The device also sends an SMS to the user's emergency contacts with the user's location.
- Development of a Wireless Sensor Network for Fall Detection and Prevention of Elderly People" by Sung-Min Oh, et al. This paper describes a wireless sensor network-based fall detection system for elderly people. The system consists of an Arduino UNO board, an accelerometer sensor, and a ZigBee module. The sensor detects the fall, and the ZigBee module sends the alert to the caregiver's smartphone.

4. PROPOSED APPROACH:

Our system includes a rechargeable battery and a solar panel that converts sunlight into electricity to charge the battery. The system features a GSM module and GPS module that are activated when the battery is turned on. The user can push the emergency button in case of an emergency, which activates the system. The LCD displays the latitude and longitude of the user's location, which is sent to the registered mobile number as an SMS for

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tracking the user's location. The system also includes a GSM module-2 connected to an Arduino nano, which provides an alert through the buzzer to ensure the response of the guardian, even if he/she missed the SMS alert. Overall, our approach to developing a Safety/Emergency System for Women/Elderly People using Arduino UNO Controller is focused on providing a cost-effective, reliable, timely, sustainable, and user-friendly solution to address safety concerns for vulnerable individuals.

Our approach for developing a Safety/Emergency System for Women/Elderly People using Arduino UNO Controller is based on the following principles:

- **Cost-effectiveness:** We aimed to develop a cost- effective system that can be easily accessible to individuals from all backgrounds.
- **Reliability:** Our system is designed to provide reliable and accurate information regarding the user's location in case of an emergency.
- **Timeliness:** Our system is designed to provide immediate assistance to the user in case of an emergency, with the help of GPS and GSM modules.

Sustainability: We incorporated a rechargeable battery and solar panel to ensure sustainable operation of the system.

- **User-friendliness:** We aimed to develop a system that is easy to use, with a simple interface and clear instructions.

5. RESULTS AND DISCUSSION:

Main Unit:

Fig 5.1(a)(b): Hardware setup top view of main unit with solar panel

The hardware setup allows the Safety / Emergency System for Women / Elderly People Using Arduino UNO Controller to track the location of the user, sent an emergency message, and provide visuals on the LCD display, LEDs to the user about the system's status.

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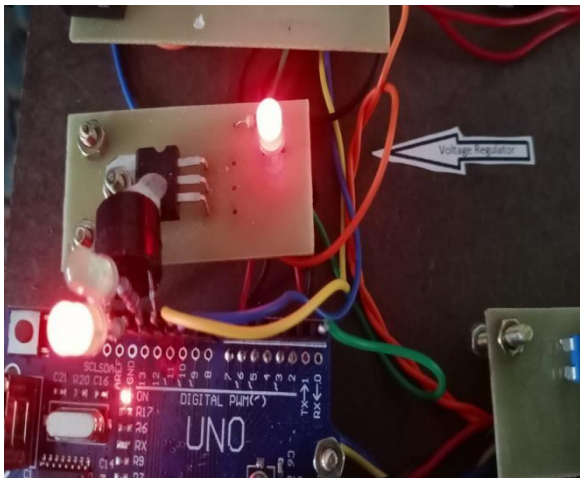
Alerting system:

Fig 5.2(a)(b): Hardware setup top view of alerting system

In case of an emergency, the Safety / Emergency system sends an emergency alert to the alerting system, which would trigger the buzzer to produce a loud alarm sound, ensuring that the user receives prompt help and assistance.

Step 1:

When the push button is pressed, the Red LED turns ON and LC D displays the following coordinates:



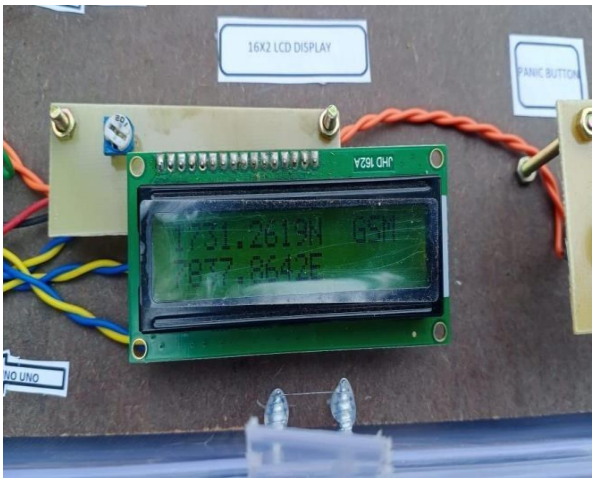


Fig 5.3(a)(b): Red LED turned ON and LCD displays the coordinates of the user

When the push button is pressed, the input pin will read a HIGH signal, and the Arduino will execute a set of instructions to turn on the red LED and display the coordinates on the LCD display.

Step 2:

The SMS is received by the caretaker when the push button is pressed.

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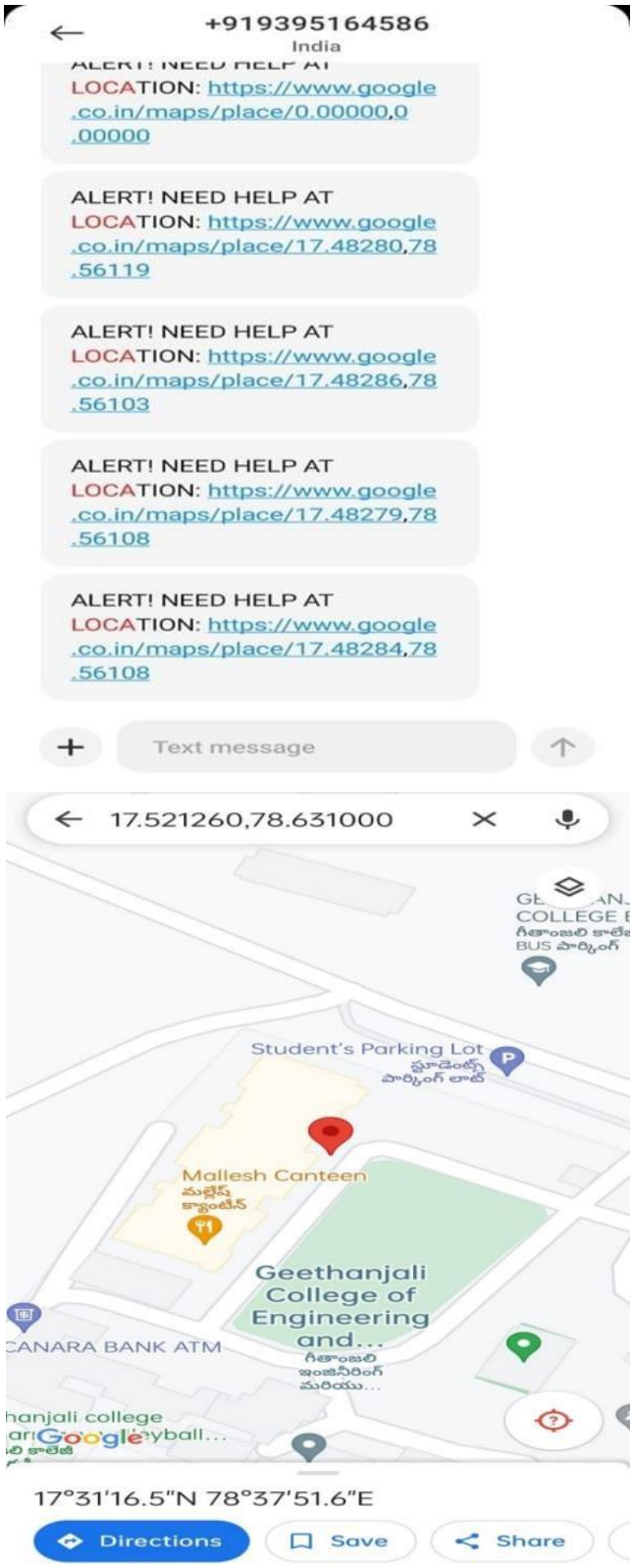

Fig 5.4: SMS received by the guardian & Fig 5.5: Google map location

The Google map location SMS received by the guardian using Arduino Nano and GSM module-2 to send an SMS message containing the location information of a user to their designated guardian.

Step 3:

The caretaker gets the buzzer alert through GSM module-2 in case of an emergency.

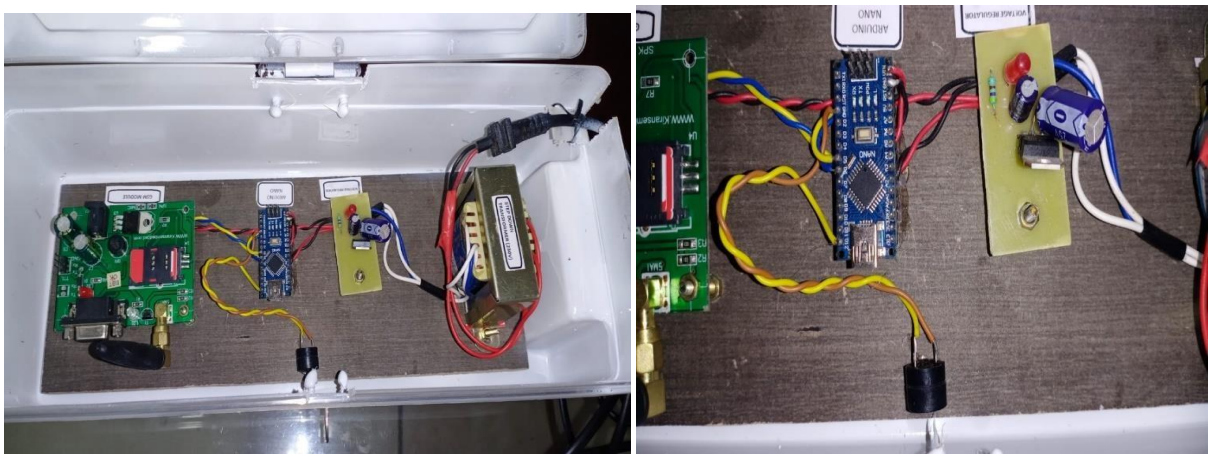

Fig 5.6(a)(b): Alerting the guardian

Alerting the guardian using Arduino Nano, GSM module and buzzer to give an audible alert to the guardian if an emergency is detected.

6. CONCLUSION:

Emergency systems for women or elderly individuals using Arduino controller offer a range of benefits that can improve safety and security. These systems can provide individuals (mostly women and elderly people) with the facility, that they may use for seeking help in the case of emergency. By using Arduino controller, these systems can be designed to be affordable, customizable, and easy to use, making them accessible to individuals of all age groups. One of the main advantages of emergency systems for women or elderly individuals using Arduino controller is the ability to provide real-time monitoring and response. Push button switch can also be used to call for help in case of an emergency, ensuring that individuals can receive assistance quickly and efficiently.

In conclusion, emergency systems for women or elderly individuals using Arduino controller are an important and promising area of research. By providing real-time monitoring and response, preventing accidents, and offering customization, these systems have the potential to significantly improve safety and security for vulnerable populations. With further development and research, emergency systems for women or elderly individuals using Arduino controller have the potential to become even more effective and widely adopted, helping to create a safer and more secure world for everyone.

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