



Pannic Button for Women Safety Using Arduino Uno

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ABSTRACT

Women's safety remains a critical issue globally, with harassment and violence often occurring in public spaces. Traditional safety devices are often expensive, complicated, or dependent on internet connectivity. This paper presents a low-cost and efficient panic button system for women's safety using Arduino Uno, GPS, GSM, and a buzzer. The device sends SMS alerts with real-time location data to predefined emergency contacts, while an alarm is triggered to draw attention. The system operates without requiring internet access, making it suitable for widespread use, particularly in remote and rural areas.

Keywords: Women's Safety, Panic Button, Arduino Uno, GPS, GSM, Buzzer, Emergency Alert System, Low-cost Technology

1. Introduction

Background:

Women's safety remains a global concern, with numerous cases of harassment and violence occurring in both urban and rural areas. While various safety applications and devices exist, many are either expensive, require internet connectivity, or are difficult to use during high-stress situations. There is a need for a more accessible, affordable, and effective system to ensure the safety of women in distress.

Objective:

The goal of this research is to design and implement a panic button system using Arduino Uno, GPS, and GSM technology to send real-time location data via SMS to emergency contacts and activate an audible alarm for immediate attention.

Scope and Significance:

This system is intended to be portable, cost-effective, and simple to use. It ensures that women in distress can send their location to emergency contacts while drawing attention from nearby individuals. The system is especially beneficial in rural or underdeveloped areas where the internet and complex devices may not be easily accessible.

2. Literature Review

There have been numerous studies and projects focused on enhancing women's safety. Existing technologies generally rely on mobile apps or IoT-based systems:

- **Mobile Applications:** Apps like *bSafe* and *Watch Over Me* offer features like real-time location tracking and emergency messaging. However, these apps require an internet connection, which can be a limitation in areas with poor network coverage.
- **IoT-based Systems:** Some systems utilize IoT devices to trigger alarms and send location information. These, however, are often costly and complex to implement.
- **Arduino-Based Safety Systems:** Several Arduino-based systems have been proposed for safety applications. These systems are affordable and can be integrated with various sensors like GPS, GSM, and accelerometers. However, few have integrated a robust location-based alert system combined with an audible alarm.

This paper proposes an integrated solution using **Arduino Uno**, **GPS**, **GSM**, and **Buzzer**, focusing on simplicity and cost-effectiveness.

3. System Architecture

The system consists of the following primary components:

1. **Arduino Uno:** Serves as the central processing unit.
2. **Panic Button:** A physical button that triggers the system when pressed.
3. **GPS Module:** Provides real-time location coordinates (latitude and longitude).
4. **GSM Module:** Sends SMS alerts with location data to emergency contacts.
5. **Buzzer:** Provides an audible alert to attract attention.
6. **Power Supply:** A battery or portable power source that powers the system.

The components are connected as follows:

- The **Panic Button** connects to an input pin of the Arduino.
- The **GPS Module** communicates with the Arduino via serial communication (RX, TX).
- The **GSM Module** communicates with the Arduino to send SMS messages to emergency contacts.
- The **Buzzer** is connected to a digital output pin of the Arduino, triggering an audible alarm when needed.

4. Working Mechanism

1. **Panic Button Pressed:** When the user presses the panic button, the system is activated. This sends a signal to the Arduino Uno to start the emergency procedure.
2. **GPS Location Retrieval:** The Arduino communicates with the GPS module to retrieve the user's current location (latitude and longitude).
3. **Sending SMS:** The Arduino then uses the GSM module to send an SMS containing the GPS location coordinates to predefined emergency contacts. The message format is: *"Emergency! My location: Latitude: 19.0760, Longitude: 72.8777. Please help!"*
4. **Buzzer Activation:** Simultaneously, the Arduino triggers the buzzer to emit a loud sound. The buzzer helps attract attention in the immediate vicinity, signaling that the person needs help.
5. **System Reset:** Once the SMS is sent and the alarm is triggered, the system resets, returning to standby mode, ready for future use.

5. Technologies Used

- **Arduino Uno:** A microcontroller board used for coordinating the components and processing the user input.
- **GPS Module (e.g., NEO-6M):** Provides geographic coordinates (latitude and longitude) using satellite data.
- **GSM Module (e.g., SIM800L):** Allows the system to send SMS messages to emergency contacts.
- **Buzzer:** Emits a loud sound to attract attention during an emergency.
- **Power Source:** The system can be powered using a 9V battery or a portable USB power bank.

6. Benefits

- **Affordability:** The components used (Arduino, GPS, GSM, Buzzer) are cost-effective, making the system affordable for a large number of users.
- **Simplicity:** The system is easy to operate, with a simple button press that triggers all actions.
- **No Internet Required:** The system works without requiring an internet connection, which is vital in areas with low network coverage.
- **Real-Time Location Sharing:** Sends the user's location in real-time to emergency contacts via SMS, ensuring that help can reach the user quickly.
- **Local Alert:** The buzzer ensures that people nearby are alerted to the emergency, potentially increasing the chances of getting help.

7. Challenges

- **Signal Availability:** The system depends on GSM network coverage, which might not be available in some rural or remote areas.
- **Buzzer Effectiveness:** In very noisy environments, the buzzer may not attract sufficient attention.

- **Battery Life:** The system's battery life could be limited, requiring regular charging or replacement in portable devices.

8. Future Advancements

Future enhancements could focus on the following:

- **Integration with Smartphone Apps:** A mobile app could provide additional features such as a real-time tracking map and audio/video recording during the emergency.
- **Solar-Powered Systems:** To extend the battery life and make the system more sustainable.
- **Advanced Sensors:** Integration with other sensors like accelerometers to detect sudden movements or falls, enhancing the system's capability.
- **Cloud-Based Alerts:** Implementing cloud-based data storage and alerts, allowing multiple emergency contacts to be notified simultaneously.

9. Conclusion

This research proposes a simple, cost-effective, and efficient panic button system for women's safety using Arduino Uno, GPS, GSM, and a buzzer. The system ensures that help can be sent immediately by alerting both emergency contacts via SMS and nearby individuals via an audible alarm. The device is designed to work in areas without internet connectivity, making it an ideal solution for a wide range of users. Despite its simplicity, the system provides a reliable and effective method to enhance personal safety.

10. References

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