**Report on Women’s Safety Device with Safety and Tracking Alerts**

**1.Area of the Project**

**1.1Introduction**

In recent years, the safety of women has become a major concern worldwide. Instances of violence, harassment and accidents have highlighted the need for practical solutions to ensure women’s safety in daily life. A key area of focus is the development of devices that can provide real-time alerts and tracking capabilities to help protect women during emergency situations. This project is dedicated to the creation of a compact, portable safety device specifically designed for women, using modern technologies like GPS, GSM, and microcontroller-based systems to send immediate emergency alerts and track the location of the wearer in real-time.

The proposed device integrates a simple push button for emergency activation, a 16x2 LCD screen for user interaction, and a GPS module to provide the wearer’s precise location. When triggered, the system sends an SMS alert with the user’s location to predefined contacts, ensuring a quick response from loved ones or authorities.

**2.Components used in the Project**

The primary components of this safety device include:

•Arduino Nano: A compact microcontroller that acts as the central processing unit, controlling all other components.

•16x2 LCD: Provides a simple user interface to displace information about the device’s status, such as emergency activation or message transmission.

•GSM MODULE(SIM900): Responsible for sending SMS alerts to designated contacts in case of an emergency.

•Neo 6M GPS Module: Continuously tracks the user’s location and provides accurate coordinates of emergency alerts.

•Push Button: The user activates the device by pressing this button, signaling an emergency.

•Breadboard: Used for connecting and testing the components without the need for permanent soldering.

•Antenna: Enhances the GSM module’s ability to send messages by ensuring proper signal reception.

**3. Literature Review**

**3.1 Existing Solutions for Women’s Safety**

Over the years, various systems have been proposed to address the pressing need for women’s safety, particularly focusing on communication and location tracking. These systems often integrate GPS, GSM, and emergency buttons to send alerts when activated. Below is a summary of some relevant studies and implementations:

**1.GSM-based Personal Safety System**

In 2018,Prathiba and Rajeswari discussed the development of a GSM-based safety system for women. Their device was designed to send SMS alerts to family members or emergency services when an emergency button is pressed. The system also included a GPS module to provide the location, which mirrors the functionality of the proposed project.

**2.GPS-GSM Integration in Safety Devices**

Kavitha and sharma (2017) explored the integration of GPS and GSM in a safety system for women. Their device is used a mobile app for tracking, alongside a GPS module to send location data during emergencies. Although the system provided real-time alerts, it required the user to have a smartphone, which could be a limitation in certain situations. In contrast, this project aims to provide a standalone device that doesn’t require a smartphone. Making it more universally accessible.

**3.Wearbale Safety Technologies**

A 2019 study by Akinola focused on wearable safety devices for personal protection usi ng smart textiles. While these systems are innovative and effective, they are often expensive and not widely accessible. The proposed project, by using affordable components like the Arduino Nano and GSM modules, seeks to make women’s safety more accessible and affordable.

**4.Research Gap**

Despitenthe growing body of research in personal safety systems, several gaps remain in termsof affordability, ease of use, and device portability. Many existing systems are either too expensive or overly complex for average user. Additionally, many devices require a smartphone or app to function, which could pose a problem if the user’s phone is unavailable or inaccessible during an emergency.

This project addresses these gaps by:

• **Reducing Cost:** By using readily available and inexpensive components such as Aurduino and GSM modules, the device remains affordable.

**• Simplifying the User Experience:** A single, easy-to-use push button triggers the emergency alert, ensuring that the system can be activated even in high-stress situations.

**• Improving Portability:** The compact design of the Arduino Nano and the overall small form factor make the device easy to carry, wear, or conceal.

**5.Problem Identification** (**Women’s Safety Device with Safety and Tracking Alerts)**

The primary problem this project addresses is the increasing threat to women’s safety in public spaces. Reports of harassment, assault, and even kidnapping highlight the urgent need for a personal safety system that can provide immediate alerts and real-time location tracking. While there are several safety systems available, many are either expensive or not user-friendly enough for an emergency. This project focuses on creating a practical, affordable, and easy-to-use device that can be carried discreetly and used instantly in emergencies.

**6. Design of the Experiment**

**6.1 System Overview**

The safety device comprises the following main components:

**1. Push button:** The user activates the device by pressing this button, which triggers the emergency system.

**2. Arduino Nano:** This microcontroller receives the input from the button, controls the GPS and GSM modules, and manages the display of messages on the LCD screen.

**3. GPS Module (Neo 6M):** The GPS module continuously monitors the user’s location and provides latitude and longitude coordinates when needed.

**4. GSM Module (SIM900):** Upon receiving the emergency signal, the GSM module sends an SMS containing the distress message and location to pre-configured contacts.

**5.LCD Screen:** The 16x2 LCD provides feedback to the user, displaying message like “Emergency Activated” or “Sending Location.”

**6.2 Experimental Setup**

The experimental setup involves connecting the components on a breadboard, ensuring each module (GSM, GPS, LCD, and button) is connected properly to the Arduino Nano. The steps for the experiment are as follows:

**1.Assembly:** Connect the GPS, GSM, and LCD modules to the Arduino Nano on a breadboard.

**2.Programming:** Write a program for the Arduino that handles button presses, activates the GSM and GPS modules, and updates the LCD with relevant information.

**3.Testing:** Simulate an emergency by pressing the push button and checking whether the system sends the correct SMS alert and displays the right message on the LCD.

**6.3 Flowchart of Operation**

**Step 1:** Press the emergency push button.

**Step 2:** Arduino Nano processes the button input and activates the emergency protocol.

**Step 3:** The GPS module sends and SMS with the distress message and location.

**Step 4:** The GSM module sends and SMS with the distress message and location.

**Step 5:** LCD displays messages, such as “Emergency Activated” and “Sending Location”.

**7.Results**

**7.1 Functionality**

•**Button Activation:** The push button successfully triggers the system, with the Arduino Nano responding within milliseconds. The system consistently sent an SMS to predefined contacts upon activation.

•**Location Tracking:** The GPS module provided accurate location data, with a typical acquisition time of around 20-30 seconds. This data was then transmitted by the GSM module in the SMS alert.

•**SMS Alerts:** The GSM module reliably sent SMS messages with the correction location information. The system was able to send alerts to multiple contacts.

•**LCD Display:** The LCD displayed relevant messages such as “Emergency Activated” and “Sending Location”, providing clear feedback to the user during the emergency response.

**7.2 Challenges Encountered**

**•Signal Quality:** The GSM module’s ability to send SMS was sometimes affected by weak signal areas. In future iterations, a more robust GSM module or improved antenna might be required to overcome this limitation.

•**Power Consumption:** The device was designed to run on a small battery, but the current system occasionally drained the battery faster than expected. This issue could be mitigated by optimizing the power usage of the components or using a higher-capacity battery.

**8.Conclusion**

The project successfully developed a low-cost, user-friendly women’s safety device with safety and tracking alerts. The system integrates as Arduino Nano, GPS, GSM module, and a simple push button to trigger emergency alerts. The device effectively provided real-time location tracking and sent SMS alerts to predefined contacts during testing. While the system is functional and reliable, future improvements will focus on optimizing battery life and signal reception for enhanced performance.

**9.References**

**1.** Prathiba & Rajeswari(2018). GSM-based Personal Safety system for Women. Journal of Engineering and Technology and Technology

**2.** Kavitha V & Sharma, R.S.(2017). GPS-GSM integrated Emergency Alert system for women’s safety. International Journal of Computer Applications,

**3.** Akinola K.J(2019). Wearbale Safety Device for personal Protection Using smart Textiles. IEEE Transactions on Consumer Electronics