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Designing an Automated Women Safety Device

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Abstract – *Even during these modern times, the woman safety is still a big concern. For generations, some women of all ages are being harassed, molested, and assaulted. There is a vast possibility for technology to overcome these problems. Various safety devices are designed especially for women, all these devices are meant to solve the problem but they have many loopholes. This paper includes an effective design of a women's safety device which sends the information to the nearby police station. Dynamic sensors such as force sensor and vibration sensor are used to detect vulnerability. The information is sent in the form of SMS and phone call. GSM and GPS technologies play a major role to send the information. Additionally, future enhancements are proposed to improve the performance on a small scale.*

Key Words: GPS, GSM, Force sensor, Women Safety Device, IoT

1.INTRODUCTION

Women's safety is been a major concern for a long time. Many devices are present already, but they follow a conventional method of pressing a button so that the device gets activated. This is considered as one of the major flaws observed because during dangerous situations, usually, the human brain cannot take spontaneous decisions. So, the requirement for automation is huge.

This paper includes the proposal and implementation of women's safety devices that can overcome the flaws of existing devices. The system should not depend on many external factors such as the internet. The GPS module and GSM module play a major role in the working of the device. GPS modules let us know the position anywhere in the world and the GSM module takes the help of a cellular network and transmits the information, it works by the means of digital modulation. The microcontroller interfaces with all the components. The highlight of this device is it does not need any push to activate, it activates itself on detecting force and sudden unusual movement. Implementation of this system will be very helpful.

2. LITERATURE SURVEY

The existing systems are designed in such a way that, manual activation is required. The external activations such as:

1. Intimation through an app
2. Activating device with a button.
3. Manual calling.

These might take a long time, so they can be eliminated by the means of automation. Automation can be achieved by physical sensors such as force sensor. The force sensor recognizes the force and sends the activation signal to the system.

3. PROPOSED SYSTEM

The women's safety device is designed with proper functionalities to send an SMS and phone call whenever a force and rapid movement is observed. The coordinates of the location are sent through SMS. The physical structure of the system is to in a form of wearable devices like hand bracelets and watch.

This proposed system works on a battery backup. It can be recharged when it drains. The design methodology is discussed in further sections. The design is meant for the prototype which varies for the actual proposed system.

4. DESIGN METHODOLOGY

The proper approach is needed to achieve the desired functionality of the system. The main functions of requirement are Microcontroller for interfacing, Force and vibration sensor, Location tracker, and module to send and receive information.

1. Arduino UNO Atmega328p is used as microcontroller.

2. Vibration sensor SW-420 is used to detect the vibration.

3. NEO 6M GPS module is used to locate the position.

4. SIM900A GPRS A6 module is used to intimate the information through cellular network.

5. IMPLEMENTATION

The description of various devices is as follows:

A. GSM MODULE

GSM stands for Global System for Mobile communications. It is a microcontroller-compatible hardware module. A SIM card of a particular service provider is inserted such that the network is discoverable. The Transistor-transistor logic degree serial interface is present inside. The range of working temperature is -30 degrees Celsius to +80 degrees Celsius. The maximum download and upload speeds are 85.6Kbps and 42.8Kbps respectively.

Fig. 1 GSM module

B. SIM Card

SIM stands for Subscriber identity module. It is used to authenticate the subscribers on the network. A SIM card is the heart of GSM devices. Sim card is inserted into our GSM module. Then our GSM module is attached to the carrier network and facilitates us to communicate.

Fig. 2 SIM card

C. Arduino UNO

Arduino Uno is a microcontroller board, which consists of several pins. Fourteen are digital input and output pins, six are analog input pins, a USB connection, an ICSP header, a power jack, and a reset button. pinMode(), digitalWrite() and digitalRead() are the functions for input and output in Arduino programming.

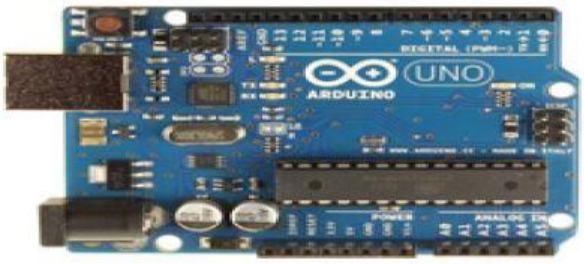

Fig. 3 Arduino UNO board

D. Vibration sensor

The vibration sensor operating voltage is 3.3V to 5V. Whenever the vibration is observed, the logic state of HIGH is produced. If it is in the rest state, it remains in the logic state of LOW. SW-420 is a module number that is compatible with Arduino UNO.

Fig. 4 Vibration sensor

E. GPS module

GPS stands for Global Positioning System. GPS modules receive data through dedicated Radio Frequencies from navigation satellites. NEO-6M is a GPS module that is compatible with Arduino UNO. In six different orbits approximately 12,500 miles above the earth, 24 Medium-Earth Orbit satellites revolve around to transmit location every second as well as present time.

Fig. 5 GPS module

All the components are interfaced through suitable ports. The microcontroller is programmed to achieve required functionality.

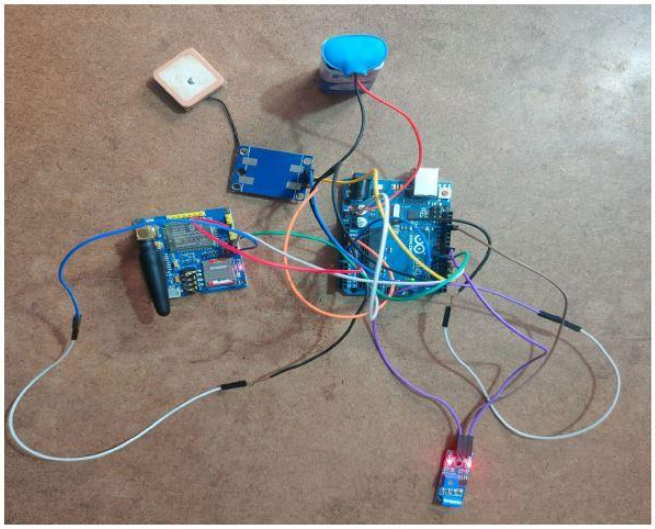

Fig. 6 Hardware System

The libraries are imported before the main program to use the functions of hardware components.

1. GPRS-SIM900-master,
2. GSM_GPRS_GPS_Shield_GSMSHIELD,
3. TinyGPS++,
4. Tiny GSM are the various libraries.

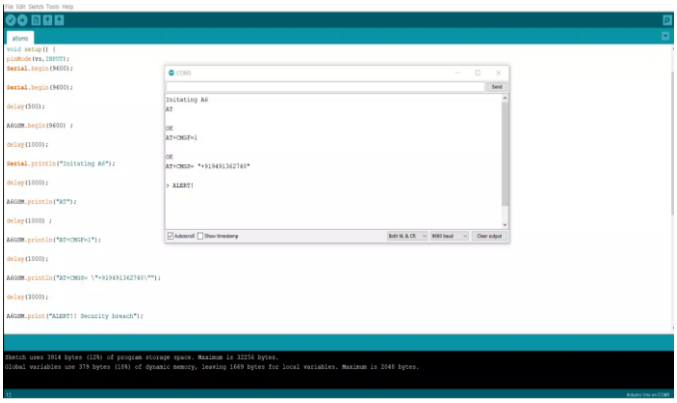

Fig. 7 Software Implementation with Serial Monitor

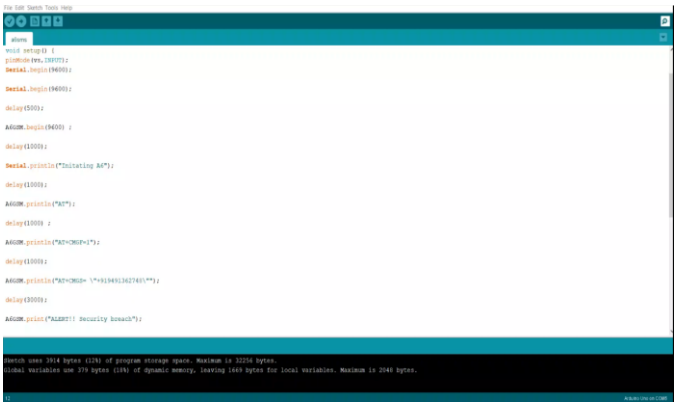

Fig. 8 Software Implementation

6. RESULTS

By implementing the system, the emergency alert which consists of the GPS coordinates is sent to the nearby police station and family members through SMS and phone call. The emergency is detected automatically without an external trigger. The alert appears to be as follows

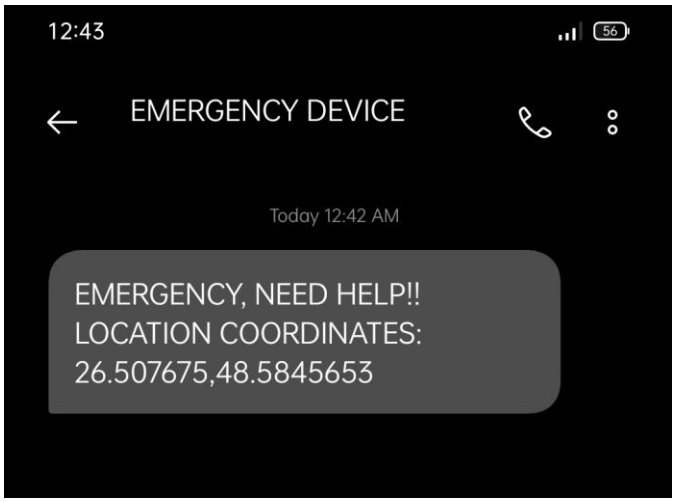

Fig. 8 Message alert

7. FUTURE ENHANCEMENTS

The human body undergoes certain changes such as pulse rate and temperature. The plan is to insert a temperature sensor and pulse rate sensor. Data should be collected from these sensors. Using machine learning, this data can be trained to observe the frequent changes in temperate and pulse rate and the dangerous situations can be detected more effectively.

8. CONCLUSION

Hence this paper meets the main objective of women's security. This device is very handy as it is a wearable device and doesn't need manual triggering. Moreover, there is no requirement for the internet.

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