



# INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact factor: 4.295

(Volume 4, Issue 2)

Available online at: [www.ijariit.com](http://www.ijariit.com)

## Design and Implementation of a Rescue System for the Safety of Women by using Arduino Controller

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### ABSTRACT

*The main contribution of the paper is to develop a wearable arm band for safety and protection of women and girls. This objective is achieved by the analysis of physiological signal in conjunction with body position. The physiological signals that are analyzed are pulse rate sensor, vibration sensor and if there is any fault it additionally uses a fault detection sensor. Acquisition of raw data makes the Arduino controller function by activating the GPS to send alert messages via GSM and the wireless camera captures images and videos and sends images to the pre-decided contacts and also shares video calling to the family contact. The alarm is employed to alert the surroundings by its sound and meanwhile, she can also use a TAZER as a self-defense mechanism.*

**Keywords:** Pulse Rate Sensor, Vibration Sensor, GSM, GPS, Alarm, Wireless Camera.

### 1. INTRODUCTION

India which seeks itself as a promising super power and an economic hub can achieve its goal if and only if large numbers of women get themselves involved and participate in the development process. In today's world, women safety has become a major issue as they can't step out of their house at any given time due to physical or sexual abuse and a fear of violence and the rates of crimes against women is not decreasing but in fact increasing at an rate especially harassment, molestation, rape, kidnapping and domestic violence. Many preventive measures have been taken by the government so far to minimize the occurrences and have remained unaffected. Generally, "embedded system" isn't a strictly definable term, since many systems possess some component of extensibility or programmability. The hardware of the project is selected to make the devices starting as low as possible.

In current scenario security for women is a major concern. There is no one without a smart one and this can help the victim to be in to stay in contact with their friends, relatives, and family members at anywhere and in any time. Thus the aim of this project is to develop a wearable device for the safety and protection of women and girls. It is a simple gadget designed solely to serve the purpose of providing security to women mainly against sexual assault. Hence the development of this device mainly consists of the following features such as wireless camera, Alarm, and a Real-time GPS tracking. The user can be constantly tracked by the user's emergency contacts. When the victim senses any danger she can immediately press the button which uses the GPS and GSM to get the accurate location and are sent to the emergency contacts. Video Recording can be activated by means of the wireless camera to capture the happenings. Above all is the main key for providing only safety and additionally a self defense mechanism called TAZER is employed.

### 2. OBJECTIVE

To create a safety system in the form of a portable safety device for women, that does the following tasks:

- i. Alerts family and police by sharing the message and voice call coordinates of the woman being attacked.
- ii. Captures and records video as well as images and does video calling to any one of the contacts as a sign to provide security.
- iii. Incorporates a technique of automatically turning the device ON by monitoring the values of different sensors used and functions in the following way.

### 3. EXISTING SYSTEM

Our idea of the proposed system is based on the base paper which is employed using an ARM7 controller and it is a wearable arm band. Yes, this paper proposes an automatic and also a manual device which is used to alert others during emergency situations by sending messages through GSM where the location is shared by GPS. This prototype gets turned on by the gesture of hand (twisting of the wrist) and the device can be turned ON by three options. If the victim has a degree of freedom to turn ON the system, then a simple switch can be used to turn the system ON. When the person is not in a situation to press the switch then the device gets turned ON by means of flex sensor. This would turn on the wireless camera which is attached somewhere in the body in form of chain or locket and this makes live streaming of video to a remote location continuously control room. At the same time, GSM would start sending the message to the prescribed contacts. Here the live streaming is sent to the police control room until the system is reset. These messages are sent on an interval of 30 seconds until the system is reset.

The armband incorporates a switch as an option to turn on the system when one feels threatened. This prototype also employs a fall detection sensor and there is also a greater possibility that the person under threat may fall when assaulted. On the other hand, message is receives through the phone with the information about the victim’s location. Once the button is pressed, the system turns ON the wireless camera and live video streaming and message is alerted with location (latitude and longitude) to a predetermined mobile station. If the flex sensor is twisted then the captured images are sent to the nearby police control room. If the fall detector sensor detects a pressure above the threshold value then the images captured through the wireless camera is transmitted to the control room along with location details until the system is reset. The processor used is LPC 2148 ARM7. Failing to initiate it either by twisting of hand or by pressing the switch, a fall detection sensor is used.

### 4. PROPOSED SYSTEM

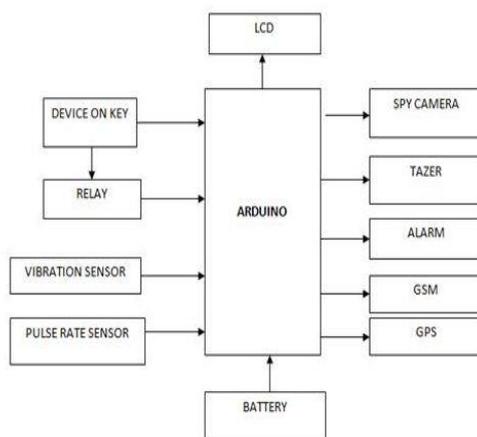
This paper proposes an automatic device which would help the victim to alert others during emergency situations. The proposed prototype can be turned ON by the activation of sensors they are pulse rate sensor and vibration sensor. When the particular value of the pulse and vibration is reached they get activated. Pulse rate works at both the ranges namely even above threshold limit and also below the threshold limit. Vibration sensor value will be different when vibration is developed in hand and in the body and both the values are programmed in such a way by means of Arduino IDE software and corresponding simulation is achieved in Proteus software.

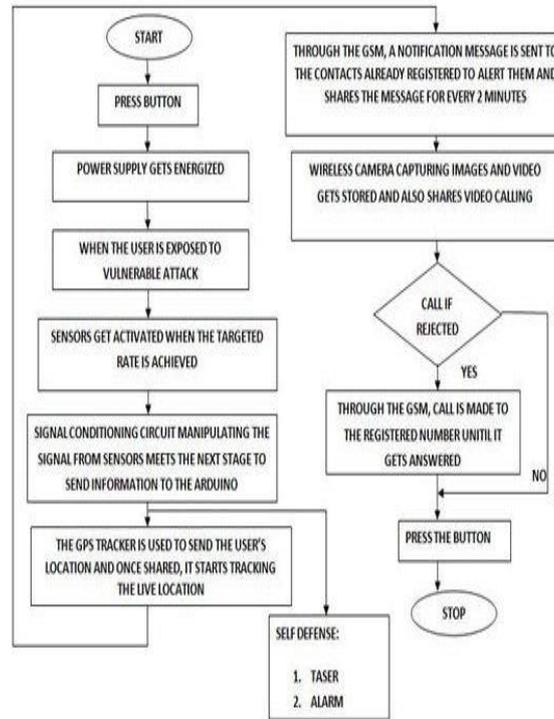
By activation of sensors makes the wireless camera to turn ON which is worn in form of chain or as a locket and it starts capturing images and videos. Images captured are sent to the contacts and video gets stored as evidence and it starts sharing video call to the contact. Further, Alarm starts to buzzer its sound and to alert the surrounding to provide a sign for security. The victim can use TAZER (shock generating device), a self-defense device to escape herself from that current scenario.

### 5. BLOCK DIAGRAM

The block diagram is given as follows where Arduino UNO R3 is employed and the hardware components involved are,

- LCD(Liquid Crystal Display), Spy Camera
- Device ON key using RELAY
- Vibration sensor and Pulse rate sensor
- Alarm and TAZER
- Battery, GSM & GPS





The flowchart illustrated above explains the following,

- i. Initially, the device switch on key has to be made ON and the battery employed can be made to use for 22 hours and can be recharged.
- ii. When the user is exposed to vulnerable attack, sensors get activated and when there is any fault in the sensor it makes a notification by means of fault detection sensor.
- iii. The GPS tracks used to locate the location and send it via GSM and mean while the victim can escape away by employing TASER and Alarm is used to alert the surroundings.
- iv. The wireless camera captures images and sends them. The video is also captured and it stores them.
- v. Live video calling is also made by means of a wireless camera and further, there are two modes of operation.
- vi. If the call is rejected, through GSM voice call is made continuously until it gets answered and if the call is not rejected again we have to press the button which is a manual method of operating the device.

## 6. SOFTWARE USED

### EMBEDDED C

- It possesses cross development in nature.
- It Dependent on hardware architecture (microcontroller or other devices).
- It is used for limited resources like RAM, ROM and I/O peripherals on an embedded controller.

### PROTEUS

- The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation.
- The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.
- Schematic capture in the Proteus Design Suite is used for both the simulation of designs and as the design phase of a PCB layout project.
- The PCB Layout module is automatically given connectivity information in the form of a net list from the schematic capture module.

## 7. IMPLEMENTATION & RESULTS

The prototype of the proposed safety armband is realized using Arduino controller. The system using Pulse rate sensor, vibration sensor and switch components interfaced with a controller is shown below. This when implemented in nano technology they will be available in the very small size and can be carried everywhere.

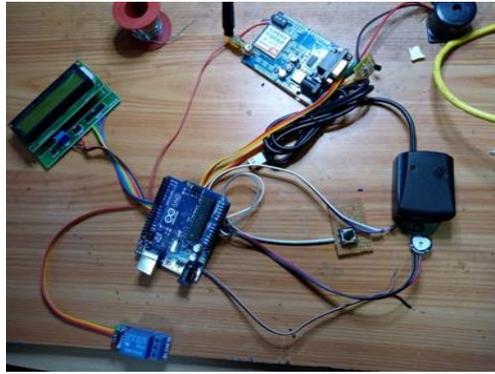


Figure 1: Basic Blocks of the Prototype



Figure 2: Battery

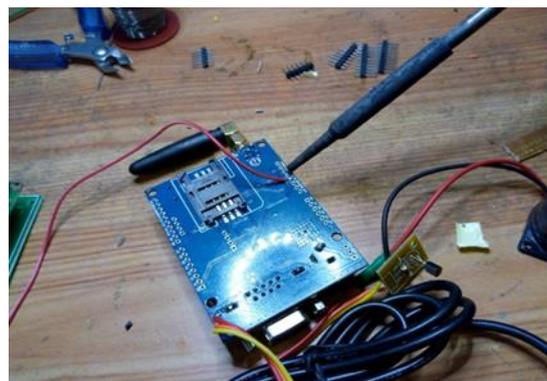


Figure 3: GSM Module

## SIMULATION REPORT

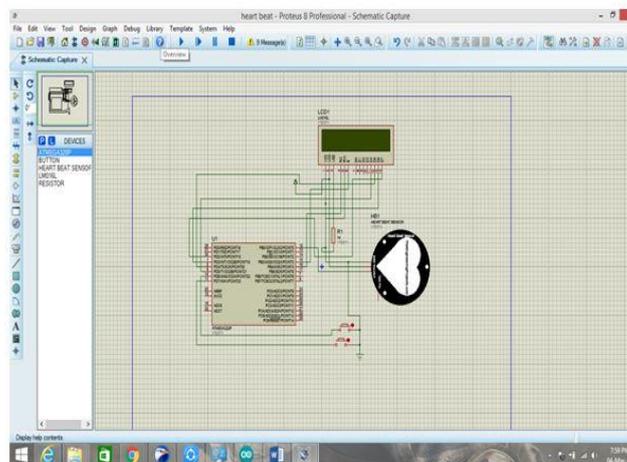


Figure 4: Simulation of pulse rate sensor

## ARDUINO INTERFACED WITH VIBRATION SENSOR

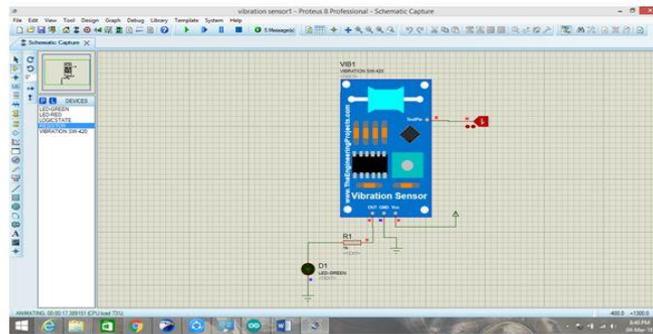


Figure 5: Simulation of vibration sensor

## 8. CONCLUSION

The proposed design will deal with critical issues faced by women and will help to solve them with technologically sound equipment and ideas. The merit of this device is that this not only provides safety and it also provides security by means of self-defense mechanism. The crime against the women can be now brought to an end with the help of real system implementation of the proposed model.

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