

Research Article

GPS attached Smart Foot Device for Women Safety

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Abstract

Women safety is a bigger issue in India now-a-days with advanced technology. Women are feeling unsafe when they are travelling alone. In this paper, a device is developed when the women feel unsafe, to help the women who are in danger. An attempt has been made to develop a smart device that can assist. The device is clipped to the footwear of the user that can be triggered discreetly without the knowledge of the perpetrator. On tapping one foot behind the other foot, an alert message is generated and sent via GSM module which is attached to the Arduino. The device is programmed for sending an alert message and location of the device via GSM module. The location of the device is detected using GPS attached to the device. The results obtained were analyzed using Naïve Bayes classifier and this low cost device showed an overall accuracy of 96%.

Keywords: Women safety; Internet of Things; GSM module; Acceleration sensor; Wearable device;

I. INTRODUCTION

A detailed clarification of our work is “Smart foot device for girl’s safety without using Application”. Women are facing many situations that makes them feel unsafe. In the survey which has been taken in the year 2018, 81% of the women have experienced sexual harassment. The women are getting afraid for being harmed, when they are alone in public places. When women facing the dangerous situation, to protect them we have developed a smart device. Device can be clipped in the footwear of the user.

There are few smart phone based solutions for the women safety, sometimes the victim cannot reach the phone without the knowledge of the attacker. There are many IOT devices with android applications. Those devices have some disadvantages. If the victim’s smartphone is thrown by the attacker only within the range the android application can be activated and can

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generate the alert message. So the application is activated only in the certain distance. This might make the user in danger situation and the alert message cannot be sent to the other devices.

Here the smart foot device is having a GSM module. There is no need of any android application to generate the alert message. The GSM module generates the alert message and GPS can send the location of the device in latitude and longitude, even when the victim's smartphone is thrown by the attacker. By just tapping one foot behind the other foot two times the alert message and the location is sent via GSM module. This can be done without the knowledge of the attacker. It is not necessary for the smart phone which should be in the range for sending the message. There is no need of any smart phone to send an alert message. This makes the women feel safe.

II. LITERATURE SURVEY

For the safety of women, many developers come with many ideas like applications, IOT devices and wearable devices.

2.1 Smart Band: In this system, "Smart band" [10] continuously communicates with the smartphone which is having an application. The application will access to the internet to generate alert message. The application is programmed to sense some human behaviour including fear, anxiety and anger. It can generate some signals and the application gets activated and the alert message can be sent to the contacts. The drawback of this solution is this device is easily noticeable, the alert message is sent only when there is an internet access. It also detect*s the wrong facial detection and false alert may be sent which makes the system inefficient.

2.2 Suraksha: It is a device [2] which is triggered by using voice, switch and shock/force. The device will recognize the voice of victim and anguish message will be sent. This system can be activated by voice command, by clicking the button and thrown in the surface. It should be carried everywhere. The drawback of this solution is that the user might not be able to reach the device and it is impossible to be carried by the user everywhere.

2.3 An android based application: In this application, [9] the location of the user can be identified through GPS and an alert message can be sent to the registered contact and to the nearby police station. This application can be activated by shaking the mobile. The user cannot shake the mobile without the knowledge of the attacker, so it might cause a danger situation to the user.

2.4 Touch me not: This device [1] which looks like a button can be attachable to the clothing. This device is connected to the system consisting of two modules. FIRST module is used for capturing videos and taking the photographs of the attacker. SECOND module is used for sensing when the user is in danger and sends an alert message to the contacts and to the nearby police station. The disadvantage of this device is it cannot be attached to every clothing of the user and it might be noticeable easily from the user.

2.5 Foot Device:

This device [3] can be clipped in the footwear of the user, by taping one foot behind the other. The device can generate a signal with this, the application that is installed in the users

mobile phone gets activated. An alert message can be sent to the contacts. The main drawback of this solution is when the user's mobile phone is thrown by the attacker. The application is impossible to get activated because the mobile phone is not within the device's range. So the alert message is not sent to the contacts.

There are many solutions for women safety. All solutions get activated when it is triggered but without the knowledge of the attacker. It is a challenge for all the solution to get activated. Even though it is not noticeable, the smartphone and the device must be in the minimum range.

III. PROPOSED SYSTEM

In our proposed system, the device is clipped in the footwear and it is not easily noticeable. By tapping one foot behind, the other the signal is generated and the GSM module gets activated and an alert message will be sent with the location of the user. In this device, there is no need of android application to generate the message and send it to the nearby police station and registered numbers.

As shown in the FIG 1.1, the Arduino UNO consists of microcontroller. Arduino consists of ATmega328 which is a microcontroller chip preprogrammed with a bootloader that allows us to add new code without the use of an external hardware programmer.

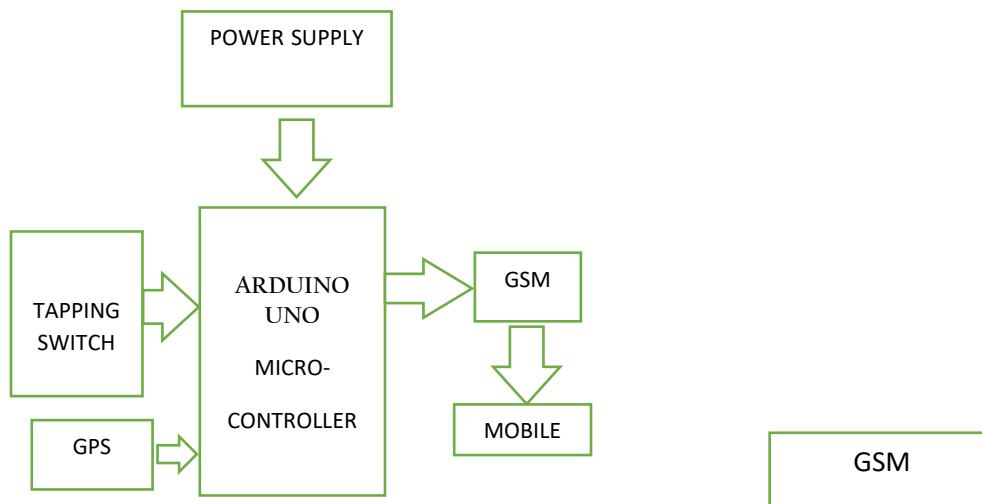


FIG 1.1: Block diagram

The limit switch is connected in the 8th pin of microcontroller and to the ground pin (GND). The GPS and GSM module connected with Arduino UNO. After tapping the limit switch two times the GPS module gets activated. The antenna in the GPS module is receiving the latitude and longitude of the device. The GPS contains 4 pins in which 3 pins are acting as a transmitter that sends signal to the GSM module. The GSM can receive the latitude and longitude of the device by the receiver. The Arduino which is programmed sends a location and alert message to the concerned mobile numbers. The Arduino UNO device supplies power through 6V 4 amps battery. After tapping the limit switch two times, following task has been performed.

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- GPS gets activated and transmits range to the GSM.
- GSM is activated and receives the signal.
- The programmed Arduino sends the alert message and location to the preferred contacts.

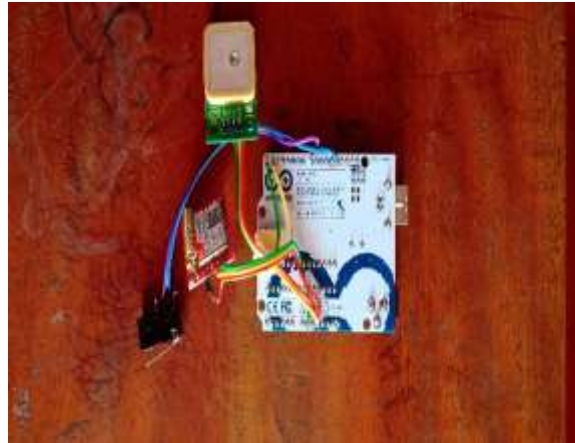


FIG 1.2: Implementation

A.GPS Module:

Global Positioning System is used for determining the location of a receiver which gives latitude and longitude on the earth by calculating the time difference for signals from various satellites to reach the receiver. The GPS module contains 4 pins i.e. RXD, TXD, GND, and power supply. We have used only 3 pins. The signal is received by the antenna. So the RXD pin is not used in the module. The TXD pin is used for transmitting the latitude and longitude to the other devices. The GND is used to maintain the frequent current supply to the GPS module.



FIG 1.3: Global positioning system

B. GSM Module:

Global system for mobile communications (GSM) is used for sending data from control unit to base unit. The GSM receives the signal from the GPS. The GSM contains the SIM card

that sends the alert message (she is in trouble) with latitude and longitude to the preferred contacts. It has the uplink of 890 MHz to 915 MHz and downlink of 935 MHz to 960 MHz.

C. Arduino UNO:

The microcontroller which is based on ATmega328 is named as Arduino Uno. It contains 14 I/O pins, 16 MHz crystal oscillator, an USB port, power jack, an ICSP header, and a reset button. It can be powered with an AC-DC adapter or through battery to get started.

D. Limit Switch:

The limit switch is used for controlling the process or for stimulating the action. It contains an important component called actuator. When some objects getting contact with the actuator, the device is activated. The applications of the limit switch are used for disconnecting some connections or used for generating some actions.

IV. SOFTWARE ALGORITHM

The steps are being performed when any mishappening is occurred to the user. The inputs are taken from the triggered action of the user (tapping the limit switch). The Arduino is preprogrammed to do the following actions. The following are steps going to be taken

- 1) The location is taken from the GPS library.
- 2) The contacts are registered in this program.
- 3) The tapping state is equal to the pullup.
- 4) The alert message is sent to the registered contacts.

V. CONCLUSION

This project is used for developing a low cost device for the safety of women. This is a first idea developed without an android application with accuracy. It is not easily noticeable to the attacker. This device is used for many applications such as children safety, safety for elderly ones.

By sending some alert messages it can give some clues about the places where the victim is located. By providing some more improvement to the project we can use it for many applications. So the safety of the women gets increased.

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