

# Smart Security Device for Women Based on IoT Using Raspberry Pi

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**Abstract**—In today's world, the major question in every girl's mind is about her security and safety. A few years back, a woman has to go for the convivial system (social media) to protest and warn about sexual harassment faced their self. A report shows that 51% have to experience sexual harassment unwillingly. The percentage turned to 66%, 38% and 35% for the public places, workplace and at their home respectively. At first, the cases handling by the police are a major issue but there have some botherations like not knowing the victim's exact location, not knowing surely the crime occurred at all, and then lack evidence, police stops investigation. This paper is focused on a new IoT based evidence-collecting device to ensure women's safety and security. This system consists of a Raspberry pi, buzzer, and camera; flex sensor, GSM, and GPS modules in a combined way. Women can use this compact device with their undergarments easily and comfortably.

**Keywords**—*flex sensor, woman safety, attacker image, sexual harassment, smart clothing wireless flex, victim location, IoT based evidence collecting, security device.*

## I. INTRODUCTION

In modern life, women are maintaining their job from the kitchen to the office daily but the major concern is their security [1]. When it's a question about women's safety and security they will get no appropriate answer to it, they just have some insecurity and unwanted situation to face [2].

They are suffering from all those incidents regularly. Even girls are not safe in their living place, in their room at all because of sexual harassment [3]. A woman or even a little girl is not secure in this dirty society, sometimes they are forcefully being harassed by any of their relatives or other outsiders continuously without saying anything to him [4].

The victim of sexual harassment is the most helpless person in this society because after being sexually harassed her own family denies to take her responsibility and overpass

everything [5]. Because of social reputation and prestige, the victim's family just decline what was happened with their girl. Sometimes the family members want to protest but they can't continue their movement against criminals due to lack of enough evidence [6].

Is that easy for a sexually harassed woman or girl to be stable on her normal mental condition as like as before? So, lack of evidence the victim doesn't get justice, just because she can't explain what was exactly happened to her at that moment [7]. That is the present situation of our society, because of increasing crimes like sexual harassment, rape, and so on, they are being scared to go out of the home. In this 21st century, though technology is rapidly increasing along with the development of new gadgets, women and girls are facing many problems everywhere [8]. With the development of the world, women are adorning their positions in many high offices like parliament, bank, school, college university, and many other important places, they are also preparing themselves for every challenge in modern society but the prime thought haunting each of them getting the freedom to step on the pathway at day or night without worrying about their security [9].

Moreover, the lack of data to find out the statistical graph is insufficient and proper steps may have hampered against this harassment [10].

An efficient automatic operating security device using Raspberry pi, flex sensor for turning on the device by the activity of human hand, a buzzer for instant alarm, camera for capturing the scenario, GPS and GSM module for tracking the location and sending SMS.

IoT based web server connectivity for saving evidence are assembled with a women's undergarment such that it can be activated after getting pressure instantly to save a woman in every unprotected place and situation.

In this paper, the raspberry pi module has been used and a GSM module has been used to send SMS to the selected numbers and track the location of the victim. A camera module and a VR module has been used to capture the pictures or video streaming and voice recognition.

A web server has been developed where the captured images and videos and audios will be saved. As a result, if there is an issue of evidence, there will be no problem with that evidence.

## II. THE BLOCK DIAGRAM

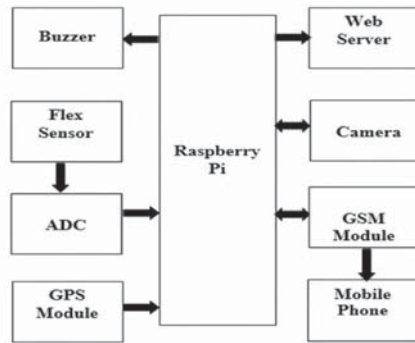


Fig. 1. Block diagram of women's safety device.

Fig.1 shows the block diagram of the woman's safety device. To activate and start this system, the flex sensor needs to get a signal. Raspberry pi gets input via ADC and GPS and then sends it to the buzzer, camera, GSM, and Webserver. Then, GSM sends SMS to previously saved numbers.

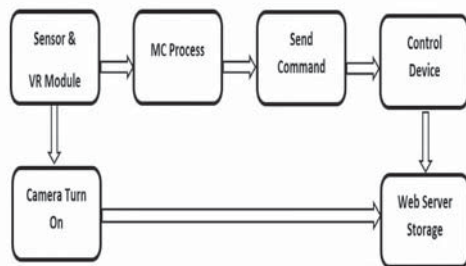


Fig. 2. Operational flow chart of the system.

In fig.2, Raspberry pi collects the data from the sensor and sends it to GSM. Flex sensor activates when an unwanted pressure is sensed. Then it turns on the device which gives the location to the desired mobile number that is stored in the device. Through camera and microphone, the images and clips are captured and send away.

## III. PROPOSED DEVICE

An automatically turning on a device that will create an emergency alarm, send SMS with the live image or video streaming link and location for asking help to nearby friends through cell phone number. Also collect evidence of the victim's situation and store them directly to the webserver for future use. The device will be attached to women's undergarments.

### A. Flex Sensor

The flex sensor is compact and can be used with any part of cloths up to a million bends [4]. This sensor is helping to make that device automatically. It will be placed like a sticker in women's undergarments when it will get the pressurized movement of human hand then there is a change of resistor

value. When the value crosses the threshold value, to turn on Raspberry pi the sensor will execute a signal. The flex sensor is an analog sensor and Raspberry pi communicates only with digital values that's why here ADC is used to convert the values.

### B. Raspberry pi

Raspberry pi zero is used as a processor for turning on the buzzer and camera after getting values from the sensor. Then GPS will track the victim's location continuously and give data to Raspberry pi and it will give the location to GSM. The camera will capture video of the victim's condition or attackers and then Raspberry pi will send it to the webserver.

### C. GPS and GSM

TheSIM808 is a GSM and GPS function module that is used in this device to catch the perfect trace of the victim by the continuously changing Longitude and Latitude of her [5, 6].

This device has synchronization with GPS and messaging services so that it will send a text message containing the victim's location whenever takes instant signals [7]. After getting the exact location by GPS, and asking for help SMS containing the victim's location and online streaming link, the GSM will start sending that to previously saved nearby numbers of police stations and friends until the security device is not turning off.

### D. Buzzer and Camera module

The buzzer is used in this device for creating an instant alarm. That alarm will create people gathering around the victim and she will be saved on that moment instantly. Wireless Wi-Fi camera is used with Raspberry pi for collecting evidence of any crime. After turning on the camera, it will start capturing video or image continuously and will store all those in Raspberry pi [8].

### E. Internet of Things (IoT)

'Internet of Things' (IoT) is referred to as the extension of the Internet and the Web in regular life with some sensing capabilities [9].

This device concentrated on IoT lead to a smart technology with smart ladies with this unique prototype device [10]. IoT supports a system to send data over a network system without any human or computer interaction [11, 12]. All the emergency contact with location will be saved to Raspberry pi via the web. In this device evidence like live-streaming video and images will be directly and continuously uploaded to the webserver then as evidence any user will be able to collect all of those from the web cloud anytime [13-17].

## IV. IMPLEMENTATION AND RESULT

This evidence collecting (prototype and proposed) safety device is measured lead to Raspberry pi. The device avail a flex sensor commencement of touching of hands while chances of being attacked or assaulted. After getting signals from the flex sensor the device will start capturing images or video of the victim's condition. GSM will start sending messages to previously saved numbers [18-21]. The basic prototype device is given below.



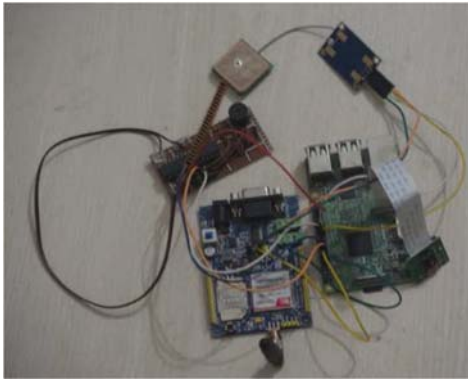


Fig. 3. The basic prototype device.

In fig.3, GSM, GPRS, Raspberry pi, buzzer, and camera module together have been used as a prototype device to save a woman from any unwanted situation.

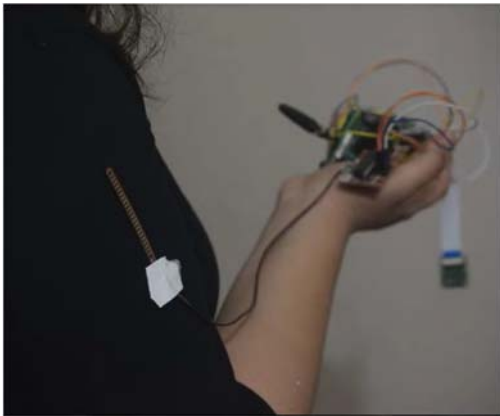


Fig. 4. The device is using by a woman.

Fig.4 representing that a woman is using the security device to keep herself safe from any kind of harassment and disturbance.



Fig. 5. When the Flex sensor is bent then the device turns on and sending the message "Help" with the victim's location and server's link.

Fig.5 shows two sensors that have been used in the device. One of them is a Flex sensor and another one is an IR sensor. The Flex sensor is used to make the system automatic. It is a kind of force sensor. If the victim press the device, the total system will be turned on. If the victim does not get a chance to create pressure on the device, there is a huge chance that the kidnapper will create pressure on the device as it will be clipped with a victim's dress. After the total system gets turned on, SMS will be sent to the selected numbers and the IR sensor will turn on and the camera will be started to capture and the VR module will start to record. All the captured pictures and audios will be saved on the server.



Fig. 6. The device has activated when someone is under attacked.

In fig.6, someone is trying to disturb a woman by touching her hand badly which is unexpected and insulting for a woman but she is not capable enough to do anything at that moment without asking for help.



Fig. 7. The device is sending SMS.

In fig.7, the SMS containing "Help me" with the victim's location and web storage link of video or image is sending to previously saved numbers continuously when the flex sensor is being touched.



Fig. 8. The attacker's image is capturing by the device.

In fig.8, the device has activated and it's capturing the attacker's image and after capturing the attacker's image, it will be saved directly to the webserver.

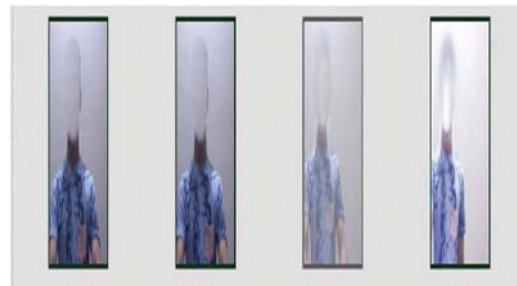


Fig. 9. The attacker's image is uploading to the webserver.

In fig.9, after taking the attacker's image the device is uploading all of them directly to the webserver one by one,

every activity of the attacker is saved for future use as evidence.

## V. CONCLUSIONS

As security is a major concern for every woman in this modern world, this device can be replaced as a smart and effective one. For the first time, this type of device has been implemented for direct evidence collecting and saving them on web storage for future use. It has been designed for mainly women's security purposes but also could be used for aged citizens and children's safety purposes. In the future, this device will be more user-friendly by scaling this device's size. Besides, more advanced technology will be used for implementation to make this security device low in cost.

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