

Security Communication System for Women Safety

Pushpalata N Sali, Dr. KTV Reddy

Abstract - As per the review of WHO, NCRB-social-government organization 35 percent Women all over the world are facing a lot of unscrupulous physical provocation in public places such as crowd places, foot paths etc. This device for the women security in community places which aims to provide the 100 percent safe atmosphere. This system can be implemented as an android app application and using Raspberry Pi based board. This system provides all required functionality and there is no need to buy and install different apps that possess different functionality. It is now becoming a necessity for females to ensure safety while travelling at late hours and visiting distant and remote locations as a part of their work management.

Keywords - Attack, Parent, Police, Server, Women Safety.

I. INTRODUCTION

In hottest years, acts of attack and cruelty against women are rising at a threatening rate. It is now becoming a necessity for females to ensure their safety while travelling at late hours and visiting distant and isolated spot as a part of their daily life. According to the NCRB, in India, 93 women were raped every day in the year 2014. Also 3, 37,922 cases of crime against women were reported in year 2014 alone [1]. These crimes are creating an atmosphere of anxiety and unrest among the women population. With the stringent and tiresome law procedures, it becomes even more difficult for those willing to take legal actions against their offenders. These factors are leading to exponential increase in attack, cruelty against women in the past rare years, and posing a threat to the growth and development of women. Hence, a security solution that creates a sense of security among women needs to be devise.

The current practices in women security broadly fall into different categories from android applications developed for mobile phones, to smart apparels that

can be wore and carried in day to day life. Each of these has their own pros and cons. However, our focus is on creating a safety system that merges the benefits of existing techniques and brings about a solution that ensures defense and creates a seamless pathway to initiating legal procedures, if any; have to be taken by the victim. We intend to create a partial wearable that can provide a complete security solution and become a utility that eases the apprehension among women and their family members.

A. Objectives

The objective of the research work is to create a safety system that precisely performs the following tasks to ensure safety of a women if an adversary attacks her. The device should:

- i. Alert the police and family about the location of the woman being attacked.
- ii. Capture, stream and store real time images/video and audio to a cloud server.
- iii. Incorporate a defensive mechanism giving a mild shock to the attacker.

B. Flow of Work

An emergency band would be worn by the person. We will be developing a mobile application which will help to send alerts in mobile of parents who are in emergency situations. The web application which will be developed is used to categorize the different users like parent and police. Parents can login to the system and view alerts by the relatives. Similarly, Police can login to the system and also, that particular location can be viewed on the map also and view daily alerts. Emergency message can be viewed by the police and appropriate action can be taken.

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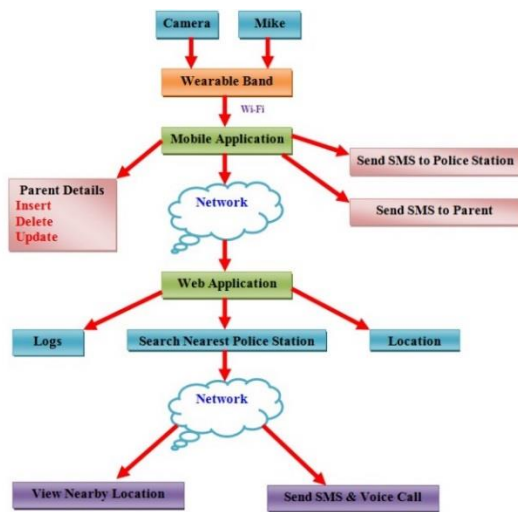


Fig. 1. Flow of Work

II. LITERATURE REVIEW

A wide variety of devices, gadgets and applications (apps) are available commercially that claim to satiate the purpose of providing security to women. In a review of the literature that has been studied for this research work, standard publications, electronic apps and gadgets already in existence will be presented. An overview of standard papers associated to either a part, or the entire research is also given in this chapter.

A. Review of Existing Devices for Women Safety

A very recent development, similar to the research objective in this report is proposed in [2], in which the authors have proposed the design of an armband using ARM7. This armband can be wrapped around the arm and can be triggered either in automatic or in manual manner. Automatic triggering is done by using fall detection sensors, which detect the falling motion if a woman is attacked. Manual triggering is done using a flex sensor situated on the hand which triggers the system only when a certain type of gesture is recognized. A switch is also incorporated for manual activation. The processor used is LPC 2148 ARM7 processor.

In [3], authors propose a smart girl's security method in the form of a belt that can be worn on the body. This belt integrates GSM SIMCOM 900 and GPS receiver to track the location of the victim being attacked. It also proposes usage of a scream alarm using APR 9600 to alert the people around. The core controller used is Arduino board using ATMEGA 328 processor. Device is proposed to be activated by pressure sensors worn on the body. The GPS module that is being used is GY-GPS6MV2 patch-on-top unit. A mechanism for sending location alerts via SMS until the device is reset is developed.

The development of another safety device for

women called Suraksha is developed in [4]. The working appliance of this device is almost on the same lines as that of [3]. The distinguishing factor is that Suraksha can be activated either manually by a switch or using a voice recognition system that responds to a pre-programmed voice only, or automatically by triggering of a pressure sensor in incidents of attack. Controller used in this device is AT 89s52.

In [5], the authors have created a client application on Android platform called iMace. This smart phone app is activated by vigorous shaking of the smart phone. The accelerometer sensor of the smart phone analyzes the acceleration on shaking the phone. If it is beyond a certain threshold then, the image acquisition is performed by activation of camera module in the phone. The localization module uses the GPS system in the phone to acquire current location of the person. Finally, the communication module uses WLAN 3G service to transfer the image of the attacker on the web server and notifies the whereabouts of the victim to the police.

Apart from these, there are several commercially launched mobile apps [6], such as the popular VithU, M-indicator apps that enable location tracking by the press of the pressed push button on our cell phones. Similar apps like Nirbhaya, Safe Hands, Watch Over Me function in a manner that lets their near ones and the police, know their location and allows tracking of the person. The 'life 360 family locator' app allows the parents to locate their ward through the day at several instances.

In the world of wearables, 'The CUFFs' are a recent trend. These are a variety of stylish and fashionable wrist bands that are GPS enabled and are associated with an app that sends their near ones an alert on a press of a switch, every time the women wearing it is in danger. However, these are not launched globally yet. Similar example is a Safe bet, which although resembles the appearance of a bracelet, performs the function of a tracker. There is yet another variety of GPS enabled jewelry like necklaces, wrist and waist bands and also earrings that pretty much satisfy the same requirement [7].

B. Review of Location Tracking Techniques and GPS

In [8], the authors have designed a tracking system for pets, elderly and the disabled. The functioning of the system is such that whenever a person tries to cross a certain boundary around the house, the tracking function is set out and the location is sent to the pre-programmed number. There is also the inclusion of an emergency calling system on triggering a latch. Successful tracking of humans was established. Authors propose the use of this system for tracking animals in zoo also. In [9], authors have designed a simplistic system for acquiring and tracking location

and have implemented the same. The simplistic approach makes it low cost and flexible for various applications. The system uses a PIC16F877A microcontroller for integrating a Garmin 18-5 Hz GPS receiver and a SIMCOM 300 GSM module. The paper presents a neat software algorithm for parsing the GPS NMEA sentences to extract the latitude and longitude. The hardware circuit details are also included showing interfacing of the Assisted GPS (A-GPS) with other components. Authors have checked the accuracy of the system using Google Maps and they deduce that the accuracy of the system is 1 to 2.5 meters in range which is better as compared to previous approaches.

In [10], a comparatively novel approach for location tracking of vehicles is introduced where the core controller is Arduino. This system uses two way communications by making use of transceivers modules at each stage, be it controllers or GSM shields. Accuracy testing was done by using the vehicle radius as a measure. With an increase in speed, the error was found to increase too.

An energy saving technique for applications using GPS is proposed in [12]. Here, the others first explain the different phases of acquiring location using GPS from a Satellite vehicle (SV). Authors have proven that sending raw pseudo ranges has saved 80% of current energy consumption. Authors also propose a Low Earth Orbit (LEO) constellation for GPS data assistance that requires only 6 satellites and is a much quicker solution.

An Indoor Positioning system that makes use of Visible Light Communication and Ultrasound is proposed in [13]. The positioning depends on unique global co-ordinates associated with each LED lamp. The hardware includes Arduino Uno, Arduino Mega and use of GSM shield along with an RF transmitter.

GPS receivers use a collection of satellites and ground elements to calculate position and time almost anywhere on earth. At any given time, there are at least 24 active satellites orbiting over 12,000 miles above earth. There are at the least, 12 satellites visible at all times as 12 visible satellites are used to TRANSMIT information back to earth over radio frequency (ranging from 1.1 to 1.5 GHz). Then, a ground based RECEIVER or GPS module can calculate its position and time. If the GPS receiver's antenna can see at least 4 satellites, it can accurately calculate its position and time. This is also called a lock or a fix.

Triangulation geometry is fairly straightforward. If distance is X in miles is known from point A it defines the position on a sphere of radius X centered on A. If distances are X and Y from two dispersed points are known, it defines the position somewhere on the imaginary circle at which the two spheres with radii X and Y intersect. If distances from three dispersed points are X, Y and Z, are known, it defines the

position as one of two points where the three spheres intersect (one sphere intersects the circle representing the intersection of the other two spheres). With 24 satellites in well-dispersed orbits, there are never fewer than four satellites above the horizon anywhere on earth, so a GPS receiver can always triangulate its position to a unique X-Y-Z point in space. The GPS satellites' orbits are precisely known, and they use precisely-synchronized on-board atomic clocks to broadcast exactly simultaneous signal patterns as well as information about any minor deviations in orbit. The triangulation procedure is shown in Figure 2.

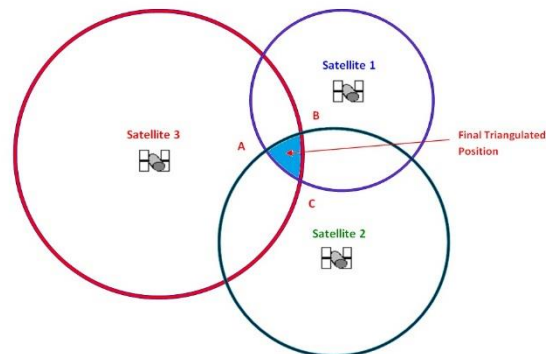


Fig. 2. Triangulation process in GPS

C. Survey of Video Streaming Techniques

The Raspberry Pi is a mini-computer based on the Broadcom BCM 2835 processor. Due to its powerful processor, it has been used in many applications involving capturing and streaming video usually to a cloud. In [16], authors have proposed and implemented an Internet of Things (IoT) approach to build a security system. It includes triggering of an alarm remotely and capturing and streaming images/videos to a cloud server if any motion is detected on the IP cameras. The open source 'motion' algorithm has been used to detect any change in consequent frames captured by the camera and if such a change is detected then the image is streamed to a server and can be viewed by the user remotely.

D. Software Tools for Raspberry Pi Zero

The Raspberry Pi has its own command terminal and its own Graphical User Interface (GUI) when connected to HDMI screen directly. Here we are using Raspberry Pi Zero which will attaching to the wearable band. This raspberry pi zero module having camera module which will record the video.

In addition to the wireless capabilities, the Pi Zero W is almost identical to the previous iteration of the appliance, which will still remain on sale at its original price. On-board, the tiny computer has 512MB RAM, a mini-HDMI port and two micro-USB ports, including one for power. As with all Raspberry Pi's, a power supply, keyboard, mouse or input appliance, and screen must be provided to use the device. However, its low cost and new-found connectivity means it is a

perfect appliance for running Internet of Things applications.

III. IMPLEMENTATION

In this review, emphasis will be given on explaining the hardware and software arrangement of the project. The choice of hardware was made considering the nature of the appliance being a partial wearable. Controllers and other supporting peripherals were selected such that they would be lightweight, portable, and at the same time possess the capacity of performing heavy load functions like video streaming. Certain hardware arrangements mentioned in the literature have also been adapted as they satisfy the requirement.

A. Hardware

The appliance can be activated by just merely pressing the emergency button once. This appliance gets activated and sends instant location with a distress message to the police pre-set numbers through a GSM module. The appliance looks like and when the emergency button is double clicked, the device sends both the distress message with instant location and records the audio of the incident. When the same button is long pressed it activated call to the police and sends message to the police instant location. The location is located using GPS. The audio is recorded using audio recorder and call is made from GSM modem respectively. This GSM Modem that is inbuilt in the smartphone accept any GSM network operator SIM card. It can be used to send and receive SMS or make/receive voice calls. And also camera and mike activated for live preview and sound recording, live preview and recording send to the registered mobile number along with police station. We connect the appliance with our mobile (through WIFI), to find our location even if our mobile is lost which can be activated by clicking tracking your mobile button and the location of the mobile is sent to the pre-set number.

Displayed equations are to be centered on the page width. Standard English letters like *x* are to appear as *x* (italicized) in the text if they are used as mathematical symbols. Punctuation marks are used at the end of equations as if they appeared directly in the text.



Fig. 3 Raspberry Pi Zero

B. Software

Design of any system may refer to either all the activities involved in conceptualizing, implementing, framing, commissioning, and ultimately modifying complex method or the activity which following requirements specification and before programming, as a stylized software engineering process.

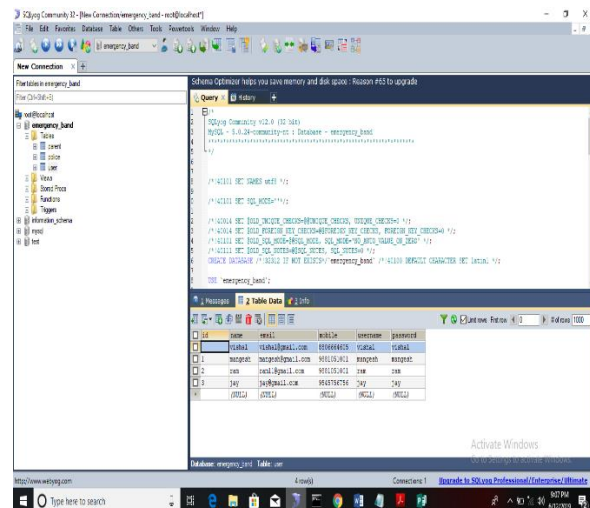


Fig. 4 SQL Implementation Software

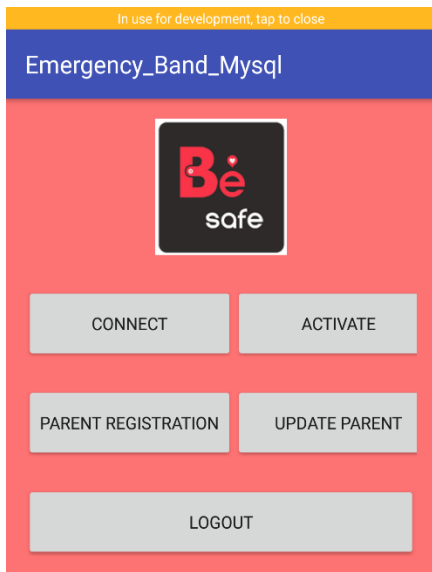


Fig. 5 Screenshot of Mobile App

IV. RESULT AND DISCUSSION

The results obtained from individual components and different sections.

In wearable section, the results relative to SMS files, audio files, video files.

The particular parent whose phone number is registered will receive an SMS displaying the location from where the emergency need has come. The screen shot is showed in Figure 6. In this figure, a sample message is displayed.

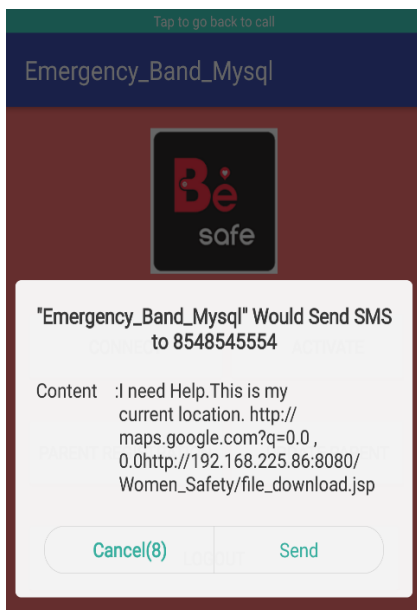


Fig. 6 Screenshot of SMS

The screen shot of location is showed in Figure 7. When the button is pressed, a details like location, mail id, mobile number and will get the longitude and latitude of the current location. It can automatically get

the longitude and latitude by pressing on get location button.

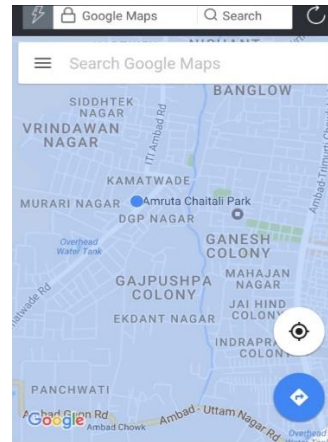


Fig. 7 Screenshot of Location

Figure 8 shows the after pressing button call is automatically generated to the registered parent.

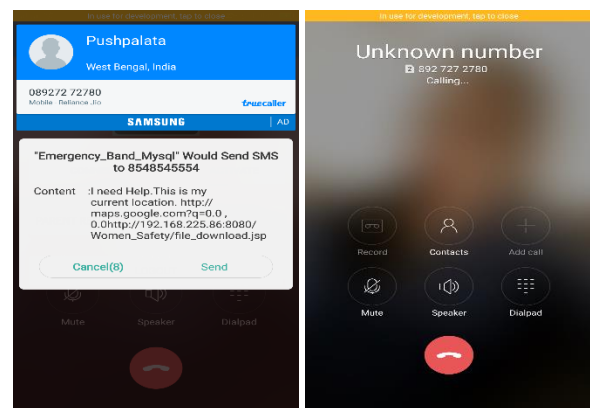


Fig. 8 Screenshot of Audio Calling

Figure 9 shows the after pressing button call is automatically capturing video and send to the registered parent.

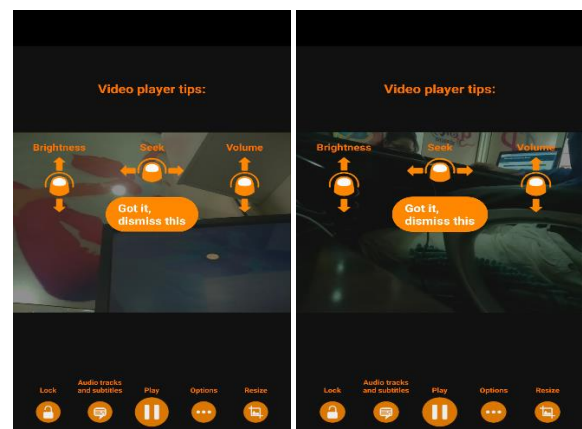


Fig. 9 Screenshot of Video

V. CONCLUSION

The proposed design will deal with critical issues like physical harassment, rape, attack etc. faced by women in the near past and will help to solve them with technologically sound equipment's and ideas.

It gives immediate alert like SMS, Video calling, Audio calling to predefined number in case of any crime which provide women safety.

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