WOMEN'S SAFETY DEVICE

Saurabh Patil[1], Anto Fernando[2], Cleetus Rodrigues[2], Mohit Rao[2], Shane Parmar[2]

[1] *Professor,* [2]*Students*

#Department of Computer Engineering, Xavier Institute of Engineering

[1]saurabh.terna@gmail.com

[2]antovin1996@gmail.com

[2]rodriguescleetus@gmail.com

[2]thisismohitrao@gmail.com

[2]parmarshane23@gmail.com

***Abstract*—Rising crime against women has made women's safety an issue that needs immediate technological solutions to be implemented. Internet-of-Things as well as cloud computing can provide a feasible solution to address this grave problem faced by the women in our country. We propose a IoT based women's safety system with features designed in keeping various untoward emergencies women must face in mind. This device consists of a system that ensures immediate alerts in case a woman is harassed or she thinks she is in trouble. By ensuring real time messaging as well as live tracking of her location immediate action can be taken to prevent crime against women. The device must be manually activated after which the user will scan her finger for the first time to trigger the system. Her current location as well as a pre-generated message will be sent to her registered contacts. The device will be tracked continuously and her contacts can keep track of her location thus. Once activated, she must keep scanning her finger after every minute, failing which the failsafe system will be automatically activated. The failsafe sends a pre-generated message to relevant authorities notifying them that the woman is in imminent danger, along with her real time location and a live stream from the device for better visual input of her surroundings as well as better visual evidence for criminal prosecution. Thus the device utilises two-step user input for notification as well as location tracking. This is a practical application of concepts of Internet-of-Things to address a relevant problem in our current society. The device has been designed keeping ease of use for women as well as nature of various untoward activities they might have to face in their day-to-day lives.**

***Keywords*— Internet-of-Things, Raspberry pi 3B+, multi-module interfacing, cloud computing, women's safety.**

I. INTRODUCTION

A. Description

India which sees itself as a promising super power and an economic hub can achieve its goal if and only if a large number of women participate in the development process. The status of women in India has gone through many great changes over the past few millennia. But also, in today's world, security is a major issue for women. In modern India, women continue to face social challenges and are often victims of abuse and violent crimes, harassment by uploading offensive photograph taken by hidden cameras etc. Women are not as physically fit as men, in an emergency situation a helping hand would be assistance for them.

The purpose of our project is to provide safety to the women's in dangerous zone. This project presents an analysis review on the principal need of intelligence security system with technology requirement and challenges to build the system. Thus, with such system we can make women more secure and make the world a better place.

As the woman feels insecure at that time she can press the fingerprint sensor, activating the system.The first activation sends the woman's current real time location to her registered contacts as well as a message letting them know she feels threatened. Then the victim should make sure that she senses her finger at least once in a minute. If she fails to do so then the Microcontroller will understand that the victim is under attack and will alert the police and the family by sending another message saying she's in danger. We will make use of IFTTT for sending SMSs. The IFTTT makes use of applets which will automatically works whenever the IF condition is triggered. The camera will start taking pictures as the micro-controller is activated. These small things can ensure that the women are safer than she was before. Thus, we can provide a safety for women using all these technologies

B. Aim and Objectives

1) To improve societal conditions for women by reducing high crime rates and general environment of danger for women by making use of technology. A positive change can be brought about in our society if women feel empowered against hooligans and anti-societal elements that indulge in reprehensible behavior such as harassment, stalking and molestation. We aim to foster a sense of safety among women by harnessing the capabilities of technology.

2) To improve response time for local authorities, by providing a simplified but effective emergency alerting and communication alternative to existing channels of notifying the authorities for help, thus ensuring swifter and immediate response by the authorities.

3) To implement a practical system using Internet-of-Things (IoT) that ensures timely reporting of crimes against women such as harassment, stalking, molestation etc. that otherwise go unreported.

4) To understand and employ real world applications of concepts under Internet-of-Things (IoT) and make use of remote data accessing using cloud computing in real-time

II. LITERATURE SURVEY

A Safety Device for Women's Security Using GSM/GPS by Abhijeet Paradkar [1] proposes wireless key GSM and GPS module with controller. As the women feels insecure at that time, she can press the wireless key then the GPS and GSM modules are activated. GPS will calculate the latitude and longitude coordinates of that area. GSM module will send SMS which contains the latitude and longitude coordinates to the numbers such as family, friends, police station and neighbors which are already stored in microcontrollers memory. Also, GSM module will make call to these numbers.

Emergency Alert for women's safety with location tracking by Prof. Kiran Mensinkai [2] proposes ATmega328 with GPS and GSM modems. The system can be interconnected with the alarm system and alert the neighbors. The detection and messaging system are composed of a GPS receiver, Microcontroller and a GSM Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude. The Microcontroller processes this information and this processed information is sent to the user using GSM modem. A GSM modem is interfaced to the MCU. The GSM modem sends an SMS to the predefined mobile number. When a woman is in danger and in need of self-defense then she can press the switch which is allotted to her. By pressing the switch, the entire system will be activated then immediately a SMS will be sent to concern person with location using GSM and GPS.

All in one Intelligent Safety System for Women Security [3] proposes system can be implemented as an android app application or using Arduino based board. It uses many modules such as database module, SOS keypress module, voice recognition module, GPS module, GSM module, Fake Call tool module, Audio and Video module to achieve many function like to view location in Google map, alert message with location, audio and video recording, speaker ON for auto receiving call, fake call ringtone with hand up option, complaints register on 100, generate electric shock for self-defense and screaming alarm siren. The proposed system provides all required functionality and there is no need to buy and install different apps that possess different functionality. Hence the cost gets minimized as well as the memory requirement by the system is less compared to having many apps.

Ashwini P Thaware's An Intelligent Safety System for Individual's Security [4] propose an android application which activates the vibrate sensor when the opens the application. Then whenever the victim touches the screen of the phone the GPS and GSM module of the phone gets active and send the latitude and longitude coordinates to the application. This application precedes these values to the registered numbers provided by the victim in the database. This ensures the safety of women.

III. DEVICE DESIGN

A. Selection of Components

The device makes use of multi module interfacing with Raspberry pi 3B+ working in integration with a fingerprint sensor, a functional picam and multiple software libraries. The components used for the design have been chosen after mindful consideration and study. Components are chosen for carrying out the work by keeping the following reasons in mind:

1) Raspberry Pi 3B +: The Raspberry Pi is a series of credit card-sized single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and developing countries. Raspberry Pi is a major component of our project, acting as the core of the device. For the purpose of this project we are using Raspberry Pi 3 B +. The characteristics that make it appropriate for our project are -

- Broadcom BCM2837B0, Cortex-A53 (ARMv8) 64-bit SoC @ 1.4GHz
- 2.4GHz and 5GHz IEEE 802.11.b/g/n/ac wireless LAN, Bluetooth 4.2, BLE
- Gigabit Ethernet over USB 2.0 (maximum throughput 300 Mbps)
- Extended 40-pin GPIO header
- CSI camera port for connecting a Raspberry Pi camera
- DSI display port for connecting a Raspberry Pi touchscreen display
- 4-pole stereo output and composite video port
- Micro SD port for loading your operating system and storing data
- 5V/2.5A DC power input

2) Fingerprint Sensor R307: The R307 module ensures that we not only have a triggering button for our project but also a mechanism to ensure user authentication to ensure only the woman in need can activate the system. Raspberry Pi has 2 pins that work with 3.3V. A USB UART converter is hence frequently needed to make the sensor work with the Pi. For a typical UART based Fingerprint sensor module –

Pin number	Name	Type	Function Description
1	Vtouch	In	Touch sensor power input(color: blue)
2	Sout	Out	Touch sensor output(color: yellow)
3	Vin	In	Power input(color: red)
4	TD	in	Data output. TTL logical level (color: green)
5	RD	out	Data input. TTL logical level (color: white)
6	GND	—	Signal ground. Connected to power ground

Fig 1. Properties of R307 Module

3)Blynk App and servers: Blynk is a Platform with iOS and Android apps to control Arduino, Raspberry Pi etc. over the Internet. Blynk is not tied to some specific board or shield. Instead, it's supporting hardware of your choice, whether your Arduino or Raspberry Pi is linked to the Internet over Wi-Fi, Ethernet or a new ESP8266 chip. The open-source Blynk server forwards information between the Blynk mobile application and Raspberry Pi, thus enabling real-time tracking of the device's location using the Blynk app.

4)IFTTT Maker Channel: The If-This-Then-That Maker channel was used to make a series of interlinked applets ie conditional statements to trigger our initial activation system as well as the failsafe mechanism. IFTTT provides services that come with triggers and actions. Triggers constitute the 'This' part of the service ie event that must happen in order for the service to be activated, while Action forms 'That' part ie the event that will take place due to action of the service.

5) Raspbian Operating System: The Raspberry Pi used in this project runs on Raspbian Operating System. Raspbian is a Debian-based computer operating system for Raspberry Pi, developed by a small team of developers, unaffiliated with the Raspberry Pi Foundation. Raspbian is based on Linux operating system. The one who wants to operate Raspbian must have knowledge of Linux operating system.

6) Raspberry Pi Camera: The picam has a resolution of 5 MP, with Camera Serial Interface (CSI)as its Interface Type. Image dimensions therein are 25x23x8 (LxWxH) mm. It supports Video Formats in 1080p @ 30fps, 720p @ 60fps and 640x480p 60/90. It is fully compatible with Raspberry Pi 3 Model B

B. Working of the Device

We propose using a Raspberry pi-3 B+ for hardware as the device at the core of the system. The Pi will be powered using a portable battery to ensure mobility. A fingerprint scanner attached will act as the triggering button for the system. The scanner serves the dual purpose of a trigger button as well as ensuring unique user identification. During the first run, the scanner will be used to read and store inputs of the scans of the user's fingerprint in various positions. This ensures that the user can initiate the tracking mechanism by having her fingerprint read in any possible position or orientation, as she may not have the opportunity to have a complete and perfect scan done due to circumstances. Hence, partial or incomplete scans will also be read and stored.

In circumstances where the woman feels threatened, she can switch on the device with the push of a pop-button. To initiate the location tracking mechanism, she must scan her print once. Since, multiple orientations and positions the finger can be scanned in have been stored, any position she scans her finger in will be a valid input to run the tracking script programmed into the device. Once she has scanned her finger, she must repeat the process after an allotted time (preferably 1 minute or less). Failure to scan the print again is taken as an indication that the woman is in danger, triggering the failsafe. Livestreaming of the users whereabouts will also be initiated to give visual clues and evidence to the authorities.

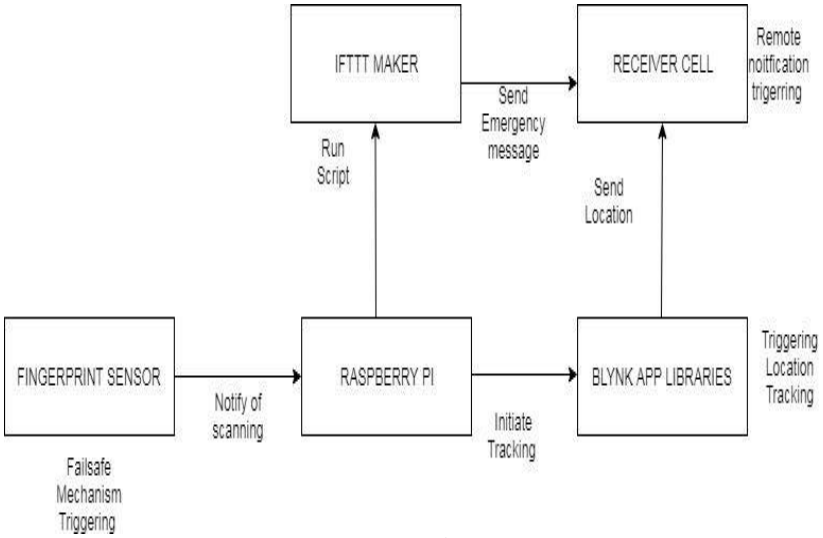

Fig 2. Block Diagram of device working

IV. IMPLEMENTATION METHODOLOGY

A. *Activating the system*

When the user feels unsafe, she activates the device and scans her fingerprint. The mechanism is this initiated and the location of the pi is tracked. The user triggers the failsafe mechanism by not scanning her print again after the allotted time, thus sending her current location and an emergency message to the contacts and authorities. First scan initiates the mechanism, thereafter the user must scan her prints after determined time to not trigger failsafe. If she fails to do so, the generated message will be sent by IFTTT maker channel, and current location will be sent from the Blynk web server to the app on receiver side.

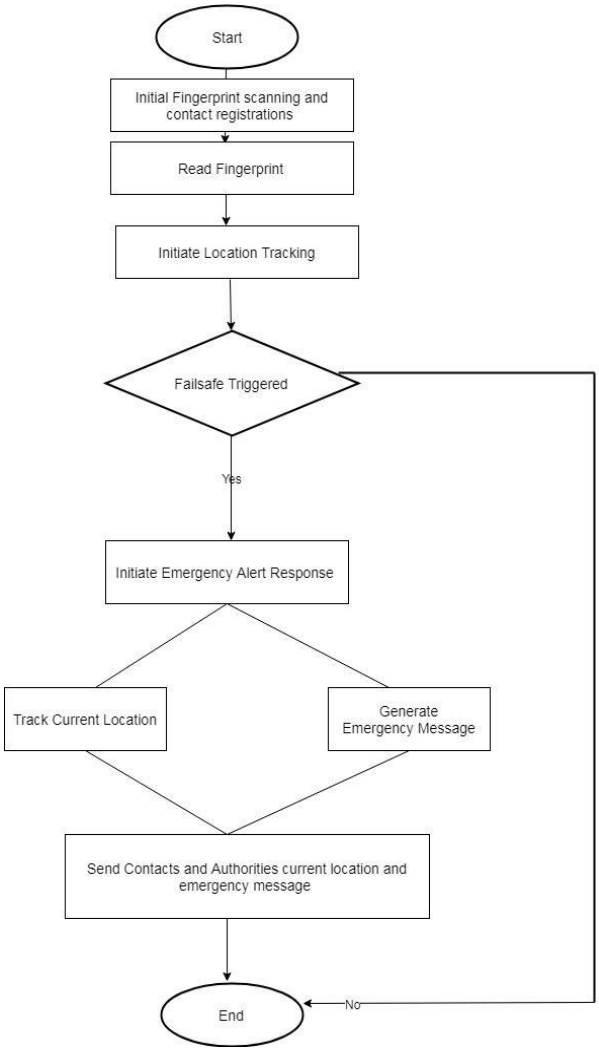

Fig 3. Flowchart of the working of the system

B. *Software Implementation for Location tracking*

Once the print is read, the pi will run a Python script for location tracking. Now, the pi is being tracked, and its real-time location updated in the cloud server we are using (for the purpose of this project, we're relying on Blynk app). Blynk will track and store the location of the device and thus the user is being tracked in real time. The open-source Blynk server forwards information between the Blynk mobile application and Raspberry Pi, thus enabling real-time tracking of the device's location using the Blynk app. Current coordinates of the user are sent via her phone to the pi, with Blynk app running on user phones and the script to receive the coordinates running when the first print is scanned. This live location will be sent to the user's registered contacts who can monitor her movements continuously. If she fails to scan her print again after allotted time the last known location is immediately sent to the authorities along with the generated emergency message.

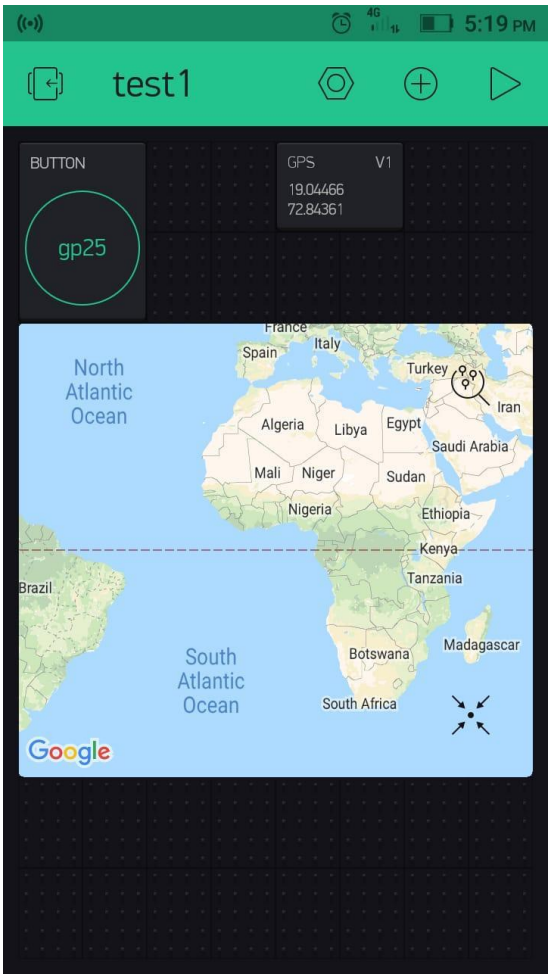

Fig 4. Blynk app displaying location tracking.

C. Sending emergency message using IFTTT Maker channel services

The failsafe mechanism is the generation and transmission of the emergency alert message from the user to select contacts and the authorities (contact info of relevant authorities e.g. Women's Cell of the Mumbai Police and Railway authorities will be preprogrammed). This failsafe is triggered when the user does not have her print scanned after allotted time. We have used IFTTT to create chains of applets that will execute successively to send an emergency SMS to the selected contacts and authorities if the woman is in danger. Three applets were created and daisy chained such that they would run consecutively, actions of one triggering the other, the end result of which would be the contact receiving an emergency SMS alerting them that user was in danger –

1) If [Webhook] then [Email] - The first applet had a webhook service from the Maker channel as its triggering event i.e. 'this' action. The webhook is an HTTP callback i.e. a post action that would occur when an 'event' occurred, thus acting as an event notification. The 'Event' is the running of a simple python script for sending web requests We then write a python code to send an Email. The action taking place subsequently i.e. 'that' action will be sending of an Email to the linked Email account i.e. the project account.

2) Forward Mail applet - the Email being received is from the 'action' account of IFTTT. An Email can also act as a trigger if it's being sent to the IFTTT - to their 'trigger' account (respective mail IDs being action@ifttt.com and trigger.receive@ifttt.com). An applet was created that would immediately forward all mail received from the action account back to

the receive account, thus any mail being sent as the result of an action itself would act as a trigger for the next applet, both mails belonging to IFTTT.

3) If [Email] then [SMS] - The mail that had originated as an action is now itself a trigger. 'This' event is the mail being sent to IFTTT, 'that' action is an SMS with predetermined content e.g. "I am in Danger/I need help" being sent to selected contact.

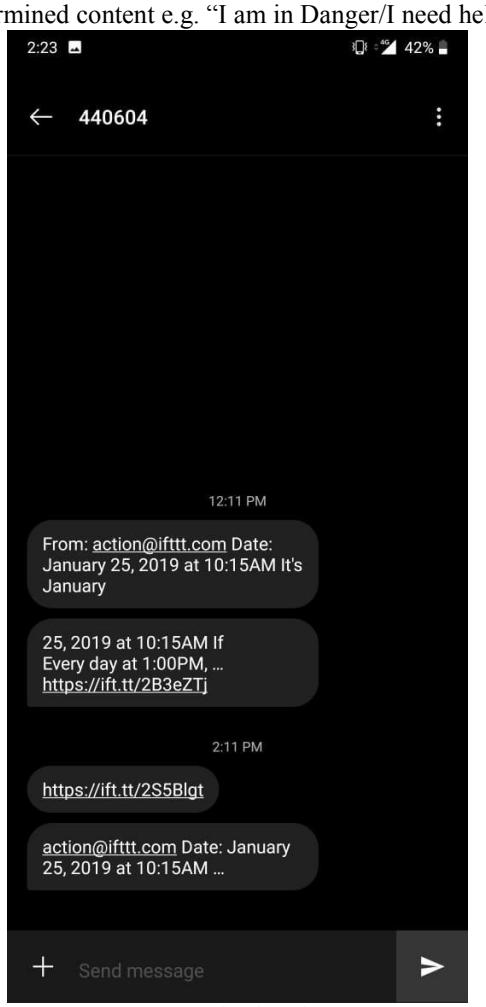

Fig 5. SMS received instantly after failsafe mechanism is triggered.

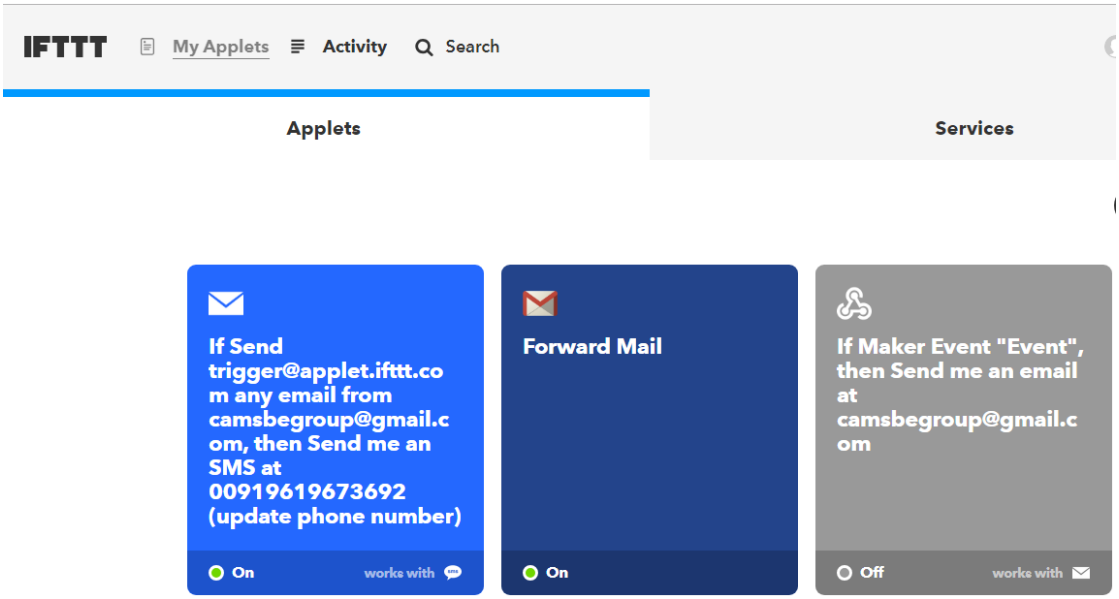

Fig 6. IFTTT Applet daisy-chaining enabling sending the emergency message.

D. Livestreaming from the user's current location

Visual referencing and evidence of the user's surroundings can be very useful in determining not only where the woman is but what problems she might be suffering currently and how she can be helped.

Real-time streaming from the user can be very beneficial in such a scenario. A 5 Mp Raspberry Pi 3 B Picam has been attached to the device enabling live video capture. The python script enabling real-time video streaming will be triggered once the user fails to scan her finger after allotted time period. For the purpose of the project, one can access the video streaming through any device that has a browser and is connected to the same network as the Pi. During fully functional scaling, a public server will be set up thus enabling streaming to authorized contacts as well as authorities.

V. Conclusion

The proposed system reduces the risk of failure in a situation of emergency. It also helps in giving the live location of the victim to the registered contacts and the police. So that immediate action would be taken over the arised situation. Our main motive to tackle the social issue of women's safety using technological innovation devised. An effective way to tackle the social issue of women's safety using technological innovation can be devised, as shown through this project. This project thus addresses a major fault in our law and order apparatus, by making efficient use of IoT. Further applications of IoT can address societal issues and bring about improvements in our daily life.

Limitations and Future Scope:

The device hinges on a number of factors that might be considered it's drawback in terms of full scaling. It depends on availability of Wi-Fi connection for the woman user as well as the assumption that her registered contacts will have functional internet connection at the time. Thus the device is majorly restricted to urban centres for now. However with rise of Internet connectivity across the nation this might not be a problem in the foreseeable future.

Future scope:

1) Children's safety: In addition to improving the conditions in terms of women's safety in India, this project can also be used for parents to detect their children's location. When children are out on a picnic or some water park and if they get lost or kidnapped, they can use this same mechanism to prevent crime from happening.

2) Banking safety: In banks, this project will help the manager and the staffs to do an emergency call to the police when some robbery takes place.

3) This project can be used by common man in day to day life whenever he witnesses an occurrence of a crime or anti-social behavior by individuals or gangs/mobs of people. Thus, people can act as active reporters of the situation and alert authorities instead of being passive eyewitnesses.

4) This project can be used in major institutions like railways whenever a bridge has collapsed or any real time death incident or major injuries to call ambulance and police.

REFERENCES

[1] Abhijeet Paradkar, "All in one safety System for Women", International Journal for Computer Application
[2] Prof. Kiran Mensinkai, "An Intelligent Safety System for Individual's Safety", International Conference for Data Analytics and Soft Computing
[3] M. Shrilekha, "Emergency Alert for Women's Safety with Location Tracking", Pace Institute of Engineering
[4] Ashwini P. Thaware "A Safety System for Women", International Journal for Recent and Innovative trends