International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 04 | April - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

Threat Detection and Tracking System

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ABSTRACT

This device provides a platform to ensure user safety by generating the user's location and alerting authorities regarding user's location. In today's era safety is a matter of prime concern as the crimes are increasing and it has become dangerous to roam freely alone especially in deserted streets and thus, we have designed this project which work on principle of a person's safety by taking into account their location monitored by fingerprint sensor also there is a GPS module that determines the location coordinates and GSM module that is use to send emergency message in pre-stored contacts. Detection of the input from the user is performed with the help of a fingerprint sensor at every minute, a distress signal is sent to authorized numbers when detection does not occur within time. The GPS track the location of user and send that information to authorized number and GSM is responsible for alerting authorized personnel by sending SMS on the mobile number with the location information of the user.

Key word: Threat Detection, Tracking, Safety, GPS module, GSM module, etc.

INTRODUCTION

In today's era security is important concern for everyone. Everyone wants to be safe and secure whenever they go outside alone because the crimes are increasing day by day and hence it has become dangerous to roam freely alone especially in deserted streets. Therefore, we have designed this project as a device which one can carry whenever one go outside keeping one safe and secure.

GPS and GSM module is used in this project for tracing the location of the person in trouble and sending the message. GSM module is used to send the message in pre stored contacts alerting the authorities that the person is in danger. It has SIM card that connect with device by sending the message. GPS module is use to identify the person's location by tracking its latitude and longitude. This project also contains fingerprint sensor that can scan the fingerprint of the person to activate the device whenever he/she thinks is in trouble or can be in trouble. The sending and receiving of data over wi-fi is done through ESP 8266 wi-fi module and also it is used for connection for sending and receiving the message. These connections are wireless, cost effective has higher stability with fast transfer of messages. There is also a LCD Display which displays the message 'Person In Danger'.

This device is very useful for the person travelling alone as it can track current location of the person with the help of GPS which tells latitude and longitude and also sends the message through GSM.

DESIGN OVERVIEW

GPS (Global Positioning System)

GPS tells the position or location that where a person is on the Earth. GPS contains mainly three parts which are satellites, ground stations and receivers. There should be minimum 4 GPS satellites for transmitting and receiving the signals. Signals in the form of radio waves are sent to the receiver. The trilateration process is used to locate the position when the signal is extracted from minimum four satellites.

Trilateration is the process which tells the location from intersection of three spheres, it tells the exact location by determining latitude and longitude.

Figure-1

GSM (Global System for Mobile Communications)

GSM is a digital cellular communication that is used for sending and receiving short messages. It enables users to use radio channel which further may have multiple radio channels. It is most commonly used technology in Internet of Thing (IOT) because it is simple and affordable. GSM system can operate in several frequency band.

GSM has two important characteristics, one is SIM and the other is privacy which encrypt the digital bit styream.

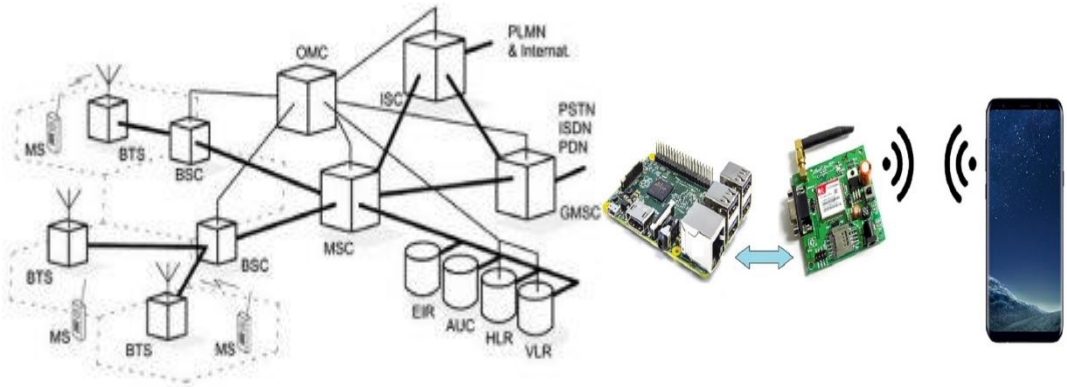


Figure-2

SP8266

It is wi-fi microchip for Internet of Thing (IOT), it is small in size, cost effective and adaptable with embedded devices. ESP8266 module connect microcontroller to wi-fi. It enables embedded device to connect to routers and transmit data, these are complete IOT MCU development board where modules are pre-installed. It works on 3.3 Volt power supply and supports serial communication which is compatible with Arduino.

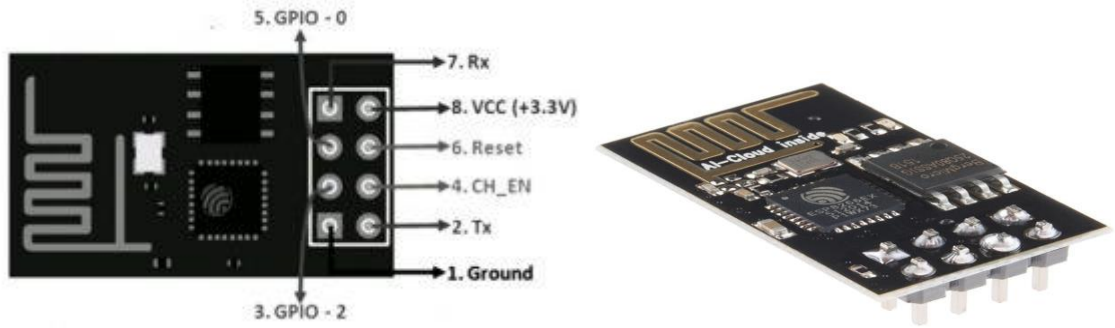


Figure-3

Fingerprint Sensor

A fingerprint sensor is a system which consists of hardware and software to authenticate an individual's identity.

The processing of fingerprint sensor consists of two elements like enrollment & matching. While in enrollment an individual's fingerprint is processed to generate and store finger pattern, matching helps in processing a fingerprint to generate and compare the new finger pattern in question with respect to the stored data.

Figure-4

LCD Display

LCDs are used to display arbitrary images which can be used to display words, images and digits. The LCD used in this project has a dimension of 16x2 i.e. two rows where each row can produce 16 characters.

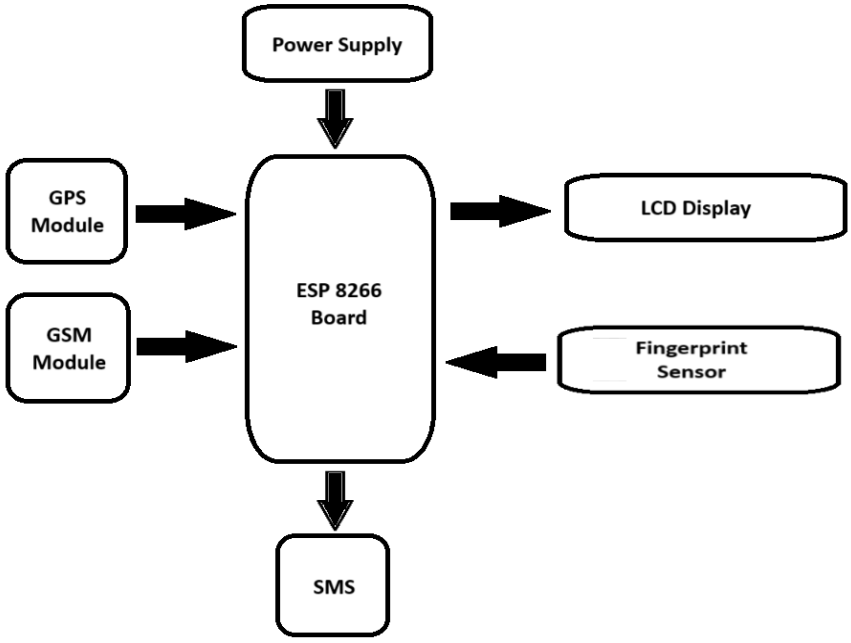
Figure-5

Power Supply

A power supply is responsible for converting electrical energy into other forms. In this project a power supply of +5V is enough for total circuit.

The ESP 8566 board is operable at 5V & 3.3V both, but an external 5V power supply is needed to the GSM module to work properly.

BLOCK DIAGRAM



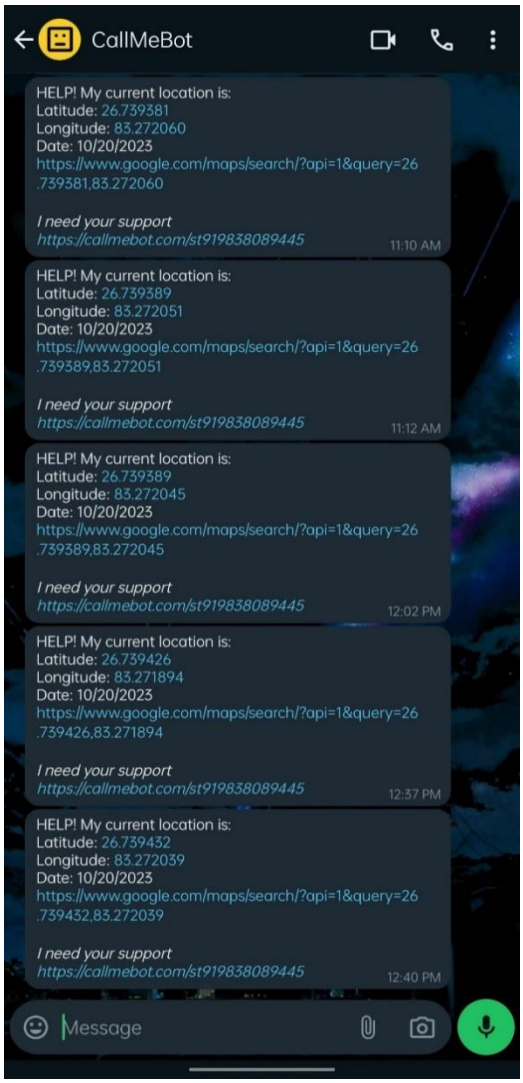
WORKING

The project uses two main modules to send the message, namely GSM and a microcontroller. The system is initiated with the activation of the device. After initiation, the system will activate GPS module to gather location details of the individual in question.

The fingerprint sensor is used to recognize the user in the possession of the device, and to reset the countdown. A countdown is set in the device to send the SMS to the authorities if not reset.

Every time the individual's fingerprint is recognized within the time limit, the countdown to send the SMS is reset. If the sensor in unable to detect the individual, an SMS is generated containing a link of Google Map to display location details of the individual and is sent to CallMeBot Platform of the authorized personnel's WhatsApp.

The device is designed in such a way that as long as the device is active, it will keep sending the updated location of the individual after an interval.



APPLICATIONS

- This safety device plays an important role in enhancing personal security and also provides a sense of confidence in women.
- This device cannot be only used by women but is also helpful to any other person.
- It is designed to be used in self-defense and accidents can be prevented as real-time location tracking is possible.

CONCLUSION

Threat detection and tracking systems focus on the safety of individuals mainly for women. As we know in today's environment safety is a major concern for everyone. This system activates and requires fingerprints after every 1 minute to check whether an individual is safe or not. If the person is not able to scan the fingerprint in the given period, then this device will send message using latitude and longitude to the authorized person through SMS.

Being unable to scan the fingerprint will only happen in case of any danger, therefore this device will play a crucial role for one's safety.

FUTURE SCOPE

- This system can be used in wearable devices by integrating it into jewelry, clothes, or accessories.
- The size of the kit can be reduced by using nanotechnology.
- We can use artificial intelligence and machine learning to enhance the accuracy, efficiency, and recognizing behavioral patterns of threat.

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