

WOMEN SAFETY SYSTEM USING ARTIFICIAL INTELLIGENT TECHNIQUE

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering Degree in
Electronics and Communication Engineering

by

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
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ENGINEERING**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

**Accredited with Grade "A" by NAAC
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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **NEHA TU** (Reg. No. 38130151) and **PRINCY AV** (Reg. No. 38130171) who carried out the project entitled "**WOMEN SAFETY SYSTEM USING ARTIFICIAL INTELLIGENT TECHNIQUE**" under our supervision from December 2020 to March 2021.

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Signature:

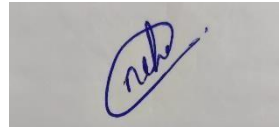
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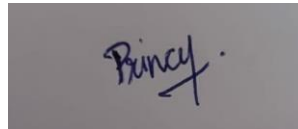
DECLARATION

We **NEHA TU** (38130151) and **PRINCY AV** (38130171) hereby declare that the Project Report entitled “**WOMEN SAFETY SYSTEM USING ARTIFICIAL INTELLIGENT TECHNIQUE**” done by us under the guidance of **Dr.S.Lakshmi** at Sathyabama Institute of Science and Technology, **Chennai- 600119** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

1.



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ABSTRACT

Women have historically been the most vulnerable and most exploited group in society, therefore their safety has been a major worry in recent years. The figures are extremely concerning and frightening. With the passage of time, society is becoming more aware of its obligations to women. As a result, some expertise has been required in this subject. For the development of a security system, technical innovation is required. Many security systems, such as smartphone apps and shock absorbers, are available. Jacket production, GPS and GSM-based position tracking and a manually activated SOS switch. However, these systems were unable to provide a complete security solution and had numerous flaws. The proposed system AI-based Women's Safety System aims to protect the women in danger and provide safety by responding immediately to a critical situation, This system can respond both manually and automatically to accurately monitor the women's status. The proposed device uses various sensors and components. It uses MEMS sensor, Heart Rate sensor, GPS, GSM. The device is processed by Raspberry Pi and it also has tear gas and shock generator so in case of an emergency situation the victim can turn ON the emergency switch and use the wake up word to start the process. The motion of the victim is continuously monitored and the heart rate is also checked and an alert message is sent from the device to the concerned authority through the aid of GSM module and the location is also sent using the GPS. The tear gas and shock generator is used to provide on-the-fly protection. This is made in such a way that it can give immediate protection to the victim to defend herself from the attacker by using the shock generator and tear gas, so that the attacker will lose his senses for the time being as the tear gas causes irritation to the eyes and shock generator will make him lose his balance and put him down for sometime so that the victim can make use of the situation and escape or wait for the concerned authority to whom the SOS alert and the location has been sent.

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LIST OF ABBREVIATIONS

S.NO	ABBREVIATION	FULL FORM
1.	USB	UNIVERSAL SERIAL BUS
2.	GPS	GLOBAL POSITIONING SYSTEM
3.	OS	OPERATING SYSTEM
4.	CNN	CONVOLUTION NEURAL NETWORK
5.	GSM	GLOBAL SYSTEM FOR MOBILE COMMUNICATION
6.	MEMS	MICRO-ELECTRO- MECHANICAL SYSTEMS

CHAPTER 1

INTRODUCTION

In today's world the crime against women has increased drastically as technology has upgraded the crime against women has also gone up high. Here we can use the same technology to protect women and keep themselves safe from a critical situation and protect themselves from Harassments, sexual abuse and violence. Women work across all domains to promote liberty, women are not physically fit as men so more than defending themselves by fighting they can use smart devices to protect themselves.

Women can not always be in the fear of getting into trouble and can not always depend on someone to protect them, the device is an easy to use device specially designed for women without intruding their privacy . The basic approach behind this device is to send alert message along with the GPS location of the victim, so the device can give them an immediate protection where they can defend themselves using the tear gas and the shock generator in the system until the concerned authority come to help them.

This device can understand the situation better and protect women from danger to an extent. This system can provide help and care to women without disturbing their privacy and it can keep them safe and women can go out any time without any fear. This application can be linked with the local authorities like police in order to send help to the victim as early as possible.

The proposed system consists of a GPS module to find the location of the victim in latitude or longitude, a GSM module to send SOS message to the concerned authority when in an emergency situation, a speaker is also used to alert the people around the victim that says a pre-recorded word " Somebody Help Me" this is used just in case if someone is around her so that they can try saving her or at least inform the cops. MEMS sensor is used to monitor the victim's motion and a Heartbeat sensor to monitor the heart rate.

For immediate protection from the attacker to keep herself save in the meanwhile the concerned authority arrives, we have used a shock generator and a tear gas set up which gets actives when the wake up word “Help” is heard by the device. When the MEMS sensor monitors abnormality in the victim, the device immediately checks for the victim’s heart rate and send an alert message to the concerned authority.

This set up was mainly made in the motive of helping women to keep themselves save when ever the go out, Since women these day work and are almost in all the fields so this is a small step by us to create awareness on Women’s safety. In the upcoming future we hope the crime against women reduces and eventually eradicates.

CHAPTER 2

LITERATURE SURVEY

Malneedi Vamsi and K. P. Soman (2020) In this literature the author has revealed that occupancy detection is a very difficult problem and not easy to sort. There are few mechanisms that exist for the problem of occupancy detection in vehicles and particularly in Automobiles. Nowadays, safety has become a top priority and is very important and a basic necessity aspect of the automobile industry. Airbag have become a basic and necessary safety measure in cars. Even though airbag is a vehicle safety device, there is a possibility that it can kill children below 12 years due to its rapid action that exerts a lot of force. This project explains about detecting the number of passengers seated in the car and then classifies each person if he or she is an adult or a child by the means of processing the image shot from the camera placed in the car. So that the deployment of airbags near children can be avoided based in the images captured. Each time car speeds from 0 to 20 Kmph, the occupancy of the car is checked and each one is classified again as an adult or child. We are using widely used technique here haar Cascades, for detection of adults and children. First, it detects faces and then classifies if each occupant is an adult or child.

Aaron Krouse and Ahmed Abdelhadi (2020) The author has stated about the increase in modernized society car accidents that have become a very common issue. If All the vehicles become more autonomous, accidents will slowly start decreasing as time goes by. Though the accidents decrease, there will be some mistakes that can not be resolved that causes damage to both the property and the person. This project is a small effort taken to reduce these mistakes, the system briefed in this paper uses sensor that can measure the height and weight of a person to distinguish if he/she is an adult or a child. Once the system distinguishes, the system will inform the driver of potential danger in the travel accommodations and recommend the person proper safety seat with respect to the person height, weight and if the person is an adult or child. This paper describes the entire process of constructing, designing and testing the prototype of the system.

A. Shaout and B. Crispin (2018) Where the author says that in today's world, infants and children being left all alone in the cars during hot summer has become a major public issue that can even lead to mortality. With new upcoming technologies and modern sensors it is able to detect such scenarios by just uploading the raw data to the cloud. So, in the cloud the system can respond to the data being sent and make judgement to notify proper response. In this paper, we are describing and exploring the cloud technology which helps us process all updates sent by a sensor system and the importance of its uses in sending notification across the internet to prevent such tragic events.

Hui Zhu and Yudong Zhang (2008) In this the author tells that as cars become more common in families all across the world, the children in these families tend to stay in the car much longer. In such cases, child casualties are rapidly increasing all over the globe. There are problems caused by vehicle accidents. To solve this problem child seat has become an important necessity as it is quite effective. In this article we'll see the importance of the design of the child seat and also at the same time along with the basic design principles and design approach to achieve more comfort and safety of Child seats through a few examples. Since the increasingly long time the child stays in the car, the parents and the family members are more concerned and will want a better child safety and a child friendly car to avoid such problems in the society. The rate of child casualties gradually decreases when we upgrade our seats with better technology. If the children do not have any kind of passenger bound measures that protect them from such crash events. This experiment shows that when the speed of the vehicle reach 50 km/h, a child of weight 40 kg is equal to the moving object of which the power is 1 t.

J.W. Fin et al. (2012) In this paper the author stated that these days, vehicle safety is still a prominent automotive issue for almost everyone including engineers, consumers, and also the government regulators. Most of all the issues the safety of a child when left behind in the car all alone parked outside during the summer months with high temperature is a major concern. The deaths and injuries caused to infants and young children and also the elderly adults have occurred due to higher body temperatures for an increasingly prolonged period of time. This system proposes the solution for the design of car safety seats that offer temporary protection from heat to the occupant. This seat provides thermoelectric cooling and also offers forced air convection to maintain the body temperature of the passenger within acceptable ranges for a limited period of time. In this system the experiment results are being presented to validate the effectiveness of this particular thermoelectric-based safety system. This system demonstrates the ability to maintain localized cabin air temperature below the survivable threshold in a completely close and parked vehicle for almost up to 95 minutes. For an emulated 7 kg infant, it represents 85% increase over child seating units at the temperature of the cabin up to 69°C.

Hu J et al. (2018) The author has proposed to study the effect of the rear seat structure for a child occupant's protection. According to the GB15083-2006 standard, an element model of the luggage cabin and the rear-row seat was developed in the LS-DYNA and was validates via test results. This model was used in the analysis of the safety performance when the luggage impact in the car crash to check the rear seat structure during these unavoidable circumstances and to minimize the risk of a child occupant and protect the passenger from any kind of injury. This was first tried with a 3 year old child seat which was simulated by fixing on the rear seat. In order to reduce the intrusion and acceleration of the rear seat, four optimization scheme were designed for this purpose. Comparing to the original model of the rear seat.

D. Zhang et al. (2018) In this the author tells Breath Track, a contact-free breath monitoring system that uses off-the-shelf WiFi devices to track the status of breath by utilising the phase fluctuation of channel state information (CSI). Breath Track compensates for the phase distortions caused by the hardware flaw by using a reference antenna attached to the transmitter. Breath Track also use the sparse recovery method to determine the dominant path in a multipath indoor setting and calculate the complex attenuation coefficient. The detailed breath status and breath rate are then extracted using the phase fluctuation of the complex attenuation coefficient. Extensive testing has shown that Breath Track can predict breath rate with a median accuracy of over 99 percent in most settings, as well as track the detailed status.

Y. Sun et al. (2019) In this paper the author has stated that Machine learning (ML) is a vital technology for allowing artificial intelligence since it can solve complicated problems without explicit programming. Both industry and the research community have pushed for the use of machine learning in wireless communication, citing its success in a variety of practical tasks like as image recognition. This study covers current improvements in machine learning (ML) applications in wireless communication, which are divided into three categories: resource management in the MAC layer, networking and mobility management in the network layer, and localization in the application layer. Power control, spectrum management, backhaul management, cache management, beamformer design, and compute resource management are among the applications in resource management, whereas ML-based networking focuses on clustering, base station switching control, user association, and routing.

X. Ma et al. (2020)] As the author has proposed that Device-free gesture recognition (DFGR) is a promising sensing approach that analyses a gesture's influence on nearby wireless signals to recognize it. Machine learning is used to design the majority of DFGR systems. When the testing condition differs from the training condition, however, the recognition performance suffers significantly. This work presents a feasible DFGR system based on meta learning to overcome the aforementioned problem, inspired by humans' transferrable knowledge learning ability. We create a deep network that can learn not just discriminative deep features, but also a transportable similarity evaluation ability from the training set and apply that knowledge to new testing settings. Extensive testing with four users in two scenarios show that the proposed solution could be useful.

C. Wang et al. (2018) In this paper the author stated that growing needs of public safety urgently require scalable and low- cost techniques on detecting dangerous objects (e.g., lethal weapons, homemade-bombs, explosive chemicals) hidden in baggage. Traditional baggage check involves either high manpower for manual examinations or expensive and specialized instruments, such as X- ray and CT. As such, many public places (i.e., museums and schools) that lack of strict security check are exposed to high risk. In this work, we propose to utilize the fine-grained channel state information (CSI) from off-the-shelf Wi-Fi to detect suspicious objects that are suspected to be dangerous (i.e., defined as any metal and liquid object) without penetrating into -the user's privacy through physically opening the baggage. Our suspicious object detection system significantly reduces the deployment cost and is easy to set up in public venues.

Towards this end, our system is realized by two major components: it first detects the existence of suspicious objects and identifies the dangerous material type based on the reconstructed CSI complex value (including both amplitude and phase information); it then determines the risk level of the object by examining the object's dimension (i.e., liquid volume and metal object's shape) based on the reconstructed CSI complex of the signals reflected by the object.-

To meet the expanding demands of public safety, scalable and low- cost solutions for identifying dangerous materials (such as lethal weapons, improvised bombs, and explosive chemicals) hidden in luggage are urgently needed. Traditional baggage inspections require a lot of labor for manual exams or expensive and specialized equipment like X-rays and CT scans. As a result, many public places (such as museums and schools) that do not have strong security checks are at risk. We propose in this paper to employ fine-grained channel state information (CSI) from off-the-shelf Wi-Fi to detect suspicious objects that are thought to be dangerous (i.e., any metal or liquid object) without invading the user's privacy by physically opening the baggage. Our suspicious object detection system saves money on deployment and is simple to use.

CHAPTER 3

EXISTING SYSTEM

3.1 EXISTING METHODS

- In the previous papers we have seen that the existing systems use WIFI signals to detect the people in the vehicle. Most of the existing systems use WIFI to detect the occupancy in the vehicle to intimate the driver or the user of the device
- The existing systems also use cameras to detect the occupancy of people in the car which is a big disadvantage since it might affect the privacy of the person and some people might misuse the purpose of the camera that is fit in the vehicle for a useful and an emergency purpose.
- Some existing systems are based on Infrared Sensor (PIR) for motion detection which might not be very effective and accurate.

3.2 DISADVANTAGES

- The use camera to detect the occupancy of people in the car which is a big disadvantage since it might affect the privacy of the person and some people might misuse the purpose of the camera
- Systems based on motion detection using an infrared sensor (PIR) may not always be effective to detect the motion of the object since it might not be very accurate and might show variations.

So, when it comes to women's safety there are a few mobile application or apps that were created for women for their safety purposes but these apps can only share the location of the victim and send an alert to the necessary authorities which will definitely be useful. These apps also have the feature of recording videos in the background when the emergency situation occurs by clicking the power button twice or there are many other ways to activate the app but the usage of the camera is a very big drawback as it affects the privacy of the victim and also these apps does not provide immediate protection against the attacker, for this purpose there are a lot of self-defense accessories like pepper-spray, flash light, shock effect etc. that should be carried manually since it is not in-built in the app. Since there is a probability if the victim is carrying any self-defense accessory or not and sometimes even if she is carrying these accessories there is a chance she might drop her bag or might not be able to use it or take it out immediately out of the bag. The victim definitely needs some grace time to escape from the attacker until the concerned authorities arrive to rescue her. To overcome this a device is proposed that is a wearable device which also has an in-built shock generator and tear gas so that it can give the grace time required to escape from the attacker and get to a safe place.

CHAPTER 4

PROPOSED METHOD

4.1 BLOCK DIAGRAM

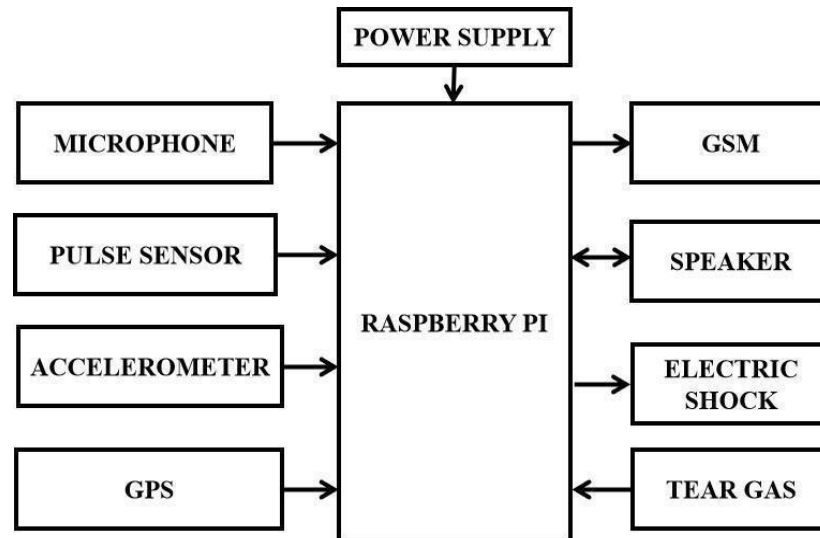


FIGURE 4.1
BLOCK DIAGRAM

The block diagram figure 4.1 shows the modules used in the proposed system and gives a clear picture of the proposed system with indicating all the sensors as input devices and the speaker, tear gas, shock generator as the output devices along with the power supply the entire setup being connected and run by the Raspberry Pi.

- **SENSORS:**

Pulse Sensor, MEMS

- **CONTROL UNIT:**

Raspberry Pi, Power Supply Unit

- **TRANSMISSION UNIT:**

GSM, GPS, Shock Generator, Tear Gas, Microphone, Speaker

These modules help women to protect themselves in harmful situations.

The block diagram is depicted as shown in figure 4.1.

4.2 PROPOSED SYSTEM

- To interact with the Raspberry Pi, you'll need a monitor, mouse, keyboard, VNC viewer, and SSH.
- For interacting with them, LX terminal commands are utilized. A USB microphone is plugged into one of the Pi's USB ports.
- The Raspberry GPIO is connected to the GSM module, GPS module, accelerometers, and pulse rate sensors.
- Python programs are used to connect them to the Raspberry Pi. Jasper is an open source, Python-based platform that may be used to create voice-controlled apps as well as a variety of other services.
- There are several online and offline Speech to Text and Text to Speech engines available. The outcomes are correct.

4.3 ALGORITHM

Step 1: Deployment of modules and activation of sensors.

Step 2: MEMS keeps monitoring the motion continuously.

Step 3: If Emergency switch pressed, then Message sent-> "Abnormal" "SOS"

Step 4: GPS for location tracking

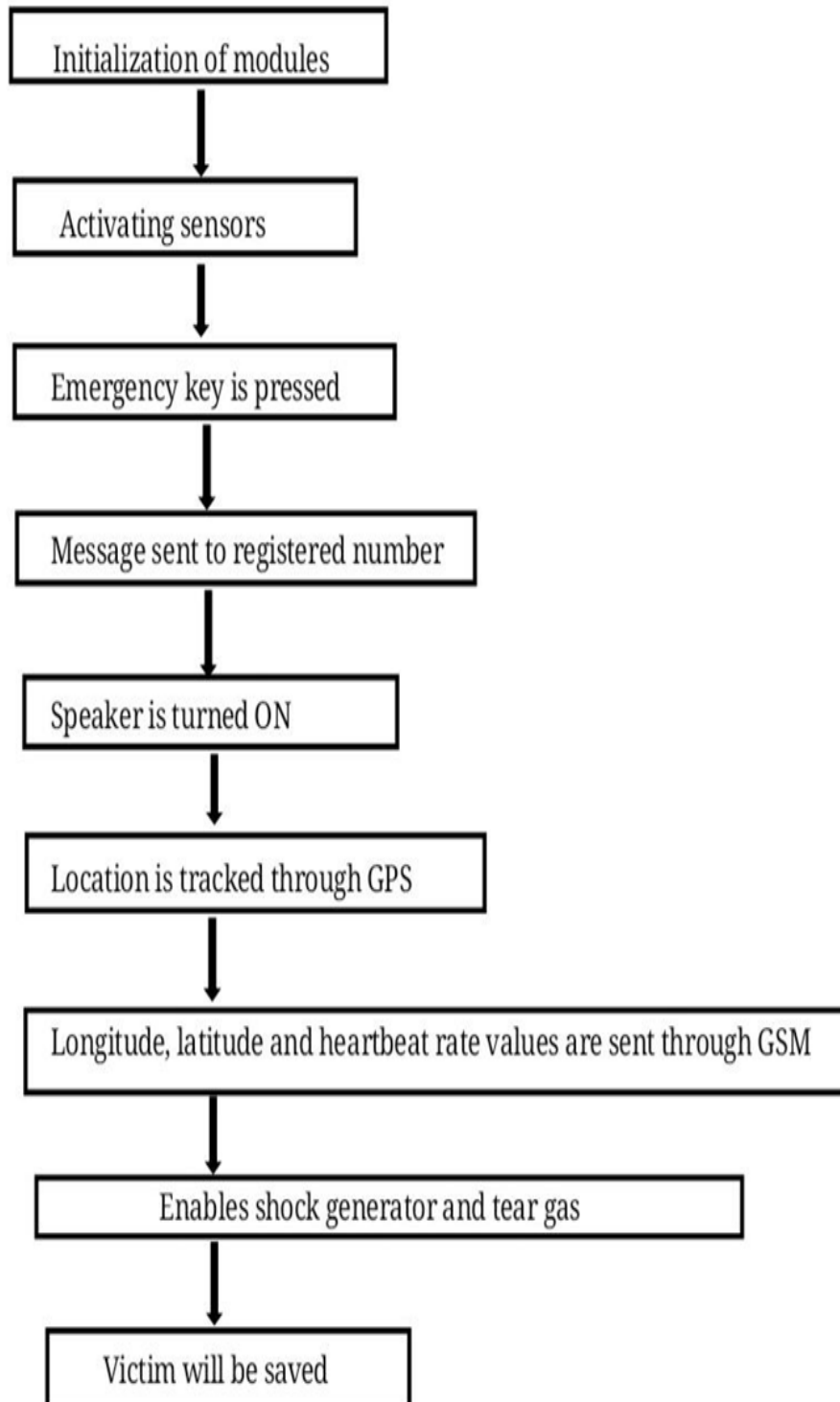
Step 5: Longitude, latitude are sent to registered number

Step 6: Pulse sensor keeps monitoring the status

Step 7: Shock generator and tear gas enabled for time being

Step 8: Authorities arrive and victim gets saved

4.4 FLOW CHART



The hardware and the software components that are being used in this system are listed below:

4.5 HARDWARE REQUIREMENTS

- RASPBERRY PI
- MICROPHONE
- PULSE SENSOR
- ACCELEROMETER
- GPS
- GSM
- SPEAKER
- ELECTRIC SHOCK (DC Voltage)
- TEAR GAS

4.5.1 RASPBERRY PI

The **Raspberry Pi** is a line of compact single-board computers as shown in figure 4.2 created by the Raspberry Pi Foundation in the United Kingdom to encourage the teaching of basic computer science in schools and disadvantaged nations. The initial model was significantly more popular than expected, selling for uses such as robotics outside of its intended market. Peripherals (like keyboards and mice) and casings are not included.

Some accessories, however, have been included in several official and unofficial bundles.



FIGURE 4.2
RASPBERRY PI

- The first-generation Raspberry Pi's Broadcom BCM2835 SoC features a 700MHz ARM1176JZF-Processor, Video Core IV graphics processing unit (GPU), and RAM. It has a level 1 (L1) cache of 16KB and a level 2 (L2) cache of 128KB.
- The GPU is the primary user of the level 2 cache. Because the SoC is placed beneath the RAM chip, just its edge is visible. The 1176JZ(F)-S is the same CPU that was used in the first iPhone,[22] but it runs at a higher clock rate and is paired with a significantly faster GPU.

4.5.2 HEART BEAT SENSOR

The sound of a person's heartbeat is the sound of the heart's valves contracting or expanding as they drive blood from one region to another. The heartbeat rate is the number of times the heartbeat per minute (BPM), and the pulse is the heartbeat that can be felt in any artery adjacent to the skin. The Heartbeat Sensor is a small sensor as shown in figure 4.3 used to calculate the number of times our heart beats in a minute.

- **Manual Method:** Checking one's pulses at two locations—the wrists (the radial pulses) as well as neck—can be used to assess one's heartbeat (carotid pulse). The process is to lay a finger (index and right hand) on the wrist (or neck just below the throat) and count the number of pulses for 30 seconds, then multiply the result by two to get the cardiac rate. Nonetheless, pressure must be used carefully, and fingers should be shifted down and up until the pulse is sensed.
- **Using a sensor:** The optical power variation as light is reflected or absorbed in its whole route through the blood as the heartbeat changes are being used to measure heart rate.

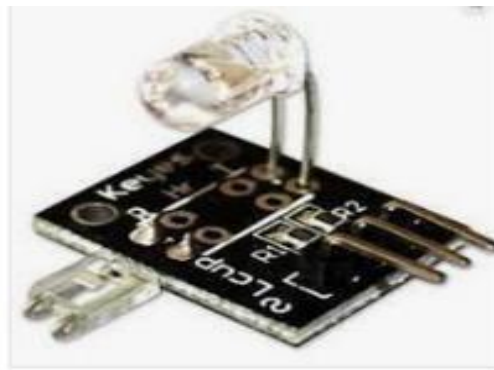


FIGURE 4.3
HEART BEAT SENSOR

The heartbeat sensor works based on basis of photoplethysmography. It monitors the change in blood volume via any organ of the body that results in a change in light intensity through such an organ (a vascular region). The duration of the pulse is especially significant in situations where the heart rate is also to be measured. The rate of heartbeats determines the flow of volume of blood, and because energy is reflected by blood, the signaling pulse is comparable to the heartbeat pulses. The applications of heartbeat sensor:

- Functions as a Digital Heart Rate Sensor
- Functions as a Heart Rate Monitoring System
- Functions as a Bio-Feedback Control System for Robotic Applications

Whenever the blood flows via the arteries, the finger becomes somewhat more opaque; as a result, less light reaches the detector from the LED. The detector signal varies with each heartbeat produced. An electrical pulse is generated from the varied detector signal. This electrical current is boosted and activated by an amplifier.

4.5.3 MEMS SENSOR

MEMS or Micro-Electro-Mechanical Systems is a small board as shown in figure 4.4, is a technology that may be characterized as miniature mechanical and electrical parts (i.e., devices and structures) that are created using micro fabrication processes. MEMS device key physical dimensions range from far below one micron on the lowest of the dimension spectrum to several millimeters on the high end. MEMS devices range in complexity from basic structures with no moving parts to very sophisticated electromechanical systems with several moving elements controlled by integrated microelectronics. The essential condition for MEMS is that at minimum some of the components have some type of mechanical functioning, regardless of whether or not they can move. In different regions of the globe, MEMS is referred to by different names.

They are often referred to as MEMS in the United States, but they are also known as "Microsystems Technology" or "micro machined devices" in other areas of the globe.

While the functional aspects of MEMS comprise tiny structures, sensors, actuators, and microelectronics, the most notable (and arguably most intriguing) parts are the micro sensors and micro actuators. Transducers, which include micro sensors and micro actuators, are described as devices that transform energy from one form to another. The gadget transforms a recorded mechanical signal to an electrical signal in the event of micro sensors.



FIGURE 4.4
MEMS SENSOR

4.5.4 GSM (GLOBAL SYSTEM FOR MOBILE COMMUNICATION)

GSM is a digitized mobile network commonly utilized by phone users in Europe and other areas of the world. GSM is the most extensively exploited of the three wireless mobile telephony technologies: time division multiple access (TDMA), code-division multiple access (CDMA) (CDMA), and GSM.

GSM serializes and compresses data before transmitting it together with two additional streams of user information, each in its time slot, via a channel. It works in the 900 MHz or 1,800 MHz frequency bands as shown in figure 4.5

GSM, along with other wireless mobile communications technology, is key to the development of wireless mobile telecommunications, which includes High-Speed Circuit-Switched Data (HSCSD), General Packet Radio Service (GPRS), Enhanced Data GSM Environment (EDGE), and Universal Mobile Telecommunications Provider (UMTS).

FUTURE OF GSM

GSM, along with some other technologies, is part of a wireless mobile telecommunications development that also includes,

- HSCSD is for High-Speed Circuit-Switched Data,
- GPRS stands for General Packet Radio System,
- EDGE stands for Enhanced Data GSM Environment, and
- UMTS stands for Universal Mobile Telecommunications Service.

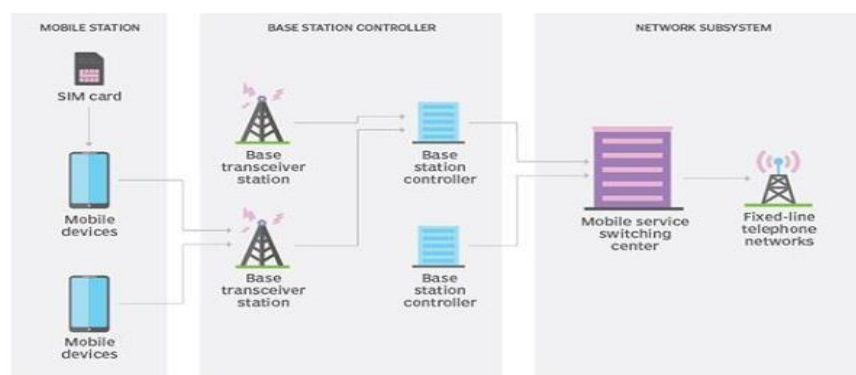


FIGURE 4.5
GSM

4.5.5 GPS

"Global Positioning System" is the abbreviation for "Global Positioning System." The Global Positioning System (GPS) is a satellite navigation system that determines an object's ground position. The United States military initially deployed GPS technology in the 1960s, and civilian adoption followed over the next few decades. Many commercial items, such as autos, cell phones, workout watches, and GPS Devices, now contain GPS receivers.

The GPS consists of 24 satellites floating in space around 12,000 miles (19,300 kilometers) above the surface. They orbit the earth every 12 hours at a speed of around 7,000 km (11,200kilometers per hour). The satellites are equally spaced, providing direct route access to four of them from everyone on the planet.

Each GPS satellite sends out a message with the spacecraft's present state, orbit, and precise time. A GPS receiver uses triangulation to estimate its exact position by combining signals from several satellites. To calculate a receiver's position, three satellites are necessary, while a link to satellites is optimal because it gives more precision.

4.5.6 SPEAKER

An electro acoustic transducer, or loudspeaker, is a device that transforms an electrical audio stream into sound. The dynamic speaker is the most common form of speaker. Before the signals are transmitted to the speaker, the sound source (e.g., a sound recorder or a microphone) should be enhanced or enhanced with only an audio power amplifier.

Individual speakers could be known as drivers, and the complete equipment is referred to as a loudspeaker in this instance. Tweeters are used to reproduce high audio frequencies, mid-range drivers are used to reproduce middle frequencies, and woofers are used to reproduce low audio frequencies. Separate subwoofers can reproduce extremely low frequencies (from 16 Hz to 100 Hz).

Radios, TVs, portable music players, computers, and electrical musical instruments all have smaller loudspeakers. Music, audio reinforcement in theater and concert venues, including public address systems all employ larger loudspeaker systems.



FIGURE 4.6
SPEAKER

As shown in figure 4.6 these are the external speakers are linked to a computer or other device to amplify (make louder) the sound, add bass with such a subwoofer or generate surround sound. You don't need external speakers if you've had a laptop, smart phone, and another device with built-in speakers unless you require louder noises, greater bass, or surround sound.

4.5.7 POWER SUPPLY UNIT

A power source (sometimes known as an electric supply unit or PSU) is equipment or system that provides electrical or other forms of energy to one or more output loads.

The phrase is most generally used to describe electrical energy sources, with mechanical energy sources being used less frequently and others being used extremely infrequently.

The transformer separates the power source from the power line by stepping down or up the input line voltage. The RECTIFIER component turns the alternating current signal into a pulsing direct current signal. However, as you progress through this chapter, you'll see that pulsing dc isn't a good idea. To convert pulsing dc to a refined, more desired type of dc voltage, a FILTER section is utilized.

The REGULATOR, the final part, accomplishes exactly what its name suggests. Regardless of substantial fluctuations in load current or input line voltages, it keeps the power supply's output constant. Let us just track an ac signal and through power supply that now you understand what each segment accomplishes. You must now examine how this signal is changed throughout each segment of the power supply. We saw how these modifications occur later in the chapter. The primary transformer receives a 115-volt input signal.

This transformer is a one-to-three turn ratio step-up transformer. The output of this transformer may be calculated by multiplying the voltage level by the ratio of primary to secondary turns; hence, the output voltage is $115 \text{ volts ac} \times 3 = 345 \text{ volts ac (peak-to-peak)}$.

The outputs of the rectifier would be one-half, or roughly 173 volts of pulsing dc because each diode in the rectifier portion conducts for 180 degrees of the 360-degree input. The filter portion, which consists of a network of resistors, capacitors, and inductors, regulates the rise and fall times of the changing signal, keeping it at a more consistent dc level. In the description of the actual filter circuits, you'll see the filtering process more clearly. The filter's output is a 110-volt dc signal with ac ripple. Later in this chapter, the cause for such lower voltage (average voltage) would be revealed. The regulator provides a consistent 110-volt dc output for electronic devices (more commonly called the load).

4.6 REQUIREMENTS FOR SOFTWARE:

- RASPBIAN STRETCH
- LX TERMINAL
- JASPER
- SPEECH TO TEXT ENGINE
- TEXT TO SPEECH ENGINE PYTHON

4.6.1 RASPBIAN OS

As shown in figure 4.7 Raspberry Pi OS (originally known as Raspbian) is an Ubuntu operating system for the Raspberry Pi. The Raspberry Pi Foundation has officially been released as the operating system for the Raspberry Pi line of small single-board computers since 2015. Mike Thompson as well as Peter Green produced the initial version of Raspbian as a side project. [5] The first phase of development was finished in June 2012.

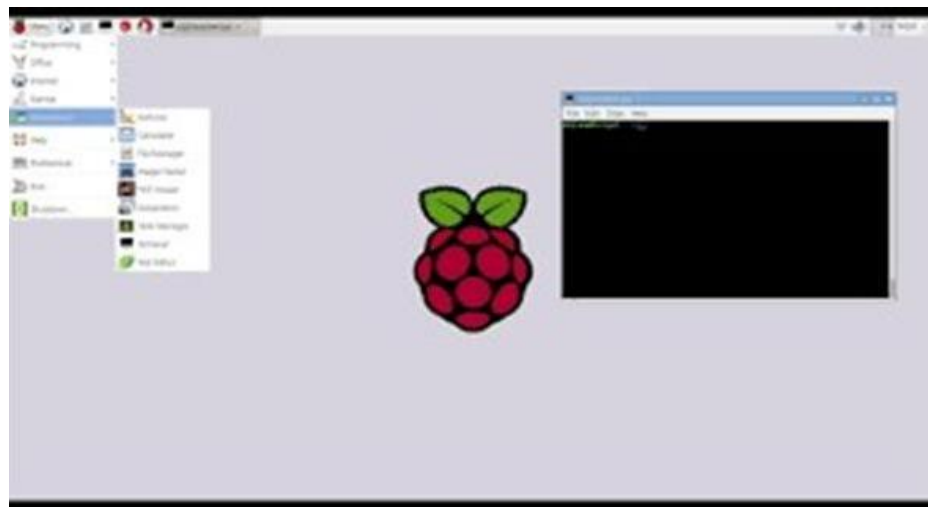


FIGURE 4.7
RASPBIAN OS

Raspberry Pi OS is designed specifically for the Raspberry Pi range of ARM-based single-board computers. Except for the Pico microcontroller, it operates on every Raspberry Pi. Raspberry Pi OS's desktop environment is a modified LXDE with the

Open Box stacking window manager and a unique style. The package includes a copy of the algebra application Wolfram Mathematica[4], as well as Mine craft: Pi Edition and a low-weight edition of the Chromium browser.

4.6.2 SPEECH RECOGNITION

The ability of an electronic device to interpret spoken words is referred to as speech recognition. A microphone records a person's voice, which is subsequently transformed into digital audio by the hardware. The audio data is then analyzed by software, which converts the sound into individual words. Voice-to-text "dictation" software, such as Dragon Naturally Speaking, is a common type of voice recognition that produces text as you speak. While voice recognition software may be purchased, modern Macintosh and Windows operating systems provide a built-in indicator. This functionality may be used to collect text and conduct basic system instructions. Some Windows programs feature speech recognition by default, while others do not. Select All Programs Accessories Ease of Access Windows Speech Recognition and click "Activate dictation everywhere" to enable speech recognition for all programs. In OSX, the "Dictation & Speech" system preference pane may be used to make dictating possible.

Simply check the "On" box next to Dictation to enable the speech-to-text capability. To begin dictating compatible applications, select Edit Start Dictation. To analyze and modify spoken commands in OSX, go to the "Accessibility" system option pane and choose "Speak able Items." Another type of voice recognition is interactive speech, which is used on mobile gadgets such as cell phones and tablets

This type of voice recognition is known as a natural user interface since it responds organically to your spoken input (or NUI). While some speech recognition software supports a variety of languages, many speech recognition systems only support English. This involves the creation of a separate dictionary with each language, as well as extra algorithms to detect and evaluate different accents. Some dictation systems, including Dragon NaturallySpeaking, may well be trained to identify your speech and develop over time to understand you better.

4.6.3 CNN (CONVOLUTIONAL NEURAL NETWORK)

CNN (convolutional neural network): CNN's are powerful image processing and artificial intelligence (AI) systems that use deep learning to do both generative and descriptive tasks. They often combine machine vision, recommender systems, and natural language processing (NLP). A neural network is a hardware and/or software program designed to mimic the way neurons in the human brain work. Conventional neural networks aren't built for image processing, thus images must be fed to them in smaller parts. CNN's "neurons" are more like in the frontal lobe, the area of the brain required to process visual inputs in humans and animals.

The challenge of piecemeal picture processing in traditional neural networks is avoided by organizing the layers of neurons in such a way that they span the entire visual system. A CNN uses technology that is comparable to a perceptron but is tailored for reduced processing requirements.

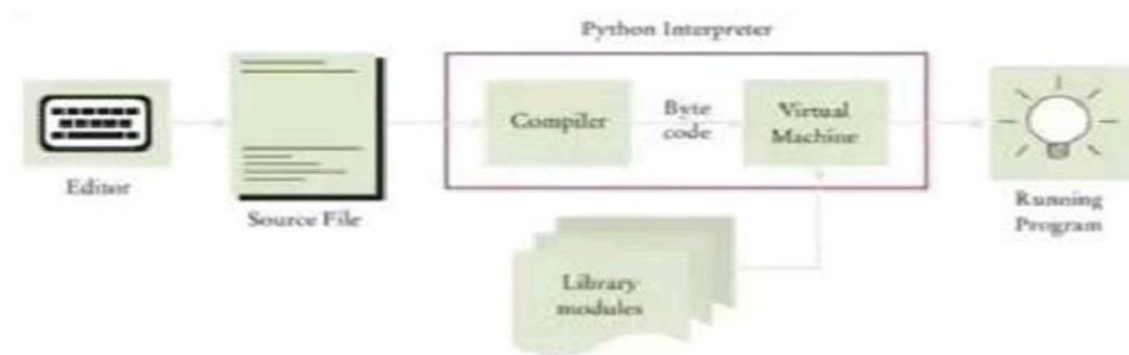
The CNN's layers consist of an input layer, an output layer, and hidden units with numerous convolution layers, max - pooling, fully-connected layers, and normalizing layers. The elimination of limitations and increased image analysis efficiency results in a system that is substantially more efficient and simple to train for the image plus language processing.

4.6.4 PYTHON

Python is a high-level, general-purpose language of programming that's also processed. Python, which was created by Guido van Rossum and initially released in 1991, has a design philosophy that emphasizes code readability by utilizing priorities extensive whitespace. It includes structures that allow for straightforward programming both in small and big sizes. Van Rossum headed the languages community until July 2018, when he stepped down as leader.

Python has a dynamic type system as well as automated memory allocation. It features a big and extensive standard library and supports several programming paradigms, such as object-oriented, imperative, functional, and procedural.

Python interpreters are capable of a wide variety of operating systems. CPython, the reference Python implementation, is open source software with a community-based development process, as are practically all of Python's alternative implementations. The Python Software Foundation, a non-profit organization, is in charge of Python and CPython.



An IDE (or Integrated Development Environment) is a software development application. IDEs, as the name indicates, combine several tools that are specially built for software development.

These tools usually include:

- An editor that is built to deal with code (with, for example, syntax highlighting and auto-completion)
- Tools for development, execution, and debugging
- Some for source control

Most IDEs support a wide range of programming languages and offer a wealth

of additional functionality. As a result, they may be huge and take a long time to download and install. You may also need advanced knowledge to use them properly.

CHAPTER-5

RESULT AND DISCUSSION

5.1 DISCUSSION

The output of this system is given below with the pictures. The hardware setup of the system in the given **FIGURE 5.1** consists of a power supply unit a step-down transformer of 220V, a speaker with the playback module, a GSM module, a GPS module, Heartbeat sensor, MEMS sensor, A/D converter, Raspberry Pi and serial USB ports.

HARDWARE CONNECTION DISCUSSION:

- As shown in figure 5.1, The system uses a 220V step-down transformer that is given to the power supply module that converts AC to DC and provides 12V and 5V required for the device to run.
- Since there is a requirement for more number of pins we use the distributor module, from the supply distributor all is sensors are connected to 5V and the relay, GSM is connected to 12V.
- The sensors connected are Pulse sensor, MEMS that uses the I2C protocol.
- A separate 3V supply is connected for the switch and the A/D converter.
- A/D converter is used since the Raspberry Pi does not have an in-built A/D converted.
- Two relays are used for the Tear gas and the shock generator. Here, the actual tear gas and the shock generator are not being used instead a motor is being used in the place of tear gas and a 12V supply is used in the place of the shock generator.

- When the controller triggers the relay the shock generator and the tear gas will get activated.
- A GSM module to send messages to the registered number and a GPS is used to monitor the location.
- A voice playback module with the recorded voice “ Somebody please help me” is used to alert the people through a speaker who are closer to the victim.
- Keyboard, Display, mouse are connected to the Raspberry Pi.

5.2 HARDWARE

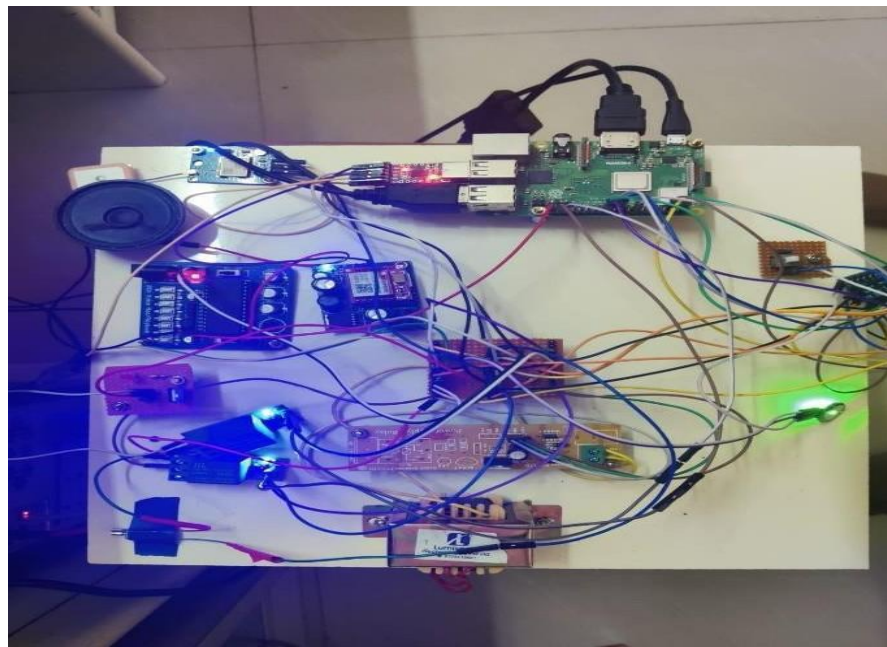


FIGURE 5.1
HARDWARE

SOFTWARE DISCUSSION:

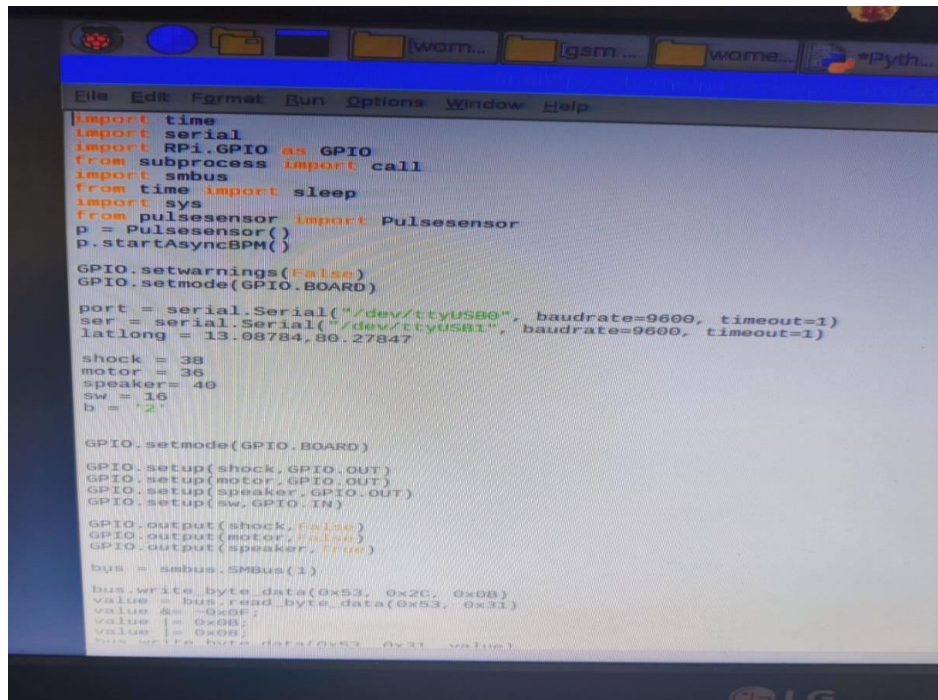


FIGURE 5.2
SOFTWARE LIBRARIES

As shown in figure 5.2, the software part of the device that shows the necessary libraries required for the code is included and the input and output ports are mentioned along with the current state of the speaker, shock generator and tear gas. Initially everything is in OFF state.

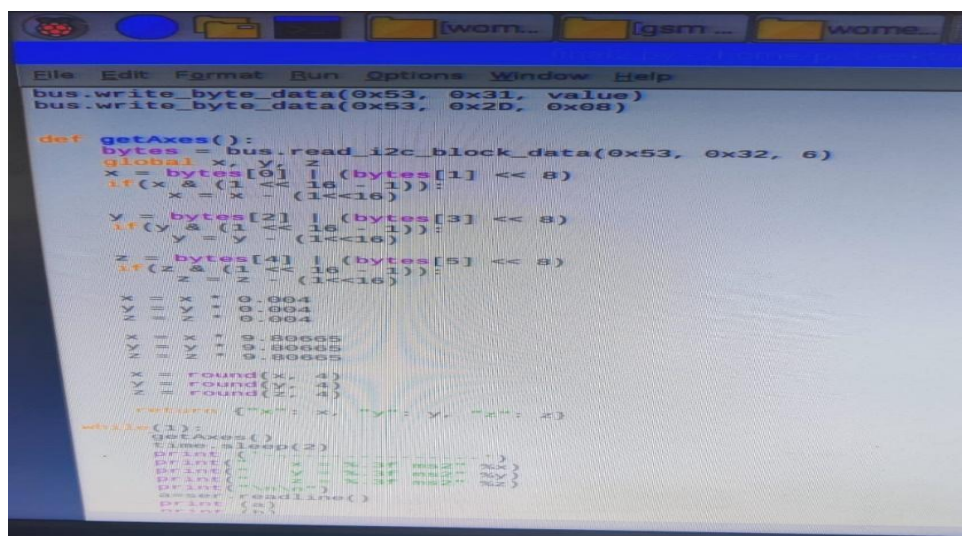
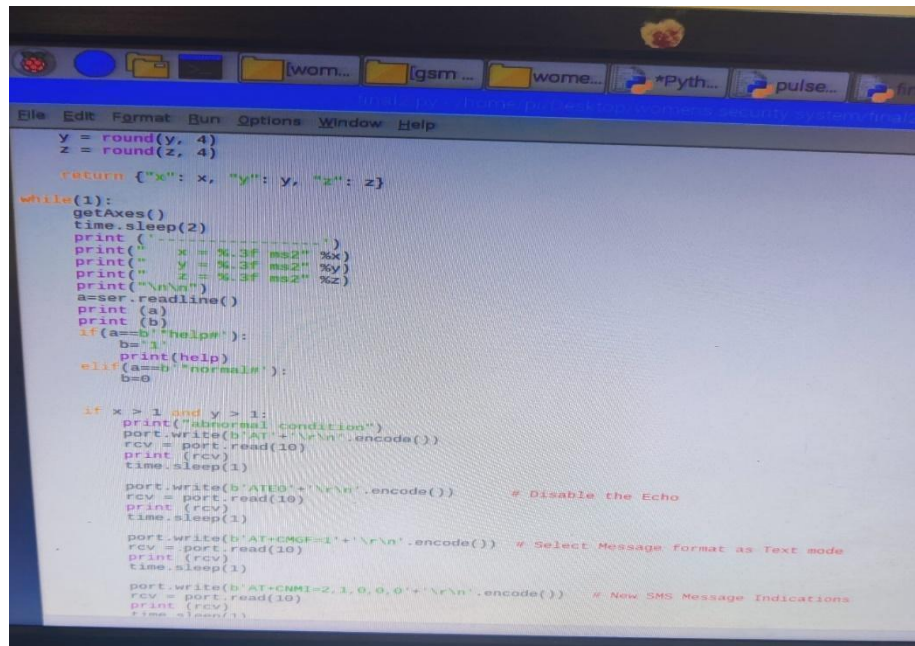


FIGURE 5.3 THE CONDITIONS OF MEMS SENSOR

In figure 5.3, the conditions for the MEMS sensor is mentioned. Since the

motion of the victim is continuously monitored, when the value of the MEMS is around '0' it is considered as normal state and does not send any alert. But, in case of emergency situation the range of the MEMS exceeds '0'.

A screenshot of a computer screen displaying a Python script in a text editor. The script is designed for voice recognition and monitoring. It starts with a function that rounds values y and z to 4 decimal places and returns a dictionary with x, y, and z. A while loop (labeled 'while(1):') contains the main logic. It calls 'getAxes()' and 'time.sleep(2)'. Then it prints the values of x, y, and z in a formatted string. It reads a line from a serial port ('a=ser.readline()') and prints it. An if-elif statement checks if the received string is 'help' or 'normal'. If 'help' is received, it prints 'help'. If 'normal' is received, it sets a variable 'b' to 0. Another if statement checks if x is greater than 1 and y is greater than 1. If true, it prints 'Abnormal condition', writes an AT command to the port, reads the response, and prints it. It then writes another AT command to disable echo, reads the response, and prints it. Next, it writes an AT command to select text mode, reads the response, and prints it. Finally, it writes an AT command for new SMS message indications, reads the response, and prints it. The script uses 'time.sleep(1)' between several steps. The text editor has a menu bar with 'File', 'Edit', 'Format', 'Run', 'Options', 'Window', and 'Help'. The top of the window shows several open files: '[worn...', '[gsm...', 'worne...', '*Pyth...', 'pulse...', and 'fin...'.

```
File Edit Format Run Options Window Help
y = round(y, 4)
z = round(z, 4)

return {"x": x, "y": y, "z": z}

while(1):
    getAxes()
    time.sleep(2)
    print ( "-----")
    print(" x = %.3f ms2" %x)
    print(" y = %.3f ms2" %y)
    print(" z = %.3f ms2" %z)
    print("\n\n")
    a=ser.readline()
    print (a)
    print (b)
    if(a==b"help"):
        b="1"
        print(help)
    elif(a==b"normal"):
        b=0

    if x > 1 and y > 1:
        print("Abnormal condition")
        port.write(b'AT'+'\r\n'.encode())
        rcv = port.read(10)
        print (rcv)
        time.sleep(1)

        port.write(b'ATE0'+'\r\n'.encode()) # Disable the Echo
        rcv = port.read(10)
        print (rcv)
        time.sleep(1)

        port.write(b'AT+CMGF=1'+'\r\n'.encode()) # Select Message format as Text mode
        rcv = port.read(10)
        print (rcv)
        time.sleep(1)

        port.write(b'AT+CNMI=2,1,0,0,0'+'\r\n'.encode()) # New SMS Message Indications
        rcv = port.read(10)
        print (rcv)
        time.sleep(1)
```

FIGURE 5.4
VOICE RECOGNITION PART

Figure 5.4 shows the voice recognition part, when the word “HELP” is used by the victim, an alert message “ Abnormal” is sent to the registered number along with which the pulse rate is also monitored.

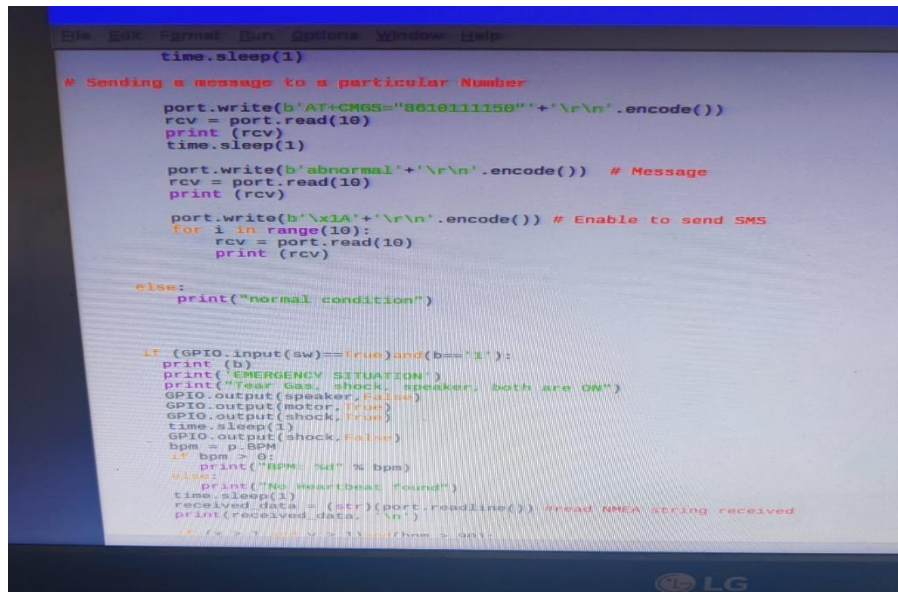


FIGURE 5.5
CODE FOR SENDING MESSAGE

Figure 5.5 shows the code for sending a message to the particular registered number.

Here, when there is no emergency situation the tear gas, speaker and the shock generator are in OFF state. In case of emergency situation and “SOS” along with the longitude and latitude is sent to the registered number and the tear gas, speaker and the shock generator gets activated automatically when the “HELP” word is used.

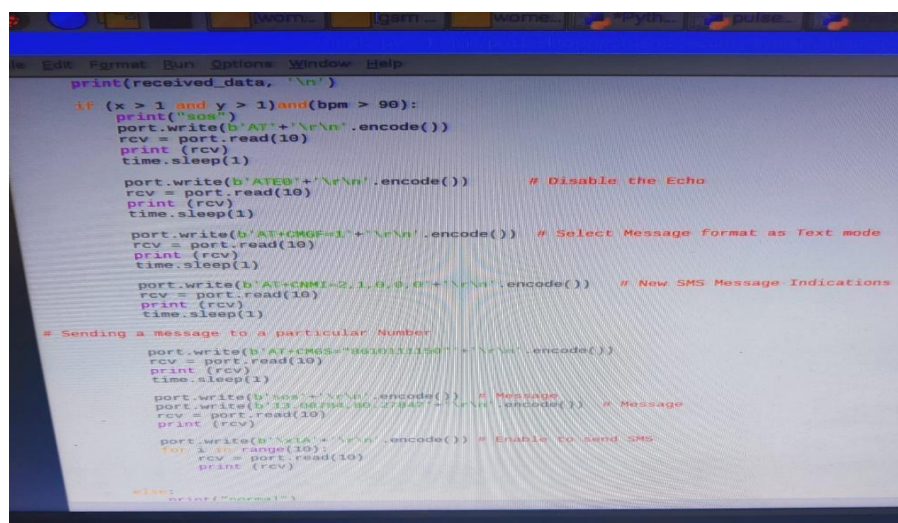
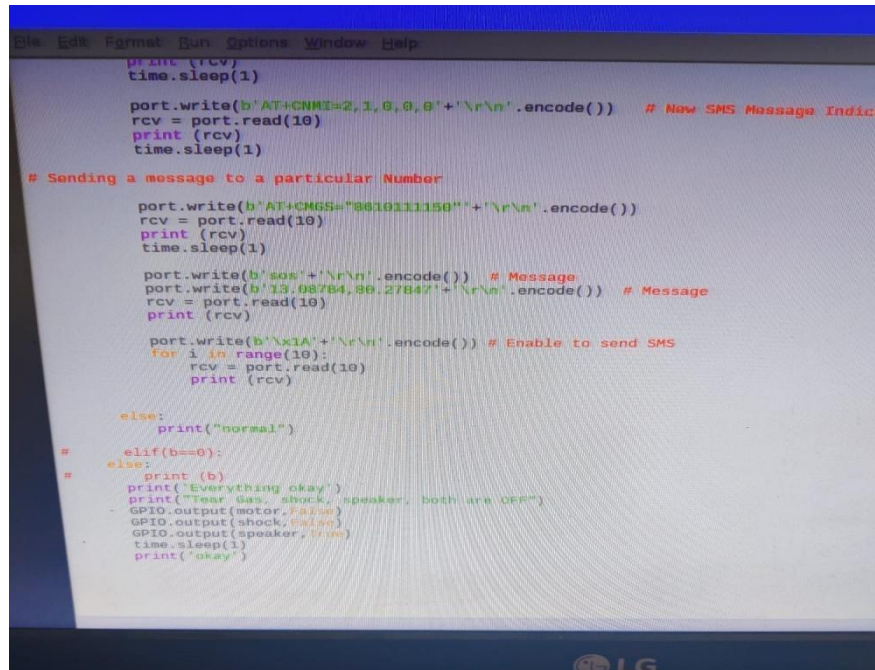


FIGURE 5.6
GPS PART AND THE CODE FOR SENDING LOCATION

Figure 5.6 shows the GPS part and the code for sending the location of the victim to the registered mobile number.



```

File Edit Format Run Options Window Help
print (rcv)
time.sleep(1)

port.write(b'AT+CHMI=2,1,0,0,0'+'\r\n'.encode()) # New SMS Message Indica
rcv = port.read(10)
print (rcv)
time.sleep(1)

# Sending a message to a particular Number

port.write(b'AT+CMGS="9610111150"+'\r\n'.encode())
rcv = port.read(10)
print (rcv)
time.sleep(1)

port.write(b'sos'+'\r\n'.encode()) # Message
port.write(b'13.08784,80.27847'+'\r\n'.encode()) # Message
rcv = port.read(10)
print (rcv)

port.write(b'\x1A'+'\r\n'.encode()) # Enable to send SMS
for i in range(10):
    rcv = port.read(10)
    print (rcv)

else:
    print("normal")

# elif(b==0):
# else:
#     print(b)
#     print('Everything okay')
#     print("Tear Gas, shock, speaker, both are OFF")
#     GPIO.output(motor, False)
#     GPIO.output(shock, False)
#     GPIO.output(speaker, True)
#     time.sleep(1)
#     print('okay')

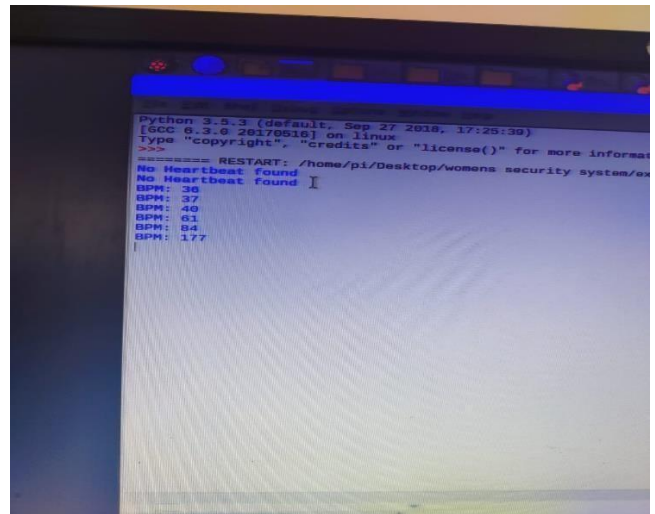
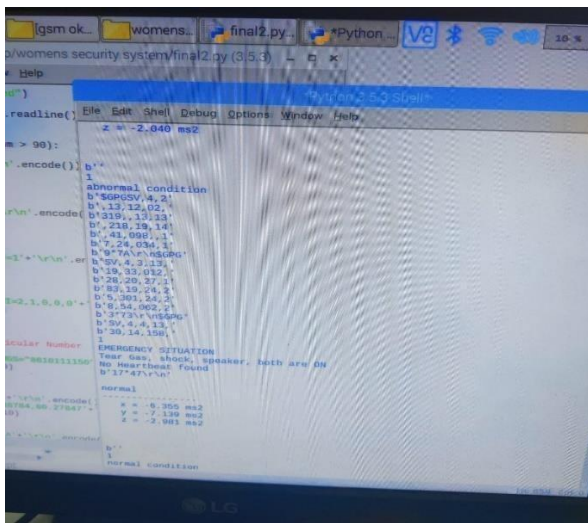
```

FIGURE 5.7
MONITOR(HEART RATE OF THE PERSON)

If everything is normal, the device sends “ Everything Okay” to the registered number and the shock generator, speaker and the tear gas are in OFF state.

CASE 1:

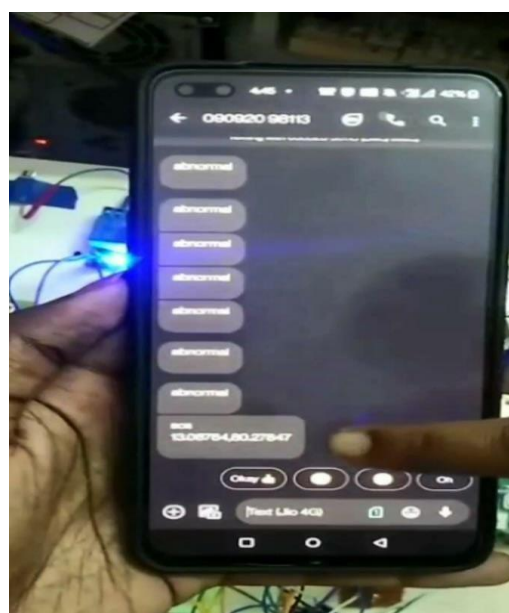
When the women using this device is in danger, she has to turn on the emergency switch in the device and use the wake up word “Help”. When the raspberry receives the wake up word given by the user it analyzes the word by comparing it with the predefined words in the library through CNN method and the necessary action will be taken by the device. The device also continuously monitors the motion of the person which considers as an emergency situation when the range of the MEMS sensor exceeds the given limit and shows “Abnormal condition” and also checks the Heart rate of the person and displays on the monitors, as shown below in **FIGURE 5.7**.



OUTPUT FROM MONITOR FIGURE 5.8

CASE 2:

As shown in **FIGURE 5.9** a message “Abnormal” and “SOS” along with the latitude and longitude from the person’s device is sent to the concerned Authority. In the mean time as soon as the wake up word is given to the device it turns ON the tear gas and the shock generator for immediate self defense so that it could given her the time to escape from the person within the time the necessary authorities reach out to her.



OUTPUT FROM MOBILE FIGURE 5.9

Here in this device since it is the prototype we are just using a motor instead of the actual tear gas and a 12v supply instead of the actual shock generator just to show the working of this prototype.

This device constantly keeps monitoring the person's motion through the MEMS sensor in order to monitor the motion so when an abnormality in the motion is found, the device immediately checks for the person's heart rate.

5.3 RESULT

The proposed system can clearly identify the situation of the person as it continuously keeps monitoring the motion of the person, and detect an emergency situation and send alert message to required authority when the wake up word is detected using voice recognition and it responds accordingly in the emergency situation by taking necessary actions against the attacker so that she could escape from the place or keep herself safe for a little while until the concerned authorities come to rescue her. This system also ensures that it does not affect the person's privacy.

- The motion and pulse will be monitored continuously by the device.
- When the woman is in an emergency situation, she can hit the emergency switch on the device.
- Immediately an alert message "Abnormal" will be sent to the registered number.
- Once the "HELP" word is communicated to the device, the speaker turns ON to alert the people around her.
- The "SOS" message along with the location will be sent to the registered number.
- The registered number can contact the police and immediately arrive at the location.
- Until the registered person arrives to save her, she can protect herself using the tear gas and the shock generator for the time being.
- This project aims for vanishing the harassments against women to some extent.

ADVANTAGES:

- Handy and portable
- Easy to use
- Responds fast
- Environment friendly

CHAPTER-6

CONCLUSION AND FUTURE SCOPE

6.1 CONCLUSION

In today's world the crime against women has increased drastically as technology has upgraded the crime against women has also gone up high. Here we can use the same technology to protect women and keep themselves safe from a critical situation and protect themselves from Harassments, sexual abuse and violence. Women can not always be in the fear of getting into trouble and can not always depend on someone to protect them, so the device can give them an immediate protect where they can defend themselves using the tear gas and the shock generator in the system until the concerned authority come to help them. This device can understand the situation better and protect women from danger to an extent. This system can provide help and care to women without disturbing their privacy and it can keep them safe and women can go out any time without any fear.

6.2 FUTURE SCOPE

- This system can provide immediate safety against the attacker.
- Speech recognition makes it more effective and efficient to tell the device to take immediate action.
- It can be used both manually and automatically.

- A switch is used in this device so that the "help" word we use in the normal conversation will not be misunderstood with the Emergency situation "help" word that is used as the wake up word. The switch can be turned ON in case of an emergency.
- Sends and SOS alert and the location of the victim in trouble
- Easy to use.

The Machine Learning technique can be used to train a person's voice and recognize that person's voice and provide immediate protection. It can be hard for the concerned authorities to reach the location sent by the GPS so to overcome this the development of an application like google maps and the willing people can register their place, so when on time GPS location is shared to the nearby registered person they can come for the immediate rescue or fast rescue action can be taken. These can be encouraged by provided rewards.

Further the data base can be collected from various users and the level of threat in each region can be monitored by the police and the app created should also be able to show the level of threat in each area and provide safest navigation route for traveling.

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