SMART GADGET FOR WOMEN SAFETY USING IoT

Carried out by

Mr. MOHAMAD ZIKRIYA
Mr. PARMESHWAR M G
Mr. SHANMUKAYYA R MATH
Ms. SHRADDHA TANKASALI

Guided by
Dr. JAYASHREE D MALLAPUR

**DEPARTMENT OF ELECTRONICS AND
COMMUNICATION ENGINEERING**

**BASAVESHWARA ENGINEERING COLLEGE,
BAGALKOT**

Abstract

As we know the present era is with equal rights, where in both men and women are taking equal responsibility in their respective works. Hence women are giving equal competition next to men in all fields, they are assigned works in both the even and odd shift. Every single day women and young girls from all walks of life are being assaulted, molested, and raped. The streets, public transport, public spaces in particular have become the territory of the hunters'.

Because of these reasons women can't step out of their house. The only thought haunting in every women`s mind is when they will be able to move freely on the streets even in odd hours without worrying about their security. In critical situations the women will not feel insecure or helpless if they have some kind of safety device with them.

We propose to have a device which is the integration of multiple devices, hardware comprises of a wearable "Smart gadget" which continuously communicates with Smart phone that has access to the internet. The complete gadget also ensures to provide self-defence application which helps her to escape critical situations. This system can be used at places like bus stops, railway stations, offices, footpaths, shopping malls, markets, etc.

The implementation of the smart gadget is basically split into two sections the first part ensures to capture the image of the Culprit the device get automatically triggered when there is a suspected motion in front of the camera, the device captures the image of the culprit and send it as an attachment to the concerned E-mail Id along with the location of the Victim. The captured image serves as the valid proof against the one who has committed the crime.

The second section deals with defence application as we tend concentrate more on providing self-defence for the women in danger. By making self-defence as the first priority we make sure that occurrence of the critical situations are eliminated. The self-defence feature is capable of working in any of the circumstances either it may be with Internet as a Smart Pendant with LED flash that makes an alert call to the family, relatives via the cloud and also glows the led flash on the eyes of the culprit to make the vision blur when the attacker is at the shorter distance. Whereas Self-defence without Internet consists of Electric shock gloves, that is used to provide the electric shocks that diverts the mind of the culprit and reduce his excited state to commit the crime on women. These two factors form the combined self-defence application and helps the victim to escape from the danger

ACKNOWLEDGEMENT

We wholeheartedly thank **Dr. J.D Mallapur**, Professor of Electronics and Communication for her active encouragement and enthusiastic guidance in completion of this project work. We remain indebted to her for this valuable suggestion regarding this project work.

We express our deep sense of gratitude to our beloved HOD**, Dr. P. N. Kulkarni**, for providing an incommensurable opportunity and facilities in the department.

We wish to thank Principal **Dr. R. N. Herkal** for providing us support for the project.

We wish to place on record our wholehearted gratitude to all the faculty members and all the other staff members of Department of Electronics and Communication Engineering, Basaveshwar Engineering College, Bagalkot for providing all the required facilities for the completion of this work.

On a personal note, we wish to avail this opportunity to express our deep sense of heartfelt gratitude and in debtness to our family, friends and well-wishers without their inspiration, affection, blessings and constant encouragement this work could have not seen the light of the day.

CONTENTS

Chapter 1

INTRODUCTION TO WOMEN SAFETY

Women are the backbone of any economy primarily shaping future of the country. She who earlier stayed at home to attend her domestic duties is now maintaining work and home simultaneously, participating in the process of economic development on an equal footing with men.

The Government of India, meeting a longstanding demand for gender parity in the workforce, has approved an amendment in The Factories Act 1948 to allow women employees to work in nightshifts. The amendment suggests that nightshift for women shall be allowed only if the employer ensures safety, adequate safeguards in the factory as regards occupational safety and health, equal opportunity for women workers, adequate protection of their dignity, honour and transportation from the factory premises to the nearest point of their residence are met.

Nightshifts have been in existence for a long time, however for India it was only recently through an amendment to the Factories Act 1948 that it was allowed under the law for women to work nightshifts. Women are participating in almost all the spheres of economic activity. From village to city, we can see number of women workers and entrepreneurs contributing towards the national income of the country. Garment units already employ 60% of women workforce; and with growth in this industry the number this will go up tremendously. So far, the IT sector were employing women for late-night work hours but had no legal obligation to provide the above safety measures.

There is no denying the fact that women in India have made a considerable progress in almost seven decades of Independence, but they still have to struggle against many handicaps and social evils in the male-dominated society. Many evil and masculine forces still prevail in the modern Indian society that resists the forward march of its women folk.

With the onset of IT&BT industry, women work in night shifts. It is the responsibility of the firm to provide office transportation to such employees. Now a days even though the companies provide the facilities for transportation, but the security of the women is not fully ensured as one of the incident occurred in the year 2007 at Pune where a girl working in the call centre was brutally raped by two of her cab drivers assigned by the company, not only this we have come across many of the same incidents in the recent times where the safety of the women cannot be

fully ensured with the cab facilities provided by the companies.
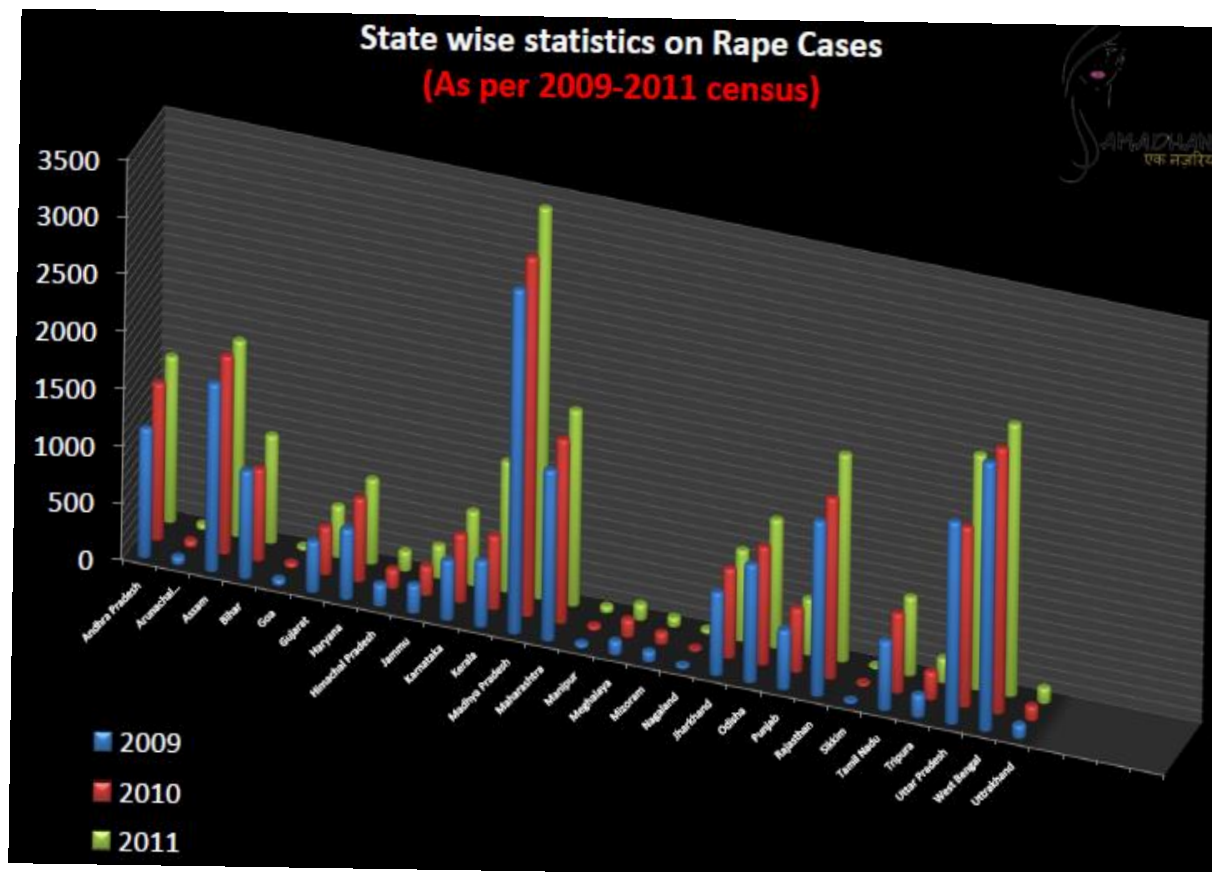
The only solution to the problem can be taken in a such a way that, women should be assigned with a safety gadget that is portable and ensures her safety. Our project focuses on providing a Smart gadget based on IoT solutions that not only helps to woman escape the critical situations but also ensures to provide justice to the women by capturing the image of the culprit if in case any harassment occurs .
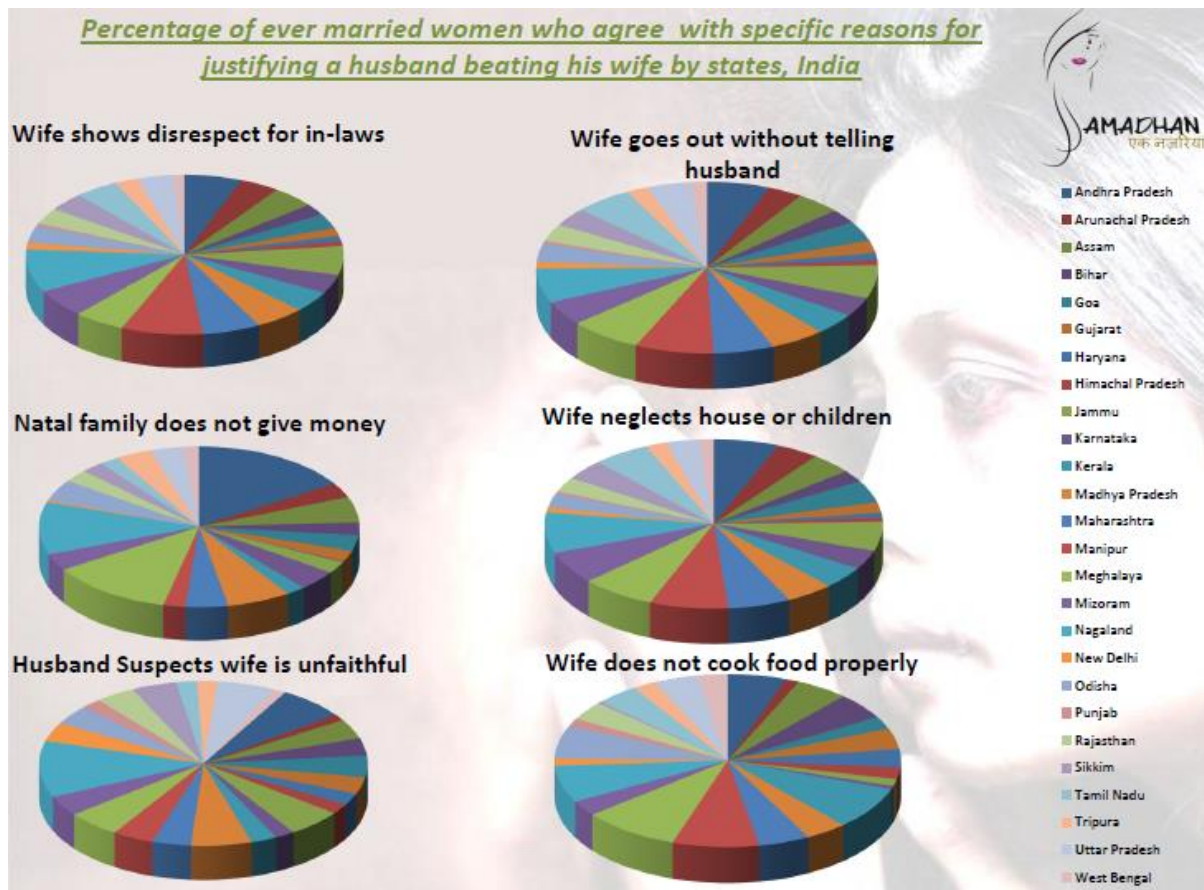
Swami Vivekananda, one of the greatest sons of India, quoted that, "***There is no chance for the welfare of the world unless the condition of women is improved, It is not possible for a bird to fly on only one wing.*** " Therefore, the inclusion of "Women Empowerment' as one of the prime goals in the eight Millennium Development Goals underscores the relevance of this fact. Thus, in order to achieve the status of a developed country, India needs to transform its women force into an effective human resource and this is possible only through the empowerment of women.

1.1 WHY SOCIETY NEED WOMEN SAFETY!!

- About 10% of all the crimes committed in the country are those of women abuse.

- Women make up two-thirds of the estimated 876 million adults worldwide who cannot read or write

- 30 lakh girl children were lost to female infanticide during 2001-2011.

- A woman is raped every 20 minutes in India.

- After 60 years of independence, 1 in 3 women in India are still illiterate.

- Only 39.5% women in India are economically active, compared to 80% in China.

- Of the 1.3 billion people who live in absolute poverty around the globe, 70 percent are women.

- 10.9% of the female population owns land, and among agricultural workers the figure drops down to 9.3%.

- Less than 40% of women give birth in a health facility.

1.1.1 Domestic Violence

➢ One in three ever married women report having been slapped by their husband.

➢ Between 12 and 15 % report having their arms twisted, being pushed, shaken, kicked, dragged, or beaten up, or having something thrown at them.

➢ 10% report that their husbands have physically forced them to have sex.

➢ Around two-third of married women in India were victims of domestic violence and one incident of violence translates into women losing seven working days in the country.

➢ One in seven ever married women have suffered physical injuries as a result of spousal violence.

➢ For most women who have ever experienced spousal violence, the violence first occurred within the first two years of their marriage.

Percentage of ever married women who agree with specific reasons for justifying a husband beating his wife by states, India

Wife shows disrespect for in-laws

Wife goes out without telling husband

Natal family does not give money

Wife neglects house or children

Husband Suspects wife is unfaithful

Wife does not cook food properly

AMADHAN
एक नज़रिया.

- Andhra Pradesh
- Arunachal Pradesh
- Assam
- Bihar
- Goa
- Gujarat
- Haryana
- Himachal Pradesh
- Jammu
- Karnataka
- Kerala
- Madhya Pradesh
- Maharashtra
- Manipur
- Meghalaya
- Mizoram
- Nagaland
- New Delhi
- Odisha
- Punjab
- Rajasthan
- Sikkim
- Tamil Nadu
- Tripura
- Uttar Pradesh
- West Bengal

1.1.2 Female Foeticide

- ➢ Every year one in 25 female foetuses are aborted.
- ➢ There are only 762 girls for 1000 boys, and one in every four girls are aborted.
- ➢ There are instances of women getting pregnant 11 times in a matter of years just to have a boy.
- ➢ It is estimated that more than 10 million female foetuses have been illegally aborted in India.
- ➢ 30 lakh girl children were lost to female infanticide during 2001- 2011.

1.2 Major Issues faced by women in working environment

We can't deny the fact that the role of women in society has been radically changed in the past few decades. From running a jet plane, teaching kids to serving as admin head or company executive, women are seen playing each role with aplomb. They are not only cherishing their fulfilling careers, but also some of them are outrunning men. Despite these incredible advances, women still have to face a lot of work issues and professional challenges at workplace.

Some of the problems and challenges faced by working women in the workplace are as follows:

1. Balancing between paid employment and family care.
2. Work related stress problems faced by working women.
3. Victims of physical harassment and unfair treatment in the workplace.
4. Tolerance of abuse, violence, harassment and discrimination.
5. Sexual harassment, mental pressure and safety problems.
6. Prejudiced and stereotyped thinking faced by working women.

Steps and corrective measures are being taken up by management and employers to provide female employers with a better workplace by eliminating gender discrimination and biasness from offices. The number of working women is increasing day by day but still there are certain women issues and barriers that they have to come across and tackle at workplace.

1.2.1 Harassment:

Women are still considered as easy target by their fellow male colleagues. Women are much vulnerable so higher management and even colleagues harass them by cracking obscene jokes, passing derogatory comment or trying to touch their private parts etc. In such cases, most of the women remain silent and try to ignore them in fear of losing job. Even some of them prefer to quit job as they believe lodging a complaint against the culprits will not help them anyway. In most of the cases the higher authority or management doesn't support the victim. Laws are there to protect working women against sexual harassment but only if complaints are lodged

1.2.2 Negative attitudes of male co-workers:

In most of the cases working women feel humiliated with the attitude and derogatory remarks passed by their male colleagues. It is believed by most the men that women are hired only to add glamour and colour to the office environment. This kind of unhealthy work atmosphere, lack of support from

colleagues and higher authority leads to job dissatisfaction and less productivity for women. Higher management should take some steps to create a healthy and conducive work environment for ladies.

1.2.3 Lower pay-scale:

Women are paid less because management has a preset notion that she will leave the job after having children or marriage. While harassment, bullying etc. are vivid acts in offices, lower pay scale is something that kills the confidence of a female employee from inside. It is a silent crime and no one can compliant about it. Women should be vocal about their right, remaining silent means that you are also supporting this shameful act. Employers should ensure that equal wages are paid to women employees without gender discrimination.

1.2.4 Safety and Security:

Women employees are not safe in office, not even in transports. Incidents of rape and sexual assault in office cab are making headlines everyday on newspapers. Women have been the victims of sexual harassments by the male colleagues or driver. This needs to be stop and for this higher authority must take necessary steps.

Some Recommended Solutions

1. Partners can be more sensitive to women's needs, and counter tradition by helping their Wives perform daily tasks and take care of children.
2. Organisations should have an internal code to ensure security of women employees and Take measures to ensure that they discharge their job in a secure atmosphere.
3. Governments should make it mandatory for companies to install Global Positioning System (GPS) in vehicles carrying women, in all industries which engage women in night Shifts.
4. Providing self-defence training to women; installing safety devices and CCTVs at the Work place; undertaking police verification of cab drivers, security guards etc.
5. Child care facilities and Child care leave for working women should be provided by every organisation.
6. Flexible timing and Possibility to work from home are required for working women.

Chapter 2

EXISTING TECHNOLOGIES FOR WOMEN SECURITY

The status of women in India has gone through many great changes over the past few thousand years. From equal status with men in ancient times through the low points of the medieval period to the promotion of equal rights by many reformers, the history of women in India has been eventful.

In modern India, women have adorned high offices in India including that of the President, Prime Minister, Leader of the Opposition and Speaker of the Lok Sabah. However, women in India continue to face social challenges and are often victims of abuse and violent crimes and, according to a global poll conducted by Thomson Reuters, India is the "fourth most dangerous country" in the world for women, and the worst country for women among the G20 [A group of developing industrial Nations established on 20th August 2003] countries.

In India, every day more than 30 women were murdered and many are suffering austere mental and physical trauma. Having this concern in mind many developers have come up with creative applications. Some of such applications are:

2.1 She (Society Harnessing Equipment)

It is a garment embedded with an electronic device. This garment has an electric circuit that can generate 3800kV which can help the victim to escape. The garment delivers an electric shock to attackers strong enough to cause severe burns, protecting the victim from any of the electricity.

The development of the garment was made with the capabilities of providing the electric shock when it is squeezed forcefully, so sharing a hug or embrace wouldn't be enough to trigger the voltage.
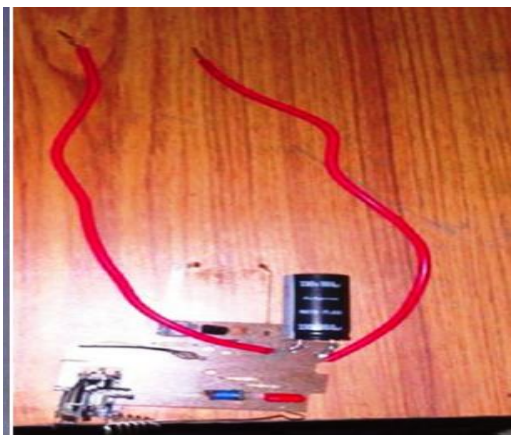
2.2 ILA Security

The co-founders of this system, have designed three personal alarms that can shock and disorient potential attackers and hence safeguard the victim from perilous situations.

2.3 Aeshs (Advanced Electronics System for Human Safety)

Advanced electronics system can be developed that can detect the location and health condition of person, will enable us to take action accordingly. The project will be developed that can detect the location and health condition of a person using electronic gadgets like GPS receiver, GSM, pulse rate sensor, body temperature sensor. The Advanced Electronic System for Human Safety (AESHS) maintains real-time status of all unit elements in the tactical combat zone. The GPS based end-unit is carried by person is connected via Wrist unit to other network sharing units. Implementation of the AESHS can be realized as part of the human monitoring and alarm system (MAS) to provide automatic tracking, monitoring and reporting of individual person.

1. Control unit-
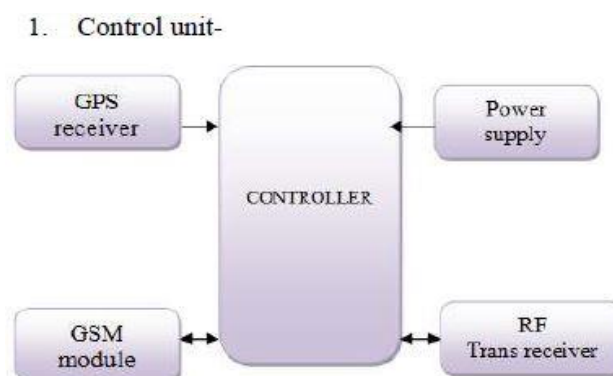
Fig .1: CONTROL UNIT
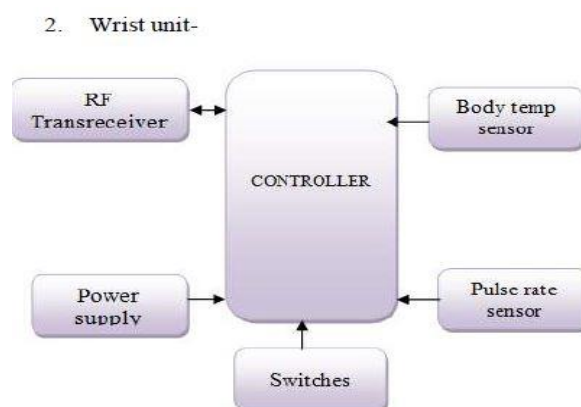
2. Wrist unit-

Fig .2: WRIST UNIT

3. Base station unit-

Fig .3: BASE STATION UNIT

2.4 VithU App

VithU, is an emergency App that, at the click of the power button of your smartphone 2 times consecutively begins sending out alert messages every 2 minutes to your contacts that you feed into the app as the designated receivers or guardians. The message says "I am in danger. I need help. Please follow my location." The receiver will receive a link to your location every 2 minutes giving them your updated location. Also, you will get updates on the Crime Scene in India and a "Tips Feed" option exclusively giving you safety tips in an emergency situation. This is an emergency app initiated by a popular Indian crime television series "Gumrah" aired on Channel

2.5 Smart Belt

This system is designed with a portable device which resembles a normal belt. It consists of Arduino Board, screaming alarm and pressure sensors. When the threshold of the pressure sensor crosses, the device will be activated automatically. The screaming alarm unit will be activated and send sirens asking help

Chapter 3

OUR EXPECTED SOLUTIONS FOR WOMEN SAFETY

India is a country of peace-loving and law-abiding citizens. It is a safe destination for domestic and international tourists. However, like any other civil society, there are aberrations, and a few persons break the law now and then. In recent past, a few isolated incidents have been reported in India in which women were sexually assaulted.

There have been many cases where cab drivers, taxi drivers or auto rickshaw drivers and other people have harassed, molested, raped or tried to kidnap the women in the day today life. Many women are afraid to be alone in work places and even in public places due to fear of being harmed. This fear has been caused by repeated cases of violence towards women.

3.1 Drawbacks of the existing systems:

1. The systems are bulky and are not portable where in these cannot be carried easily anywhere, any time
2. Requires more hardware, which in turn increases the implementation cost.
3. The systems doesn't provide a complete kit solution to the existing problem
4. As we can see above the entire systems are separated with each other and lack the feature of one stop solution to problem of women safety
5. The main drawback of the applications and services is that the initial action has to be triggered by the victim which often in situation like these doesn't happen. So the emphasis is to build a solution that works autonomously in situations encountered.

Also these existing technologies are not one stop solution to the existing problem. Our project presents design and implementation of women safety system which will ensure women safety by providing the one stop solution using IoT.

3.2 Existing women problem

➢ Women are the subject of exploitation inside and outside the home say whether on roads, trains, cabs, schools etc.
➢ Women occupy almost half the globe. But their survival has always been a question, when it comes to existence with honour and dignity.
➢ Women's empowerment in the country can be brought once their safety and security is ensure, either it may be at home, publics places or during travelling.

3.3 Solution to the problem:

The level of security can be increased more by electronics assistance device having portability that can be carried anywhere, which can track the location of women , captures the image of culprit and makes the alert call to the registered family numbers in times of danger

The electronic gadget (project) is implemented using Internet of Things (IoT) gadget will be used in the public places such as malls, bus stands, offices etc. The description of the hardware's and the software tool required for making the women safer is given in the further topics

The major reference of our project is taken form the paper entitled as "Smart Security Solution for Women based on Internet of Things (IOT)" published (ICEEOT) 2016, the paper proposed has the major drawbacks as follows:

- Not providing the defence application for the women to escape the critical situation
- And also the proposed system lacks the feature capturing image of the culprit

Our project mainly focuses on providing the tolerable electric shock to culprit that reduces the exited state and help women to escape the critical situation, we also tend to implement the device that is triggered without any manual aid e that provides safety for women in public places transport vehicles such as cabs, taxi, bus, auto rickshaw and working places.

3.4 Objectives of project

The project aims to provide low cost IoT based solutions for women safety which includes:

- Image capturing of culprit, this helps to find the culprit and also serves as valid proof to make culprit guilty in the Indian Judicial courts
- Making alert call via cloud (Twilio) to family alerting woman is in danger
- Locating the position of women under danger
- Electric shock gadget for defence to help women escape in critical situation

3.4.1 Advantages of Gadget over existing Technology

- Portable Can be easily carried any where
- Comfortable and Easy to Use
- Reduced Cost
- Wifi- Enabled

3.4.2 Working Approach

Women in danger	On getting the Information registered user (family police relatives) Take's necessary action	Find the Culprit Using the image captured from the gadget
User device	Device makes alert call, captures image of culprit and Send location of women	
Give electric shock and Activate gadget with motion	When triggered gadget gets connected to cloud (Twilio)	

3.4.3 Component details

- **Raspberry pi** : Controller to handle the activities of image capturing of the culprit and location tracking of woman in danger

- **Nodemcu wifi module** : Module is equipped with the Ultrasonic sensor that helps to trigger the connection with the cloud by measuring the distance and make alert calls
    1. Nodemcu ESP-12E

- **USB Camera module:** Captures the image of Culprit

- **Ultrasonic / PIR sensor:** This is used along with the pendent to measure the distance, make alert call, and glow the flash light when the culprit is near

Chapter 4

BRIEF INTRO ON TECHNOLOGIES USED FOR IMPLEMENTATION OF WOMEN SAFETY

4.1 Internet of Things (IoT)

Definition

The Internet of Things (IoT) refers to the use of intelligently connected devices and systems to leverage data gathered by embedded sensors and actuators in machines and other physical objects. IoT is expected to spread rapidly over the coming years and this convergence will unleash a new dimension of services that improve the quality of life of consumers and productivity of enterprises, unlocking an opportunity that the GSMA refers to as the 'Connected Life'.

- For consumers, the IoT has the potential to deliver solutions that dramatically improve energy efficiency, security, health, education and many other aspects of daily life.
- For enterprises, IoT can underpin solutions that improve decision-making and productivity in manufacturing, retail, Agriculture and other sectors..

Objects around us have been connected for decades. Devices like TV remote controls and garage door openers have been part of our domestic landscape for generations. Industrial applications of these technologies—for example, through remote monitoring and control of production—are also nothing new. In fact, even the phrase "Internet of Things" is not a recent invention; it was coined around twenty years ago.

However, recent developments in both networks and devices are enabling a much greater range of connected devices and Internet of Things (IoT) functionalities. Today, the phrase "Internet of Things" refers to the world of smart connected objects and devices. Gone is the remote control, replaced by an intelligent device that will automatically fulfill its task based on its analysis of user behavior. All of this is made possible by the miniaturization of electronic devices, accompanied by a huge increase in the availability of internet connectivity.

IoT describes a system where items in the physical world, and sensors within or attached to these items, are connected to the Internet via wireless and wired Internet connections. These sensors can use various types of local area connections such as RFID, NFC, Wi-Fi, Bluetooth, and ZigBee. Sensors can also have wide area connectivity such as GSM, GPRS, 3G, and LTE.

4.2 Understanding the Internet of Things

IoT will enable life-enhancing services

As the Internet of Things evolves, we can see an increase of smart connected devices supported by mobile networks, providing seamless connectivity, will unlock opportunities to provide life-enhancing services for consumers while boosting productivity for enterprises. Figure below, shows thirteen industry sectors where in significant adoption of IoT services are going to take place

INTERNET OF THINGS INDUSTRY SECTOR CATEGORIES
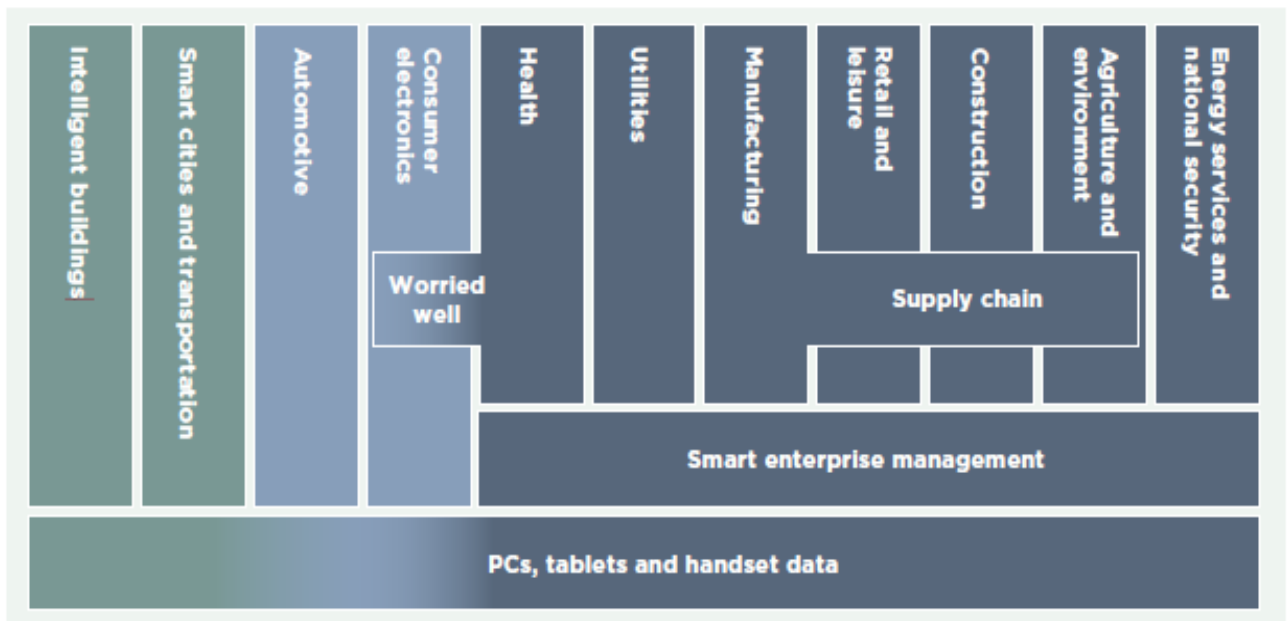
In cities, the development of smart grids, data analytics and autonomous vehicles will provide an intelligent platform to deliver innovations in energy management, traffic management and security, sharing the benefits of this technology throughout society

EXAMPLE IOT SMART CITIES APPLICATIONS
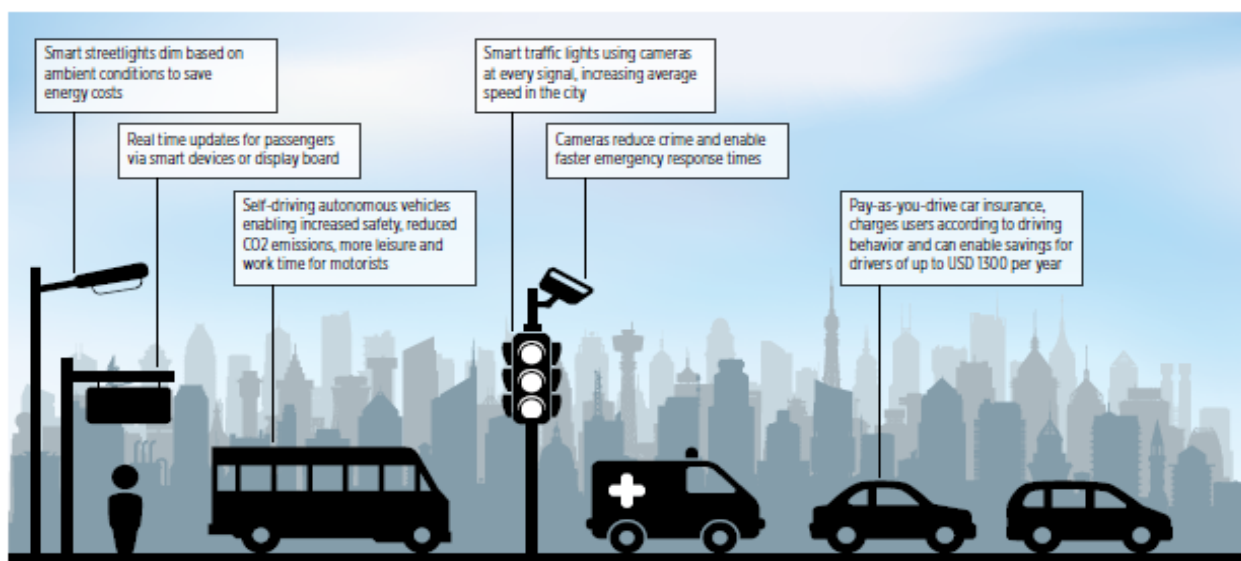
The IoT will also help widen access and improve quality of education and health. As demand for healthcare doubles8, connected smart devices will help address this challenge by supporting a range of e-health services that improve access and enable monitoring of chronic diseases and age-related conditions in the home. In doing so, they will improve the quality of care and quality of life for patients, while reducing the strain on the wider healthcare system

EXAMPLE IOT HEALTH APPLICATIONS
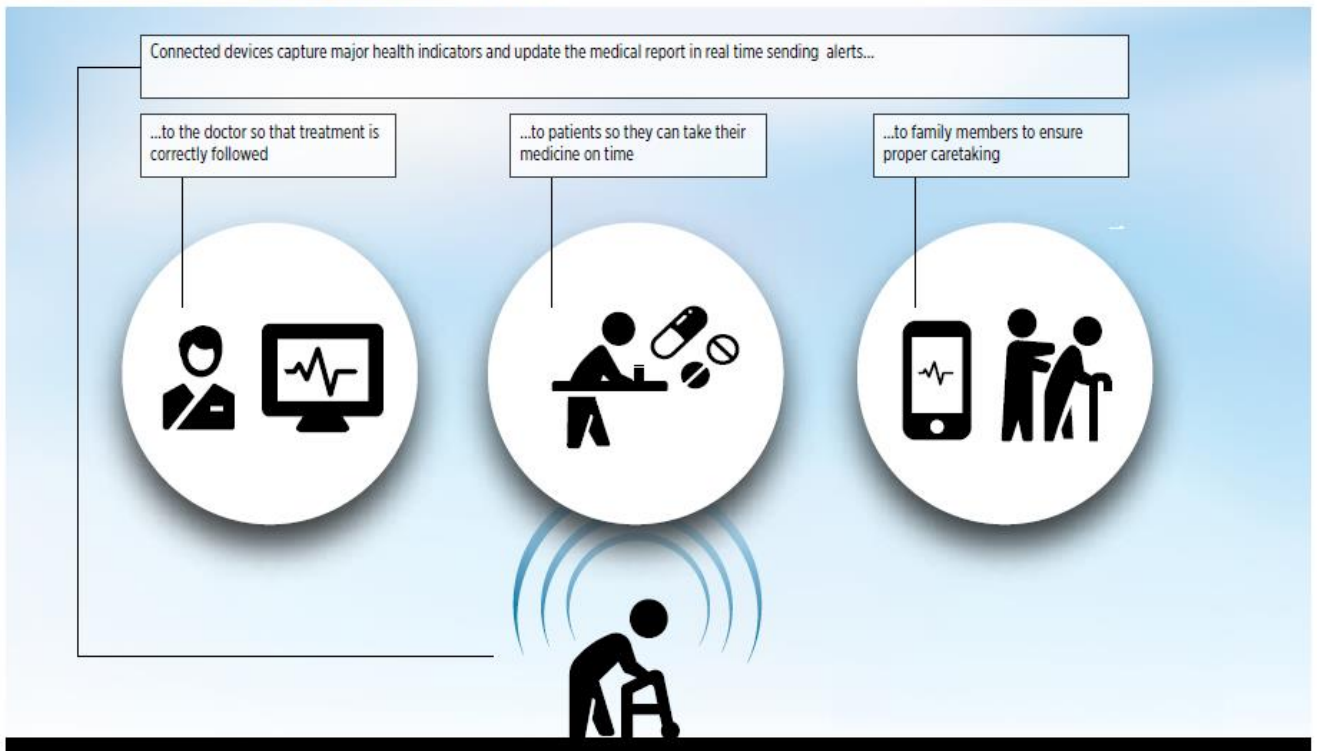
For enterprises, the ability of IoT to combine innovations in data analytics, 3D printing and sensors, will improve productivity by enabling a step change in the quality of decision making, efficiency of production, personalisation of retail and productivity of food production.

EXAMPLE IOT PRODUCTIVITY APPLICATIONS
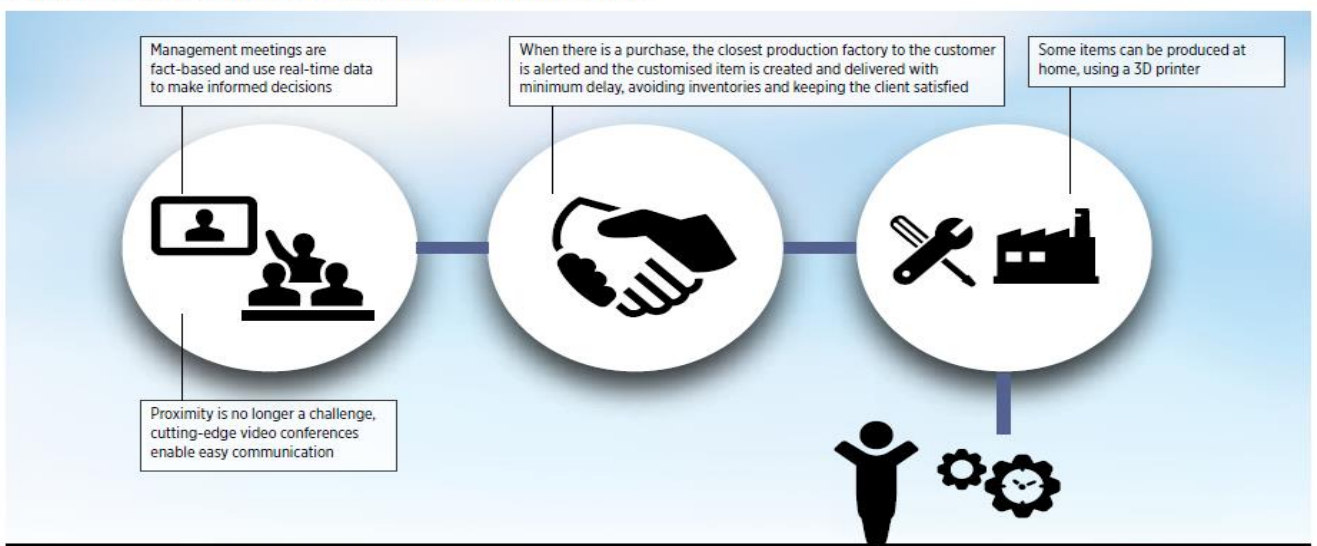
4.3 The Internet of Things Phenomenon

The Internet of Things is majorly helping in a societal revolution: anything and everything can now be connected. While industrial applications like remote management and monitoring have been present in manufacturing for decades (General Electric in particular has over the years developed some standards for industrial uses), the consumer-oriented IoT is a new phenomenon, enabled by the miniaturization of devices, the emergence of the internet as a favored communications method and the proliferation of powerful and smart mobile devices.

The internet of things is made possible by what Alain Louchez, managing director of Georgia Tech's Center for the development and Application of Internet of Things Technologies (CDAIT), calls internet of things as "DNA:" given as

Devices: with miniaturization of sensors and captors

Network: through radio signal, wireless Internet, etc.

Applications
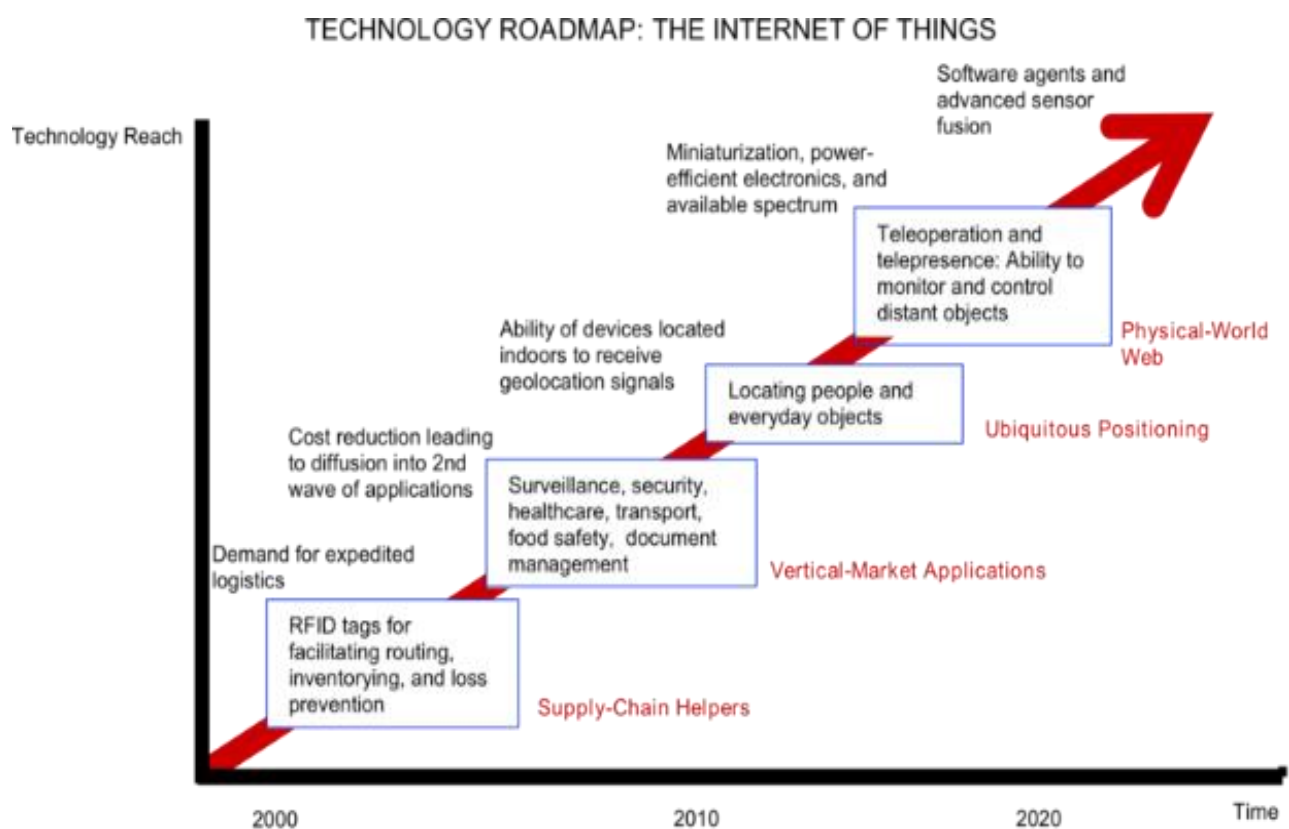
Source: SRI Consulting Business Intelligence

4.3.1 The Devices

Over the past few decades, researchers and industry players have developed Micro-Electro-Mechanical Systems (MEMS). These are miniaturized structures, sensors, actuators and microelectronics, the sizes of which range from microns to several millimeters. Micro sensors and micro actuators are categorized as "transducers," which are defined as devices that convert energy from one form to another. In the case of micro sensors, the device typically converts a measured mechanical signal into an electrical signal.

These new microelements are very powerful: for example, researchers have placed small micro-actuators on the leading edge of airfoils of an aircraft and have been able to steer the aircraft using only these devices. Ultimately, miniaturization will allow any object to be connected, which could have substantial positive impacts for persons with disabilities as more and more products can be controlled from accessible computing platforms. The number of connected devices is set to explode from 4.9 billion this year, according to the Gartner Group, to 25 billion or even 50 billion by 2020

World Population	6.3 Billion	6.8 Billion	7.2 Billion	7.6 Billion
Connected Devices	500 Million	12.5 Billion	25 Billion	50 Billion
Connected Devices Per Person	0.08	1.84	3.47	6.58
	2003	**2010**	**2015**	**2020**

More connected devices than people
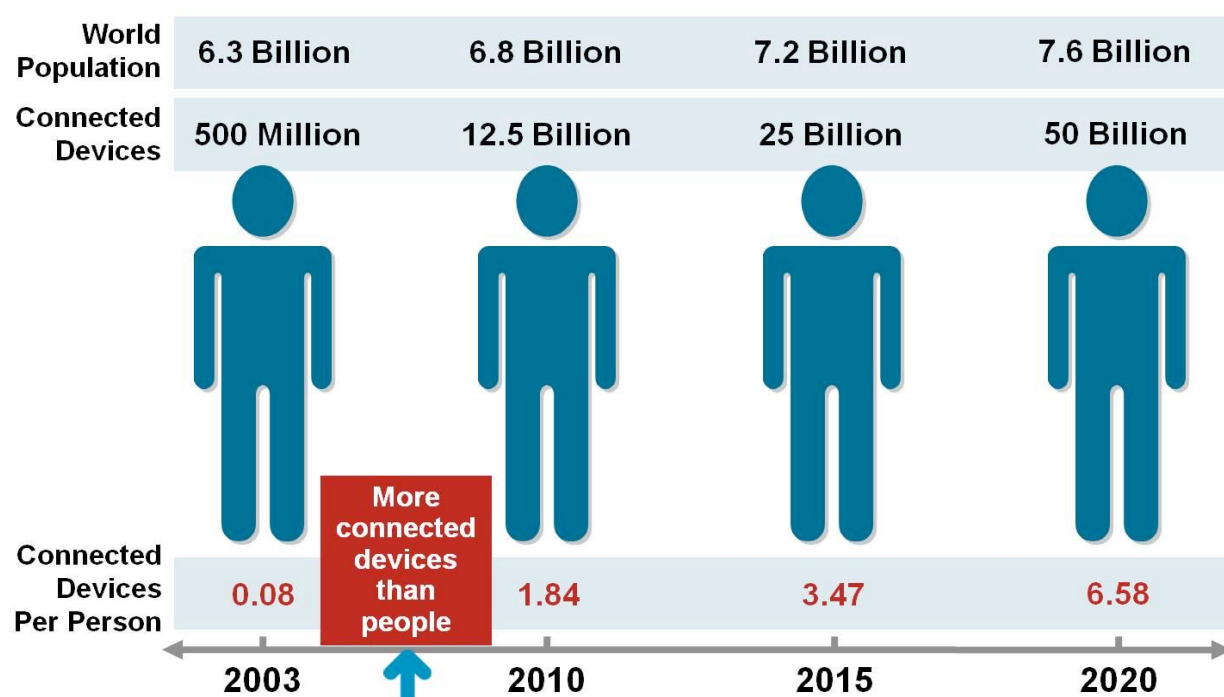
4.3.2 The Network

As important as these advancements in microelectronics are, the Internet of Things refers not just to devices, but also to the connections between them. For IoT applications to work, the sensors and the actuators must be able to communicate with the devices that inform their action, whether it is a smartphone or something as simple as a remote thermometer.

Communication between devices can be established by a variety of different modes, including radio signals, Bluetooth (for devices in close proximity) or an Internet connection (Wi-Fi and wireless

broadband for a wider range of communication and for video). And, as our wired and wireless networks reach more and more people*, the potential applications for the Internet of Things will continue to expand.

4.3.3 The Applications

New IoT applications are being introduced to the market every day. While IoT applications are expected to penetrate into many activities—both consumer and industrial—smart home applications seem to be the fastest growing segment. Connected home devices are expected to comprise 25% of all Internet of Things devices shipped this year, according to BI Intelligence, a market currently valued at $61 billion and expected to jump to $490 billion by 2019.

Many of these, as the next section discusses, have potential to improve quality of life for persons with disabilities. Home automation applications and security systems are an obvious example of this. Other examples include self-driving cars that identify traffic and obstacles and remote medical monitoring that makes access to care available to more people in more places

4.4 Raspberry Pi Board Technology

The Raspberry pi is a single computer board with credit card size that can be used for many tasks that your computer does, like games, word processing, spreadsheets and also to play HD video. It was established by the Raspberry pi foundation from the UK. It has been ready for public consumption since 2012 with the idea of making a low-cost educational microcomputer for students and children. The main purpose of designing the raspberry pi board is, to encourage learning, experimentation and innovation for school level students. The raspberry pi board is a portable and low cost.

Raspberry Pi model B Hardware Specifications

The raspberry pi board comprises a program memory (RAM), processor and graphics chip, CPU, GPU, Ethernet port, GPIO pins, Xbee socket, UART, power source connector. And various interfaces for other external devices. It also requires mass storage, for that we use an SD flash memory card. So that raspberry pi board will boot from this SD card similarly as a PC boots up into windows from its hard disk.

Essential hardware specifications of raspberry pi board mainly include SD card containing Linux OS, US keyboard, monitor, power supply and video cable. Optional hardware specifications include USB mouse, powered USB hub, case, internet connection, the Model A or B (USB WiFi adaptor is used and internet connection to Model B is LAN cable).
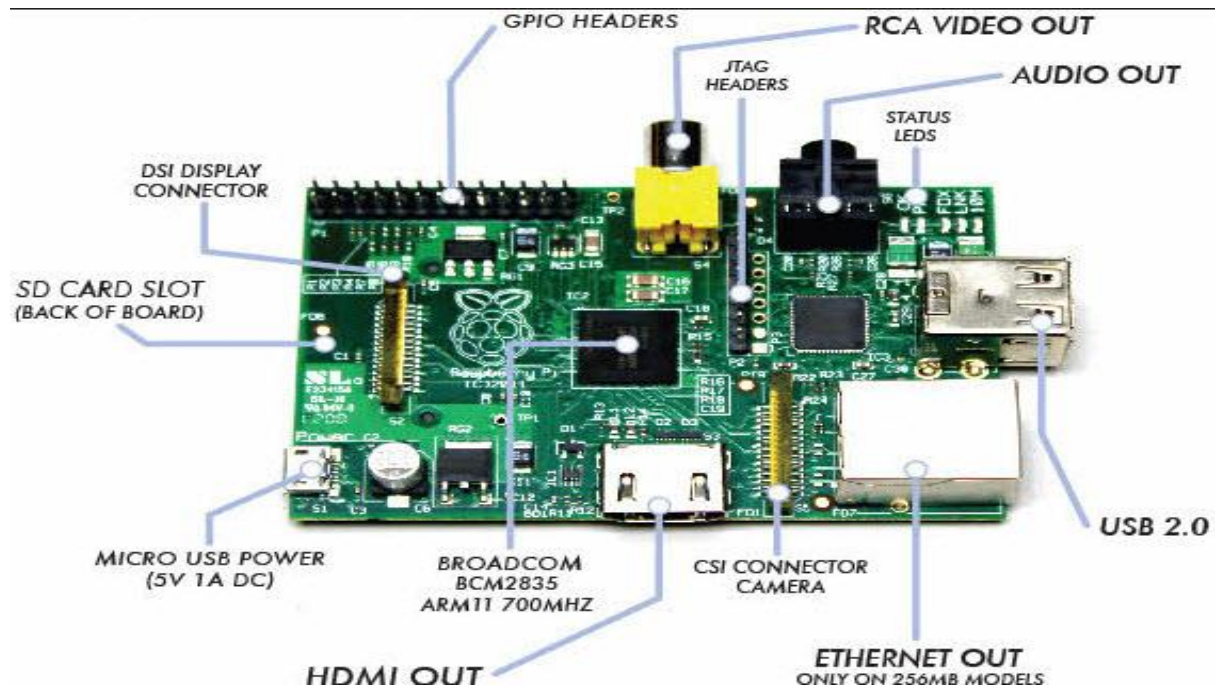
Memory

The raspberry pi model A board is designed with 256MB of SDRAM and model B is designed with 51MB. Raspberry pi is a small size PC compare with other PCs. The normal PCs RAM memory is available in gigabytes. But in raspberry pi board, the RAM memory is available more than 256MB or 512MB

CPU (Central Processing Unit)

The Central processing unit is the brain of the raspberry pi board and that is responsible for carrying out the instructions of the computer through logical and mathematical operations. The raspberry pi uses ARM11 series processor, which has joined the ranks of the Samsung galaxy phone.

GPU (Graphics Processing Unit)

The GPU is a specialized chip in the raspberry pi board and that is designed to speed up the operation of image calculations. This board designed with a Broadcom video core IV and it supports OpenGL

Ethernet Port

The Ethernet port of the raspberry pi is the main gateway for communicating with additional devices. The raspberry pi Ethernet port is used to plug your home router to access the internet.

GPIO Pins

The general purpose input & output pins are used in the raspberry pi to associate with the other electronic boards. These pins can accept input & output commands based on programming

raspberry pi. The raspberry pi affords digital GPIO pins. These pins are used to connect other electronic components. For example, you can connect it to the temperature sensor to transmit digital data.

XBee Socket

The XBee socket is used in raspberry pi board for the wireless communication purpose.

Power Source Connector

The power source cable is a small switch, which is placed on side of the shield. The main purpose of the power source connector is to enable an external power source.

UART

The Universal Asynchronous Receiver/ Transmitter is a serial input & output port. That can be used to transfer the serial data in the form of text and it is useful for converting the debugging code.

Display

The connection options of the raspberry pi board are two types such as HDMI and Composite. Many LCD and HD TV monitors can be attached using an HDMI male cable and with a low-cost adaptor. The versions of HDMI are 1.3 and 1.4 are supported and 1.4 version cable is recommended. The O/Ps of the Raspberry Pi audio and video through HMDI, but does not support HDMI I/p. Older TVs can be connected using composite video.

4.5 NodeMCU ESP8266 (ESP-12e)

The ESP8266 is the name of a micro controller designed by Espressif Systems. The ESP8266 itself is a self-contained WiFi networking solution offering as a bridge from existing micro controller to WiFi and is also capable of running self-contained applications. This module comes with a built in USB connector and a rich assortment of pin-outs. With a micro USB cable, you can connect NodeMCU devkit to your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboard friendly.

Firmware

NodeMCU is an open source LUA based firmware developed for ESP8266 wifi chip. By exploring functionality with ESP8266 chip, NodeMCU firmware comes with ESP8266 Development board/kit Since NodeMCU is open source platform, their hardware design is open for edit/modify/build. NodeMCU Dev Kit/board consist of ESP8266 wifi enabled chip. The **ESP8266** is a low-cost Wi-Fi chip developed by Espressif Systems with TCP/IP protocol.

i.e. NodeMCU Development board.
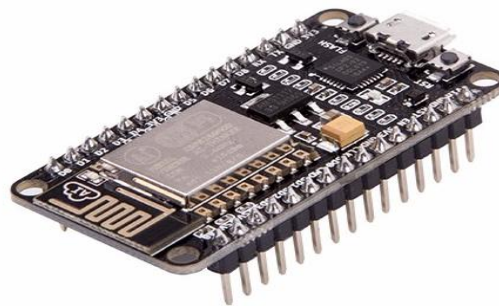
NodeMCU Development Board

Features
- Open-source
- Interactive
- Programmable
- Low cost
- Simple
- Smart
- WI-FI enabled

Specification:
- Voltage: 3.3V.
- Wi-Fi Direct (P2P), soft-AP.
- Current consumption: 10uA~170mA.
- Flash memory attachable: 16MB max (512K normal).
- Integrated TCP/IP protocol stack.
- Processor: Tensilica L106 32-bit.
- Processor speed: 80~160MHz.
- RAM: 32K + 80K.
- GPIOs: 17 (multiplexed with other functions).

- Analog to Digital: 1 input with 1024 step resolution.
- +19.5dBm output power in 802.11b mode
- 802.11 support: b/g/n.
- Maximum concurrent TCP connections: 5.

Pin Description Nodemcu (ESP-12e)
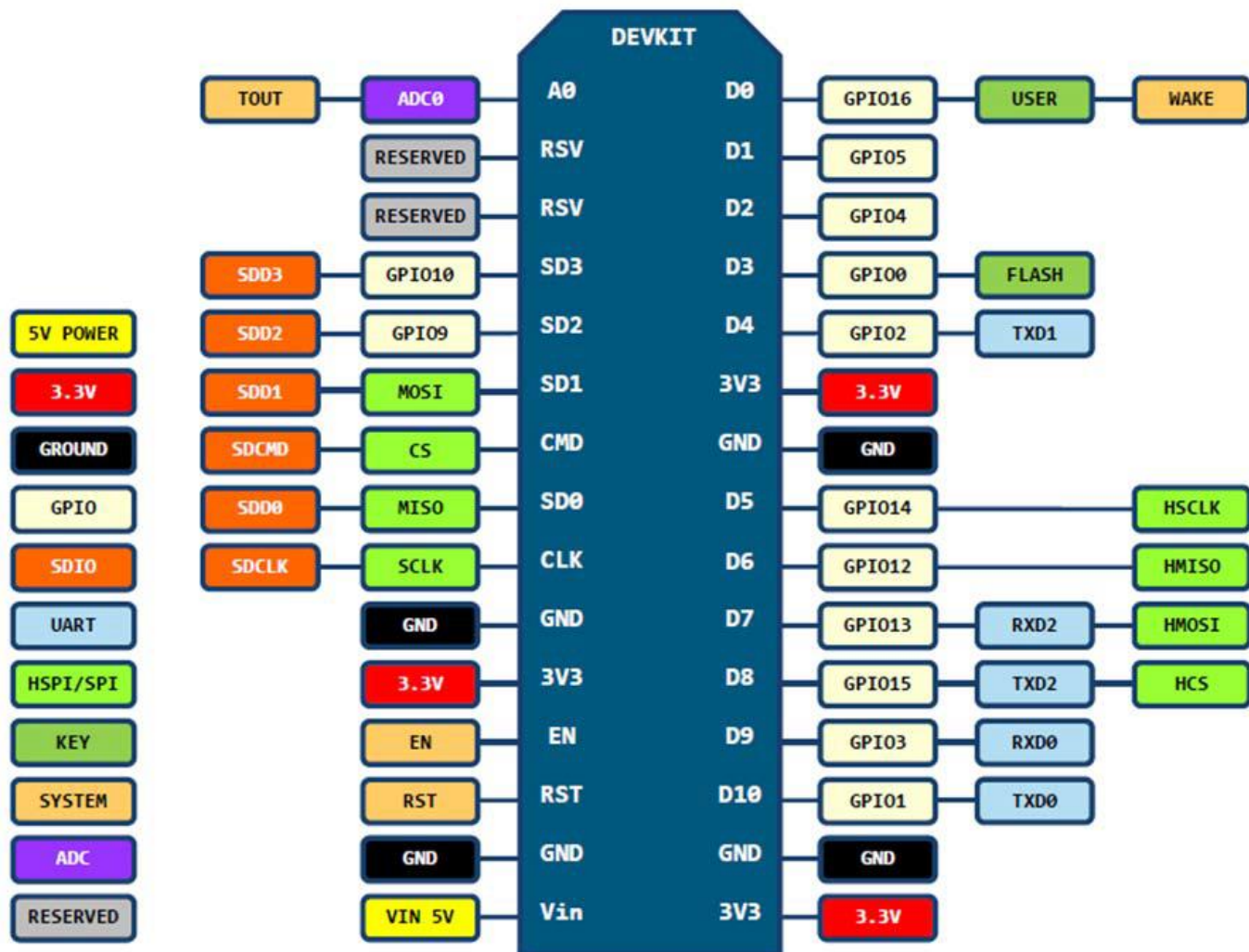
D0(GPIO16) can only be used as gpio read/write, no interrupt supported, no pwm/i2c/ow supported.

4.6 Ultrasonic Sensor (HC-SR04)

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object
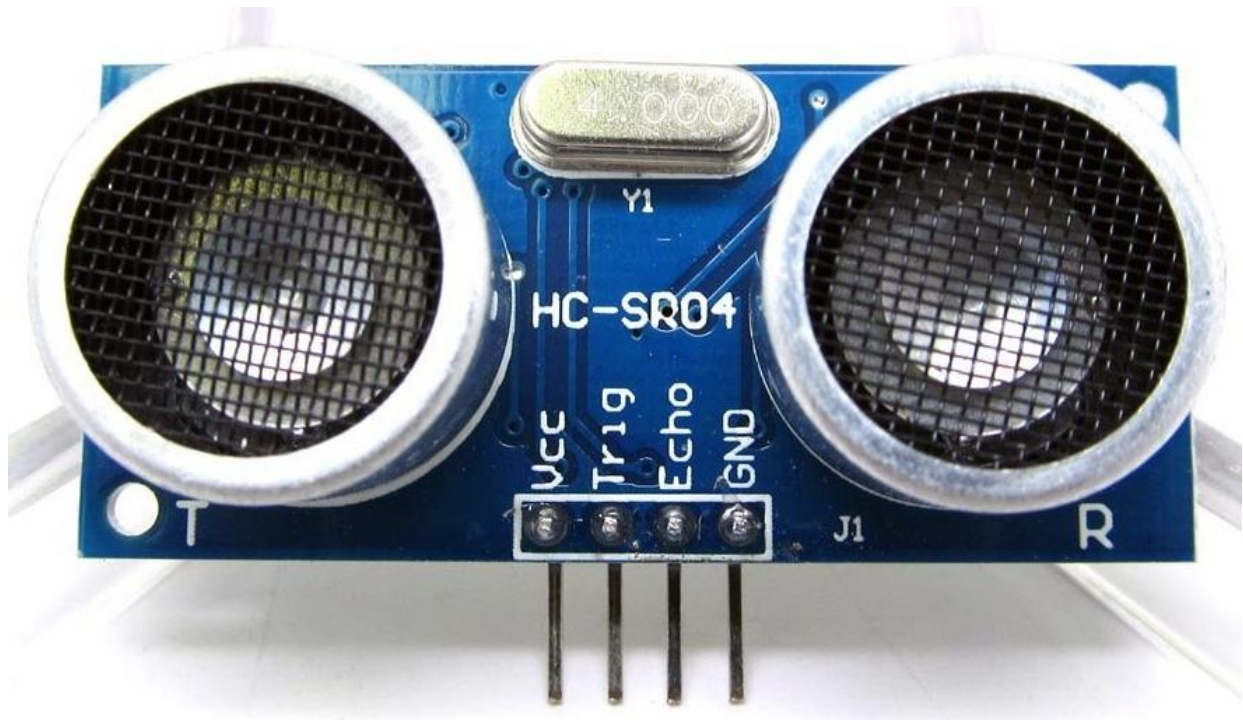
It emits an ultrasound at 40 000 Hz which travels through the air and if there is an object or obstacle on its path It will bounce back to the module. Considering the travel time and the speed of the sound you can calculate the distance.
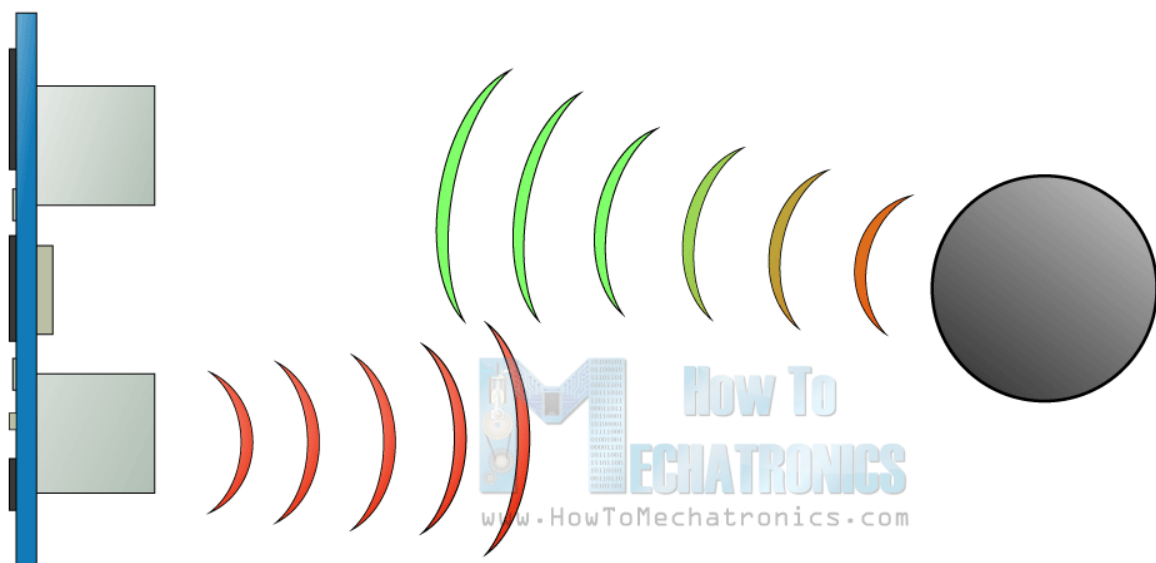
The HC-SR04 Ultrasonic Module has 4 pins, Ground, VCC, Trig and Echo. The Ground and the VCC pins of the module needs to be connected to the Ground and the 5 volts pins on Board respectively and the trig and echo pins to any Digital I/O pin on the Board.

In order to generate the ultrasound you need to set the Trig on a High State for 10 µs. That will send out an 8 cycle sonic burst which will travel at the speed sound and it will be received in the Echo pin. The Echo pin will output the time in microseconds the sound wave travelled.
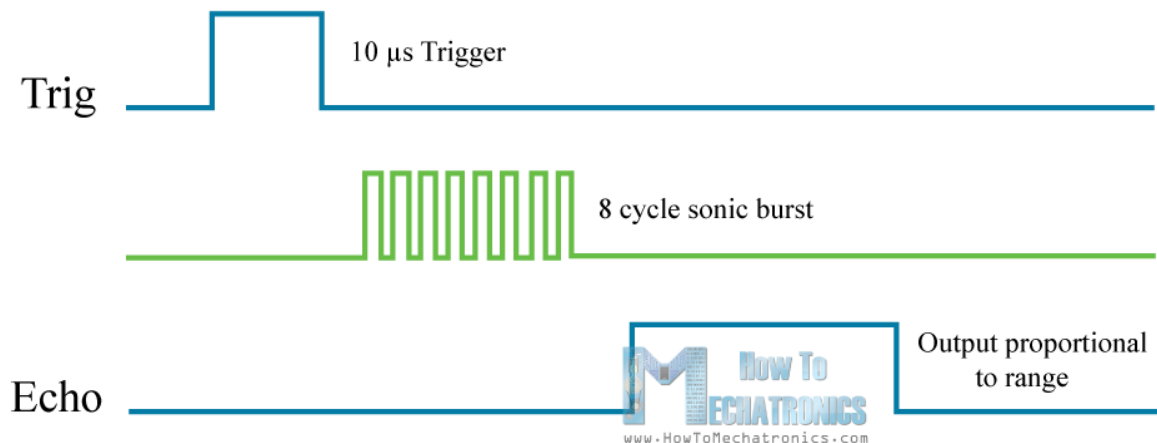
For example, if the object is 10 cm away from the sensor, and the speed of the sound is 340 m/s or 0.034 cm/µs the sound wave will need to travel about 294 u seconds. But what you will get from the Echo pin will be double that number because the sound wave needs to travel forward and bounce backward. So in order to get the distance in cm we need to multiply the received travel time value from the echo pin by 0.034 and divide it by 2.

speed of sound:

$$v = 340 \ m/s$$
$$v = 0{,}034 \ cm/\mu s$$

Time = distance / speed:

$$t = s / v = 10 / 0{,}034 = 294 \ \mu s$$

Distance:

$$s = t \cdot 0{,}034 / 2$$
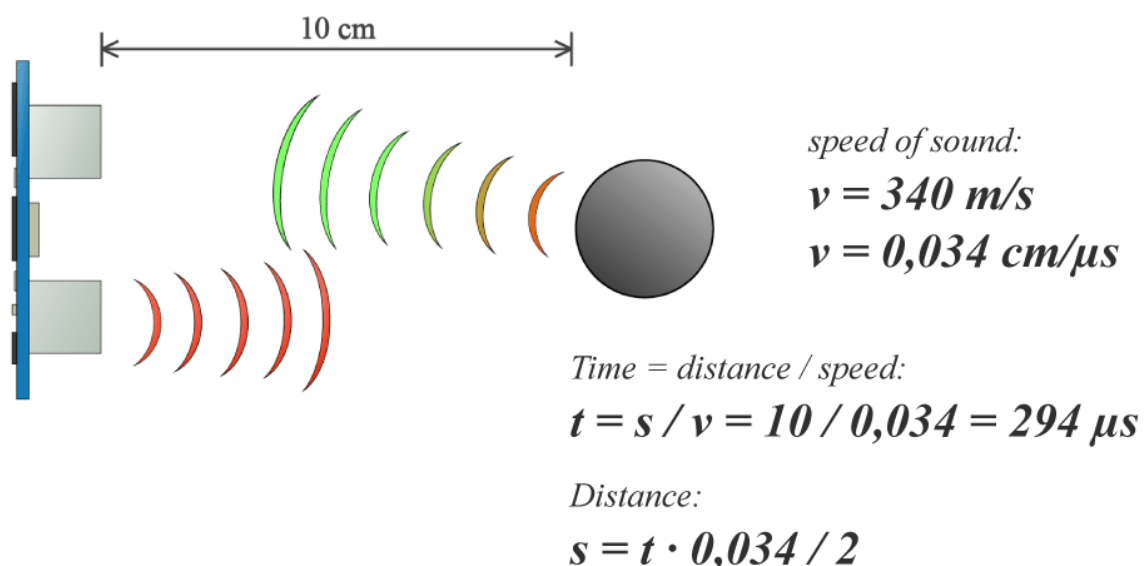
Chapter 5
PROPOSED WORK OF PROJECT

5.1 Proposed System

Our proposed system gives first priority on self-defence by   providing the tolerable electric shock to culprit that reduces the exited state and help women to escape the critical situation, we also tend to implement the device that is triggered without any manual aide that provides safety for women in public places transport vehicles such as cabs, taxi, bus, auto rickshaw and working places.

The implementation is divided into the 3 Sections

5.1.1. Device:

Raspberry pi board with the image capturing and location tracking as shown in figure[2]
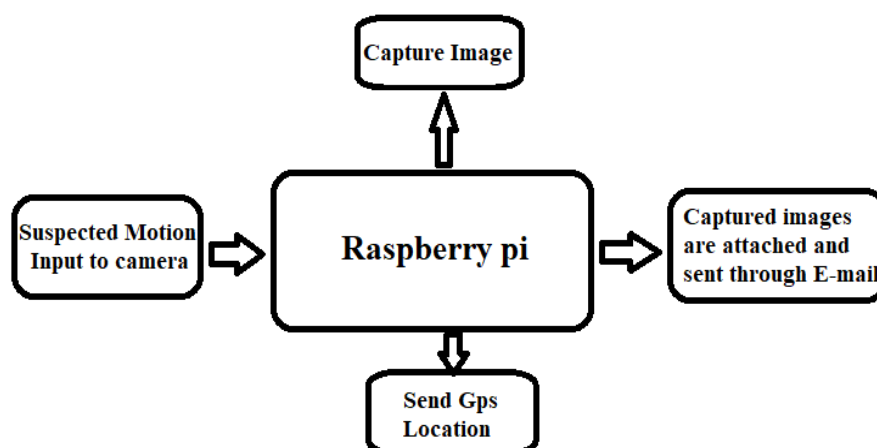
Figure[1] Raspberry pi Device

5.1.2 Defence:

5.1.2.1 Smart pendant with internet for Emergency alert and Led Flash as shown in Figure[3]
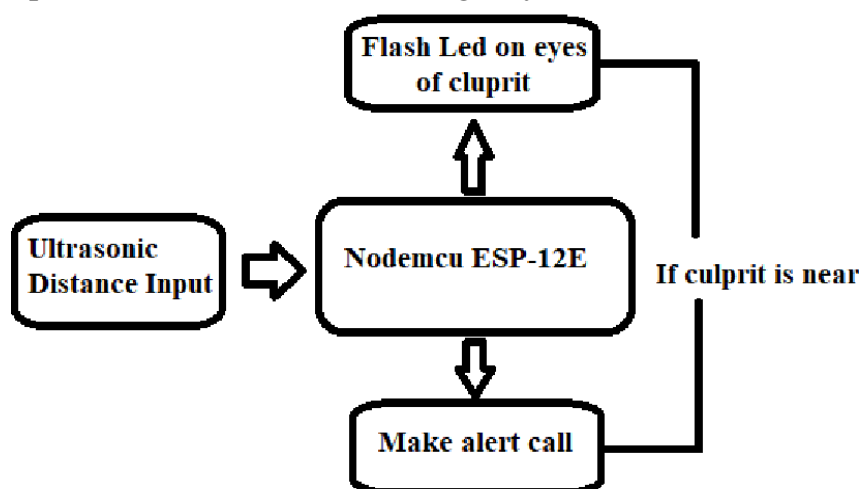
Figure[2] Smart pendant with Emergency alert and led flash

5.1.2.2 Electric shock gloves for self-defence without internet

Electric shock gloves providning shocks uptill 3000 volts for few mili seconds to cluprit

5.1.3 Expected outcomes of project

- The project mainly focuses on the low cost implementation of the device which can save the life of the women in the critical condition

- The smart device as shown in fig[1] is equipped with the motion software , which make the device to get triggered if there is any suspected activity in front of the camera and dose the following operations as follows

  - Captures the image of the culprit

  - GPS location of the victim and the captured image of the culprit are sent through the E-mail from the device

- On a counterpart the project also ensures to provide the self-defence feature, the smart flash light pendent with internet (IoT) makes the vision blur when the attacker is at the shorter distance and also makes the Emergency alert call to the victim's family/police station indicating the women is in danger.

- And if the Smart pendant fails to operate in the low network/ remote areas ,The electric shock gloves without internet assures women escape the critical situation, These two factors form the combined self-defence application and helps the victim to escape from the danger

5.2 Electric Gloves (self-defence without internet)

Self-defence, especially for women, is of utmost importance in the kind of the world we live in today. Women, usually referred as the weaker sex, are considered easier targets. In a country like India where the cases of gender violence are on rise, out of which many go unreported, self-defence for women has become a necessity more than ever. Rape, molestation, kidnapping and murder are the most common forms of crime against women in India. As the responsible citizens of an independent country, we fail to realise is that these instances of harassment can flare up into other bigger heinous crimes against women.

We should not wait for that criminal and intruder before we wake up to the reality of protecting ourselves, and in the case of women should have to be ready with extra precautions and not wait for a determined theft to surprise us and will do anything not to be caught, including inflicting harm to her.

Not only that women may be in danger in homes, but also we may face such threats even when she is peacefully walking from work going to our homes at night when suddenly a pothead decides and approaches her and harm. Not only that they are determined of harming her because at times they will also do everything to stop women from hurting or stopping them.

What will be women going to do if we're not ready with self-defence? How she is going to defend not only her possessions but also her life? We don't have to spend much on weapons, such as guns and pepper sprays but we can provide device which can suddenly be used.

The above questions can be answered from idea of our project. Our project mainly gives first priority to the self-defence application as we intend talk about the preventive measures of not causing any harm to women and help women to escape from the activities like molestation, rape or kidnapping. As seen from the case studies of the previous implemented projects on women safety the feature of self-defence was nowhere in the picture and also the tools available for women safety did not provide assurity for the women to escape the critical situation. The implementation of our project speaks of a Self-defence gadget which intends to provide instant security for women even without the internet facility.

The gadget is basically a shock providing glove, which is capable of giving a tolerable voltage shock to reduce the excited state of the culprit. The output voltage is of the order 5000 vlts for few milli seconds which does not cause any severe harm to the culprit. The gadget also ensures that the victim gets an opportunity to escape the critical situation. The detailed working operation is explained along with the necessary circuits as shown Figure[3] below

5.1.1 Circuit Operation
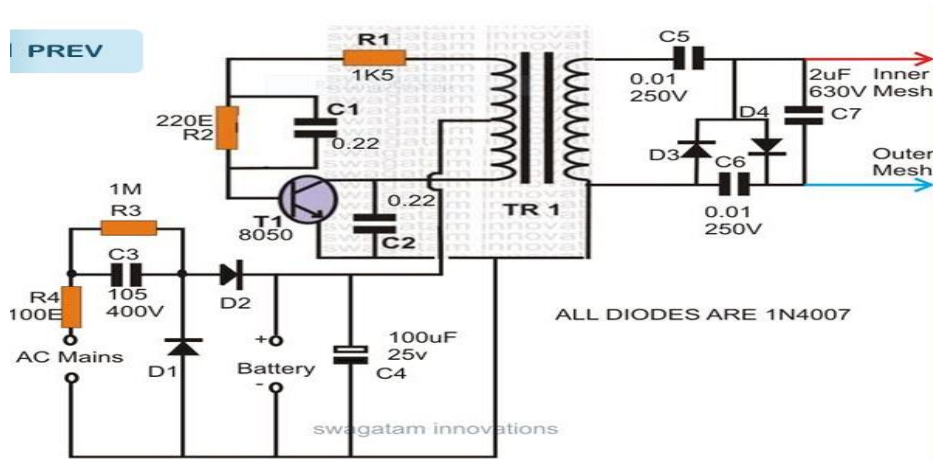
Figure[3] Circuit for Electric Shock Gloves

The circuit consists of a fly back topology transformer driven by a general NPN transistor 2SD965. The feedback coil of transformer is of 10 turns, the primary is of 40 turns and the output or secondary coil is of 450 turns. When this circuit is run by 4Volts, the transformer generates about 2000-4000 volts at zero load, and the output is then coupled 3 times by using 3 IN4007 diodes and suitable capacitors, thus reaching our need of 5000-10,000 volts.

The total circuit is can generally be divided into 3 stages, namely
1. The power supply/charging circuit for battery inside,
2. Oscillator/transistor stage
3. And finally the voltage booster stage.
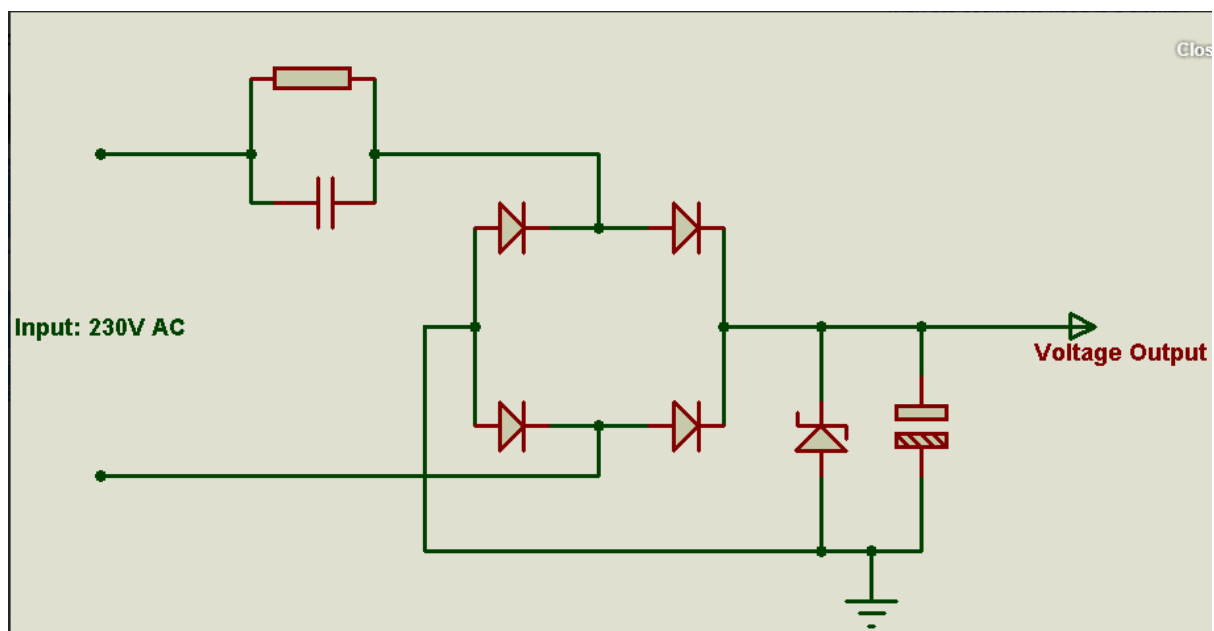
1. Power Supply/ Charging Circuit

It's a simple capacitive power supply which can source a few milli amps sufficient enough to charge the battery inside. The initial capacitor helps in limiting the current and then the voltage is rectified. This rectified voltage is brought to the desired level (battery voltage level) using a Zener Diode and a capacitor to filter the noise on the DC voltage produced. This would charge the battery inside when plugged into mains. This may be accompanied with a switch to enable charging.
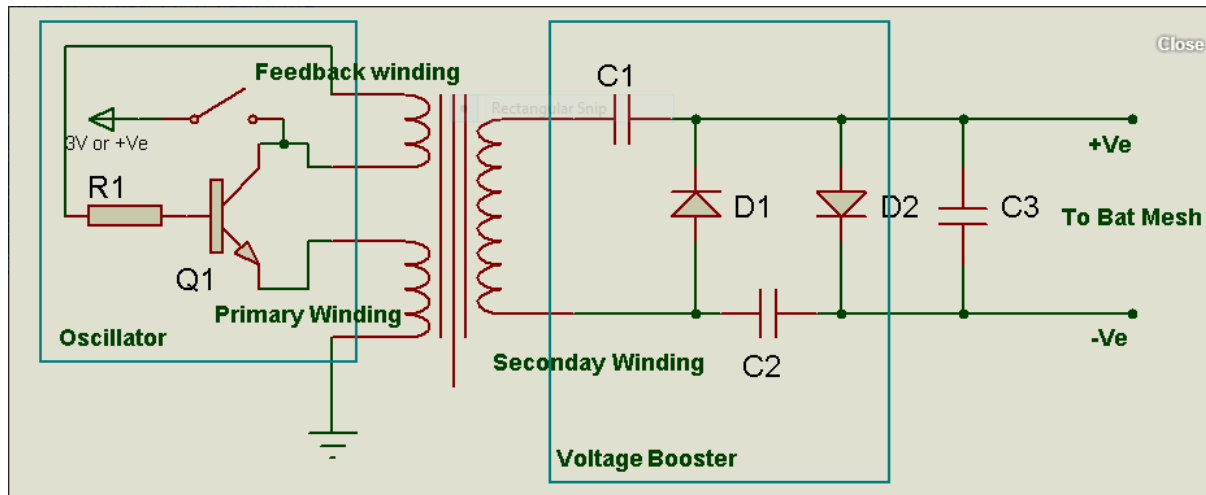
2. Oscillator

Current is enabled through a transistor (generally npn) which allows the current to flow through a primary coil, inducing voltage in the secondary coil and secondary coil in return induces voltage in feedback coil. This counter voltage in the feedback coil causes the transistor to stop conducting and the magnetic field in the ferrite core to collapse via electrical energy from secondary coil. This process helps the transistor to conduct again, repeating the process and creating pulsed DC. The changing magnetic field induces high voltage in the secondary coil. Voltage induced in the secondary coil depends on the ratio of number of turns of Primary and Secondary winding. This voltage will be in the order of few hundred or thousands

3. Voltage Booster

This voltage is now further boosted using a combination of Diodes and Capacitors, which is typically a Voltage multiplier typically, the circuit uses Voltage Triple, which triples the available voltage from secondary winding of transformer. This high voltage is passed onto the wire mesh of the glove. Out of 2 wire pairs of each mesh, the terminals from the output of the ckt are connected to respective -ve/GND and the +ve terminals generating a high voltage.

The implementation results are as shown in Figure[4]
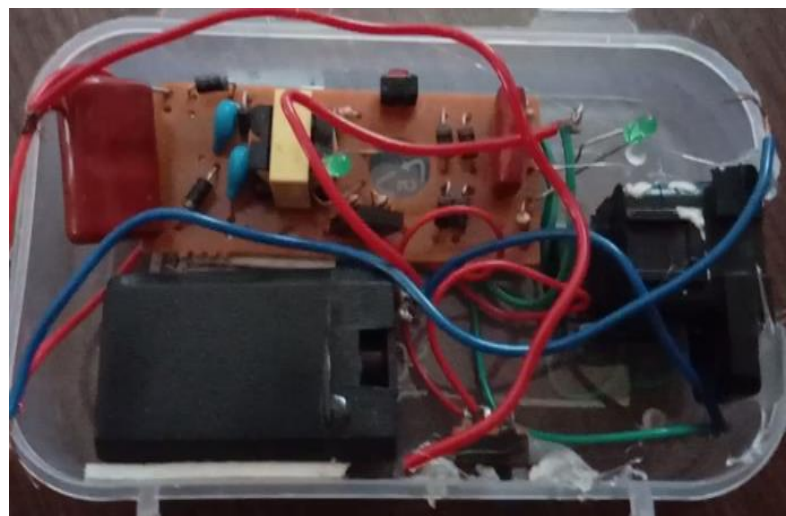
Figure[4] Electric Shock Gloves

5.2 Emergency alerting smart pendant with led flash
(Self-defence with Internet of Things)

Whether we like it or not, there will always be emergencies and they will happen when you least expect them. There are three major types of emergencies which are likely to occur these include security emergencies, medical emergencies, and fire emergencies. And we can't always count on the police when emergencies occur as they are not always in our premises when something bad happens. So how are we supposed to alert them and let them know that we need them without calling them?

Nowadays, we can find a lot of Alarm Systems in the market, the Smart pendant of our project is made with the similar concepts, but things that make our pendant different from the existing technology is that we intend to provide a smart pendant which not only sends an alerting message to the family or police but also provide a combined self-defence led flash circuit that creates a sense of blurriness to the eyes of culprit when he tries to attack the victim at the shorter distance.

Our Gadget is capable of working without the aid of any manual Input, gadget works on a full automatic bases by measuring the distance between the culprit and victim, if measured distance is less than the accepted value then device triggers itself, making to LED glow which in turn makes the light to flash on to the eyes of culprit and also tends to make an alter call to the family or police station via TWILO API (Cloud). This complete process is controlled by the aid of hardware components like Nodemcu ESp-12E (Wi-Fi Module) and Ultrasonic sensor.

The detailed circuit connection and the steps of using the Nodemcu ESp-12E, Twilio Api is explained below
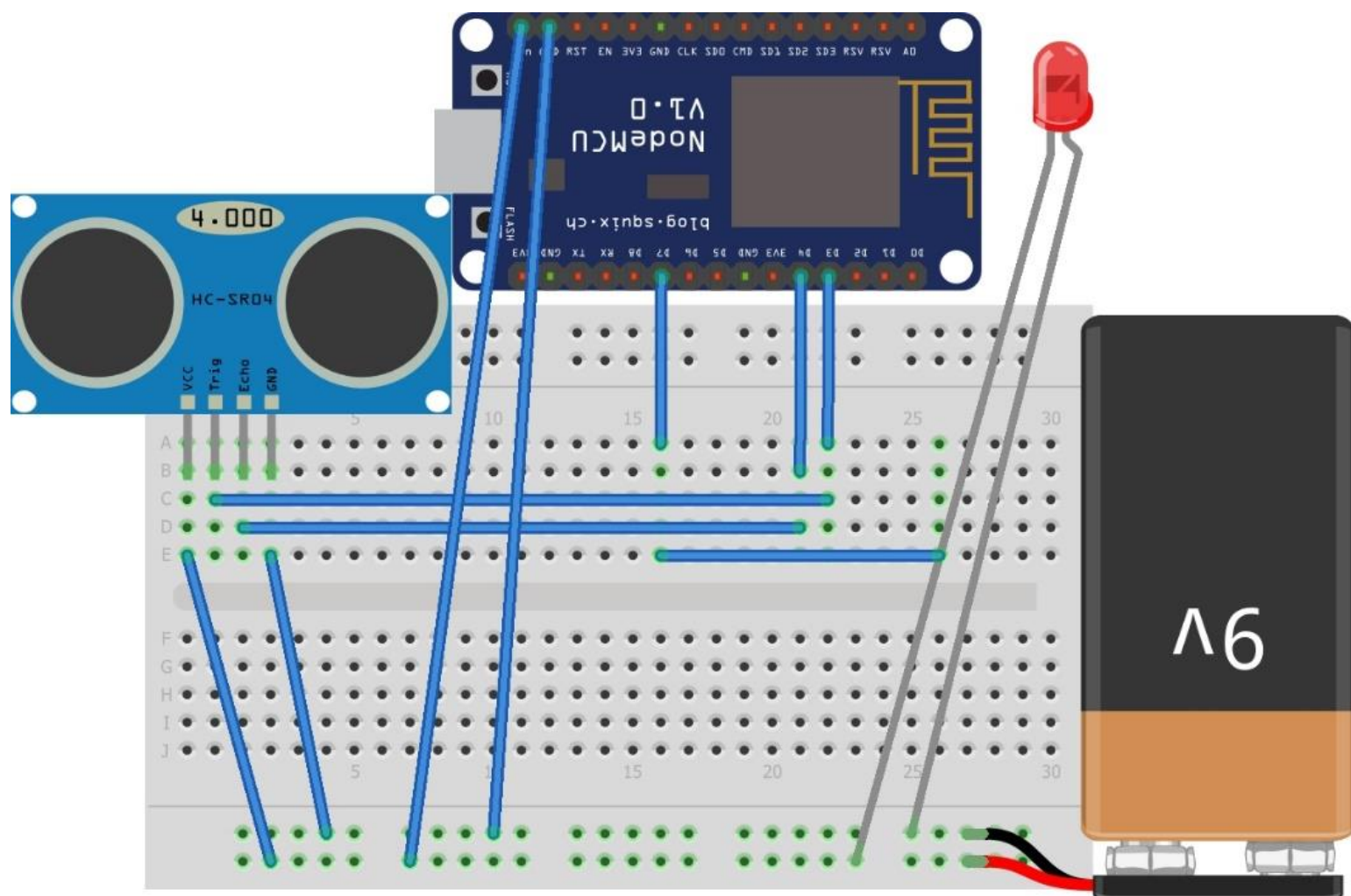
1. D3 of Nodemcu - Trig pin of Ultrasonic sensor
2. D4 of Nodemcu - Echo pin of Ultrasonic sensor
3. D7 of Nodemcu - Anode of LED
4. Vin of Nodemcu - +ve of Battery
5. Gnd Of Nodemcu - -ve of Battery
6. Vcc of Ultrasonic Sensor - +ve of Battery
7. Gnd Of Ultrasonic Sensor - -ve of Battery

5.2.1 Steps for Configuring Nodemcu

Flashing Nodemcu firmware to device

NodeMcu Flasher for Windows

NodeMcu flasher is a firmware programmer for NodeMcu DEVKIT V0.9. You can use it to program NodeMcu DEVKIT or your own ESP8266 board. As of now it works only on Windows but the creator of this tool has promised to come up with a cross platform tool in near future.
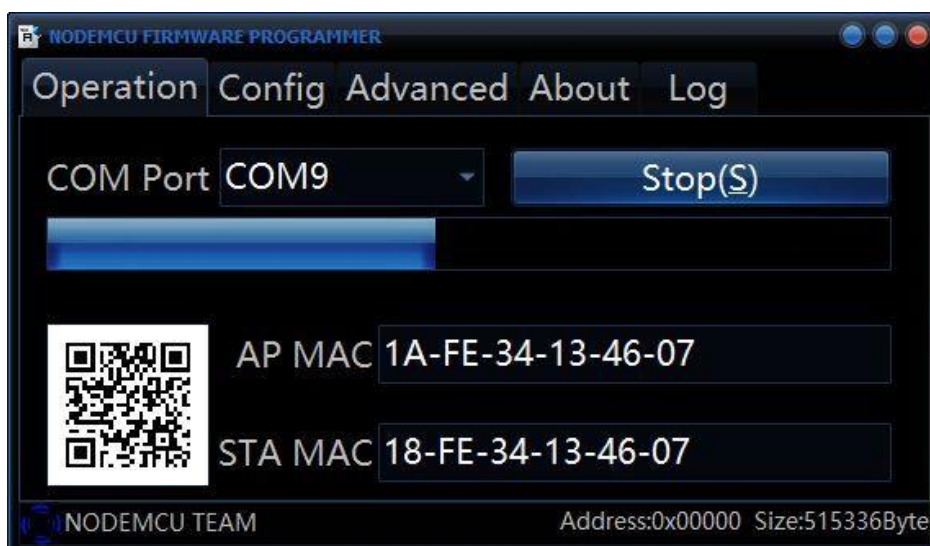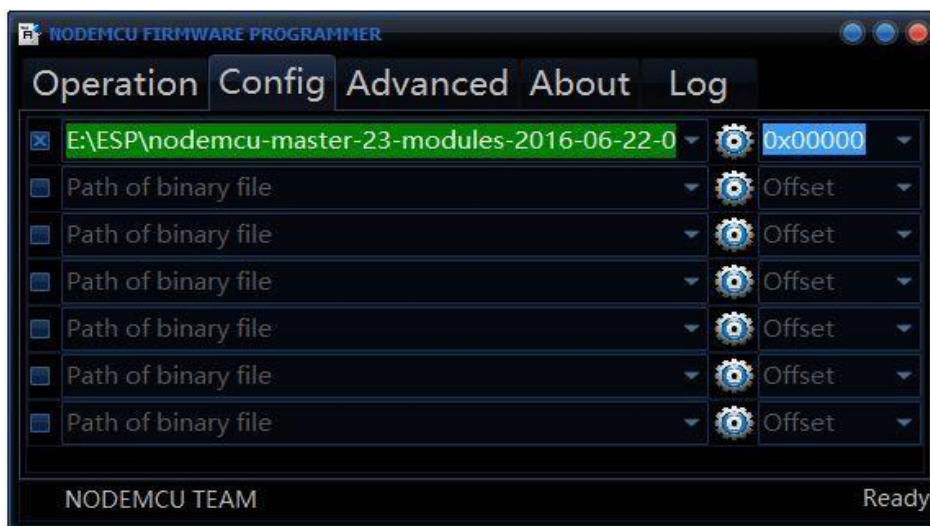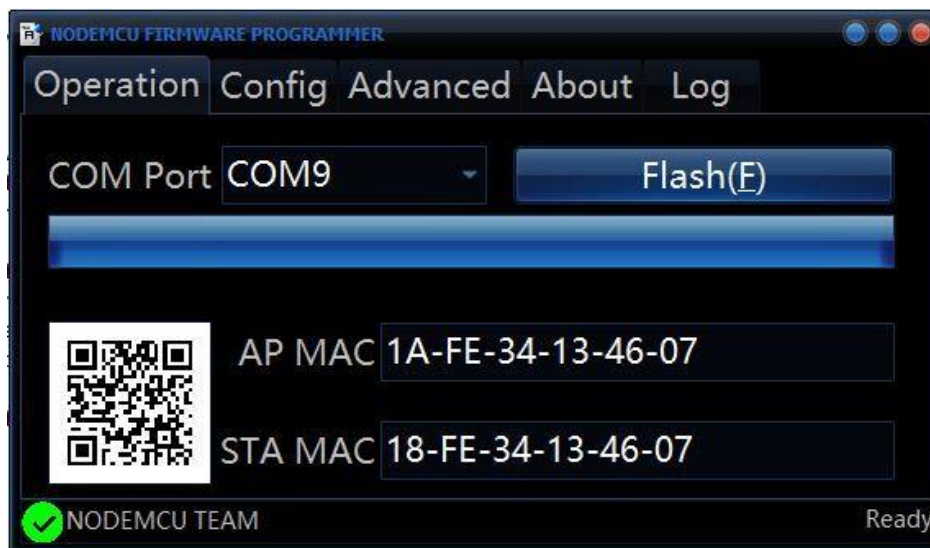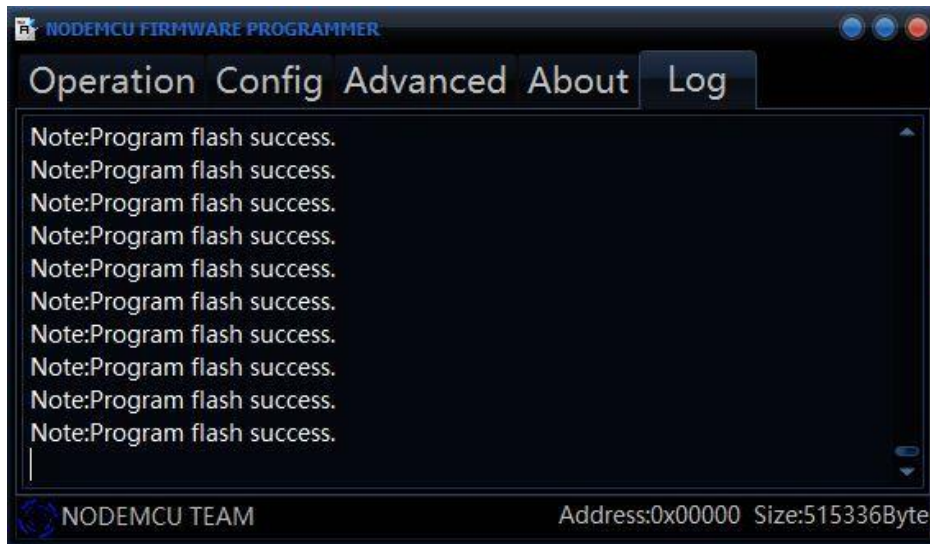
Open NodeMcu flasher application and click on "Log" tab.Initially it'll be empty

- Now connect your ESP device to the computer after enabling flash mode
- The COM port number will be displayed in the log tab
- Go to "Config" tab and select the file you had created using cloud service, The address should be 0x00000
- Go to Operation tab and click on Flash button. The MAC address and COM port will be automatically filled and the progress bar starts moving
- If you check the log tab now it'll show you the status of flashing each block
- Once the flash is successfully completed you will get a green tick on bottom left corner

Now your ESP device is ready to be programmed using Lua scripts. Remove the USB cable and connect again to bring the device back to normal mode

 ES-Porter LUA Programming IDE

Following software will be required to start with LUA programming on ESP8266 using ESPlorer.

Download ESPlorer Software from the below link.

https://github.com/4refr0nt/ESPlorer

After downloading ESPlorer.zip extract the same to your desired place. This is how it looks like

The highlighted file in the following image is the file to run ESPlorer. Double click on the highlighted file to run ESPlorer.
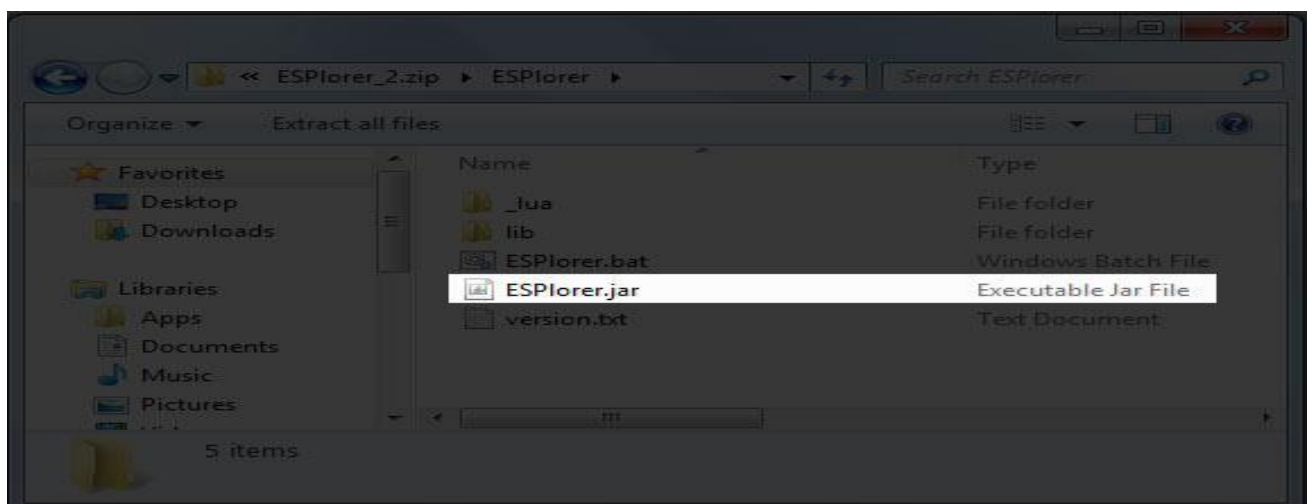
Introduction to ESPlorer

Open ESPlorer as explained in above steps. It looks like following image –
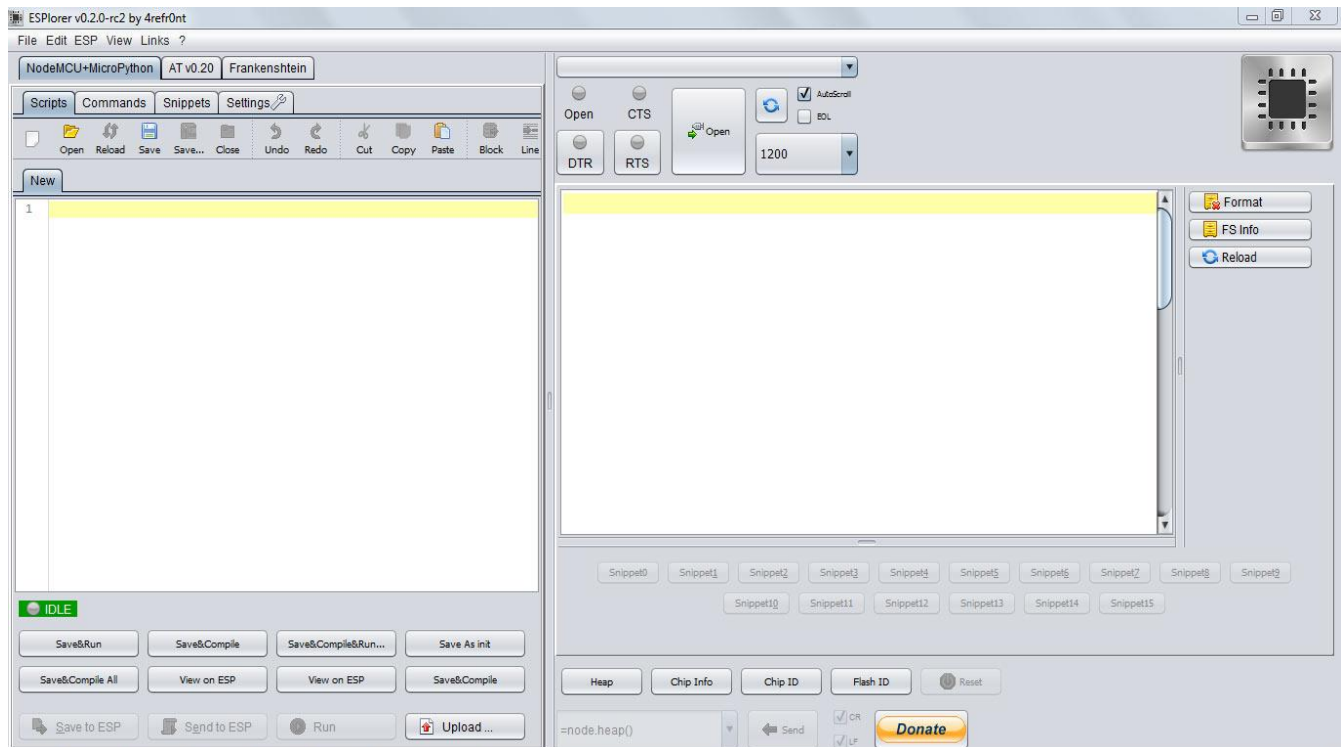
Connect your ESP8266 to your computer and note down the COM port (Mine is COM2). You will need to restart Es-plorer after connecting ESP8266 to the computer. Select you COM port. COM Port selection area is highlighted in the following image
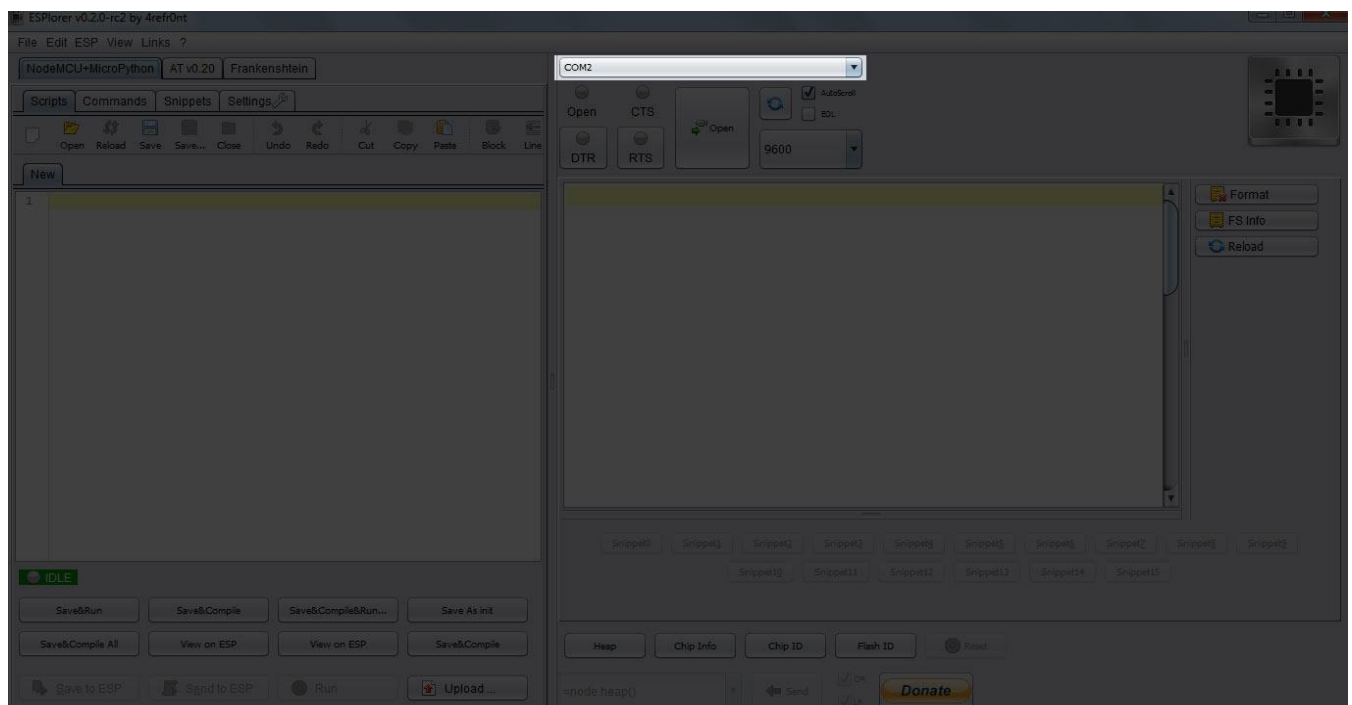
Select Baud Rate as shown highlighted in the below image, It is to be 9600, but some time it doesn't work. So you will need to repeat these steps with other baud rates.
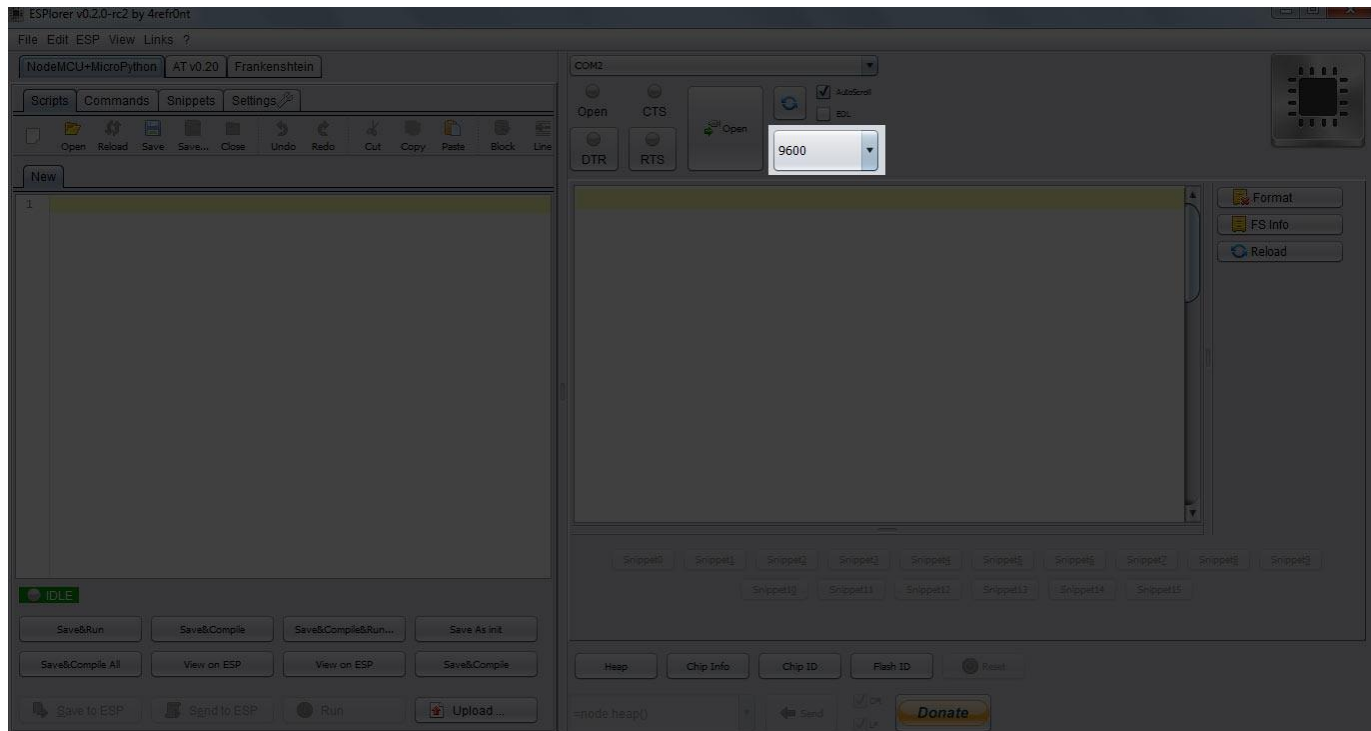
Click on open button to connect ESPlorer to the ESP8266 wifi module.
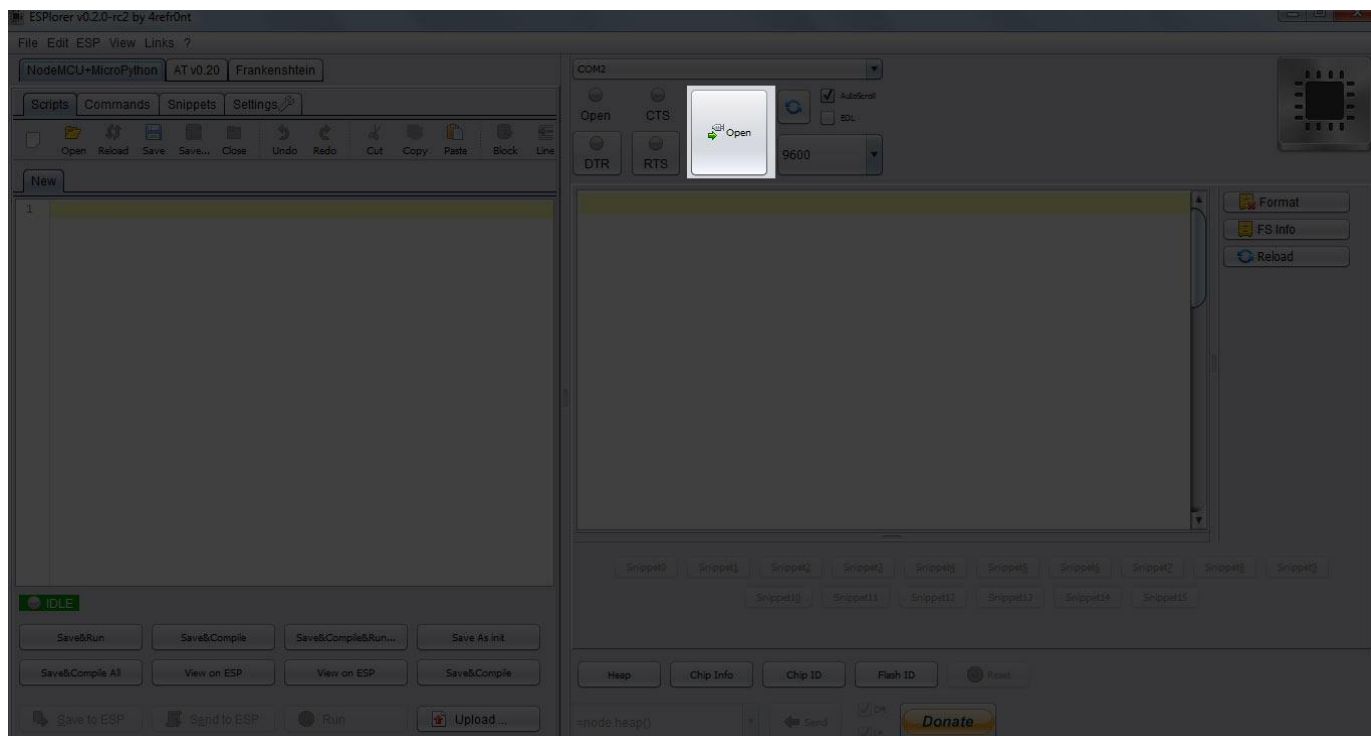
Following window is response window, you will know what exactly is happening in ESP8266 through this window, After successful connection you will see message as shown highlighted in following image.
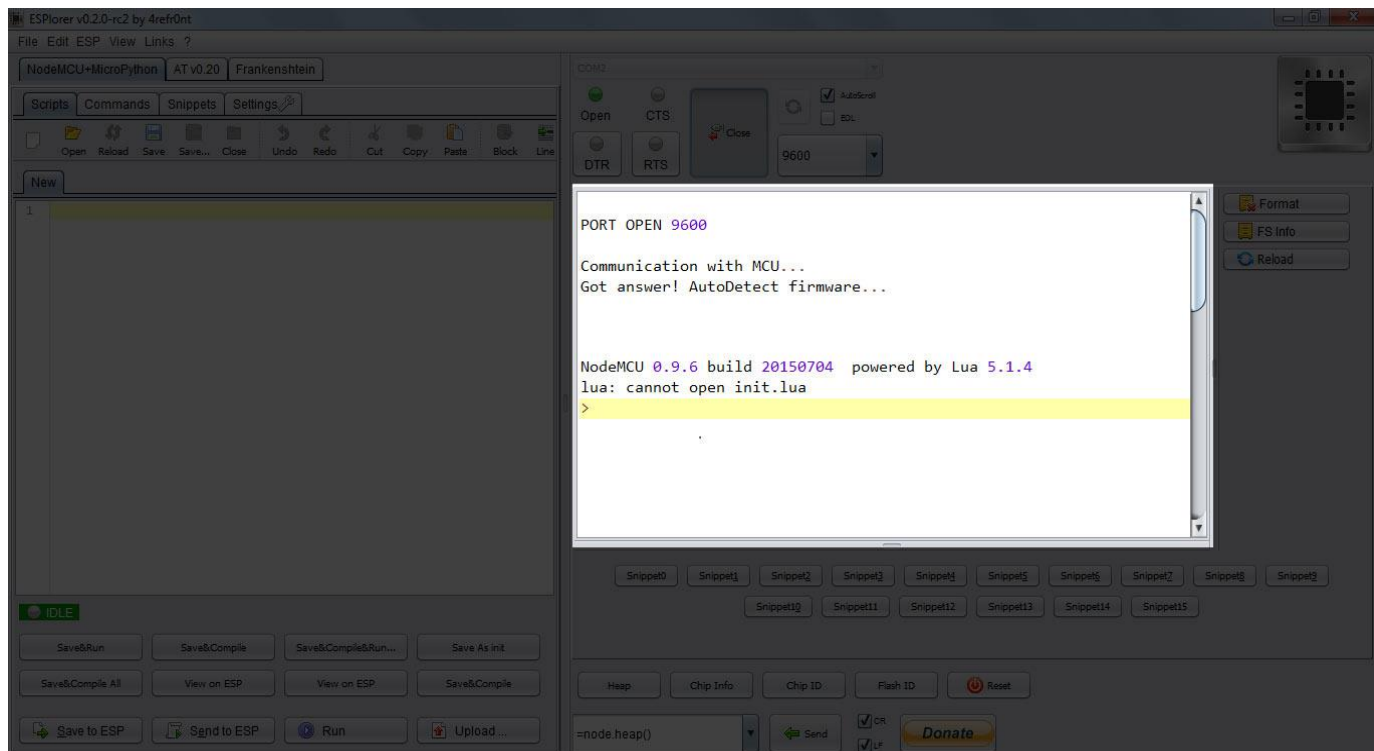
Following window is user window where you can write codes or commands for ESP8266.
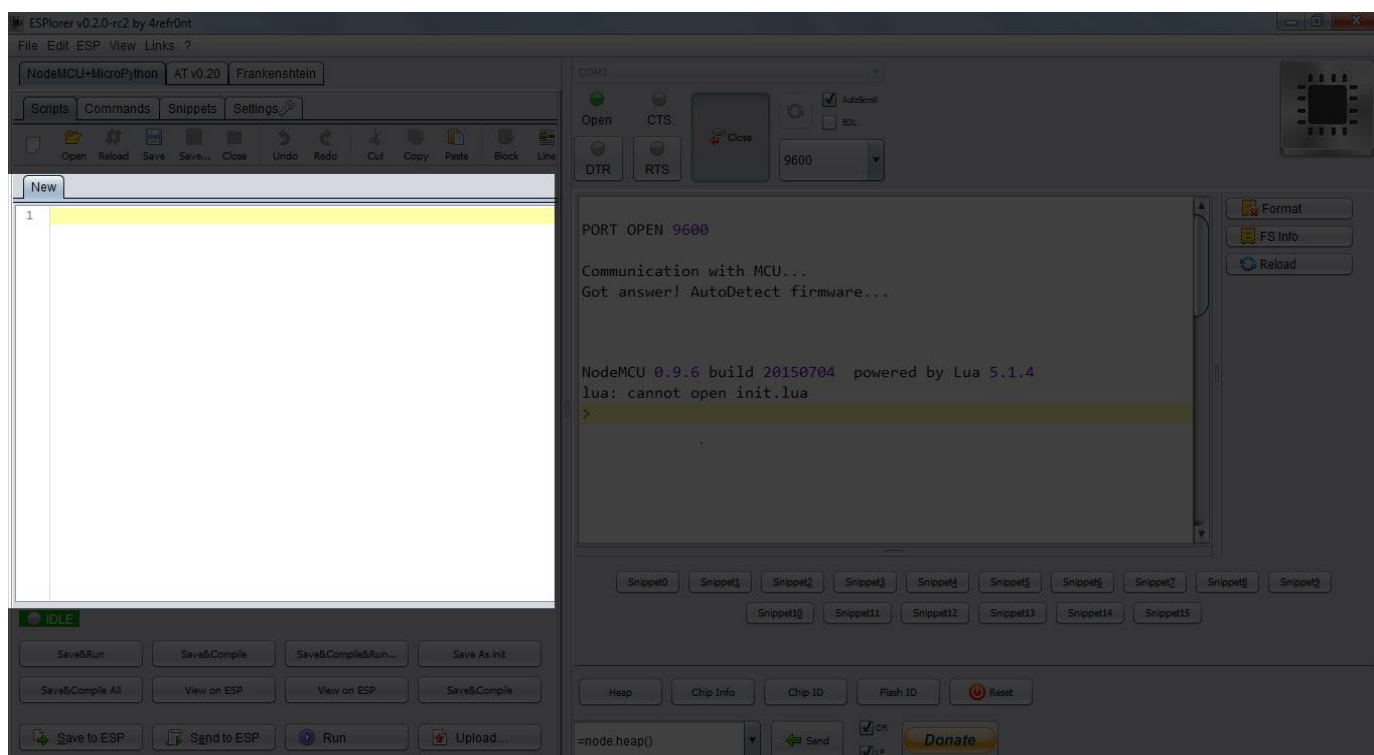
Set of commands can be saved in a form of file with .lua extension. Such files can be transferred to ESP8266 and be executed by calling their name.

init.lua this file is executed at the starting. So as the ESP8266 wifi modules gets power it find init.lua and executes all of the command set written in this file.

For uploading file to ESP8266 you need to have that file prepared with you. You may use Notepad, LUA Editor, or ESPlorer to do the same. Click on the highlighted button locate the file you created and it will be uploaded to ESP8266 wifi module.
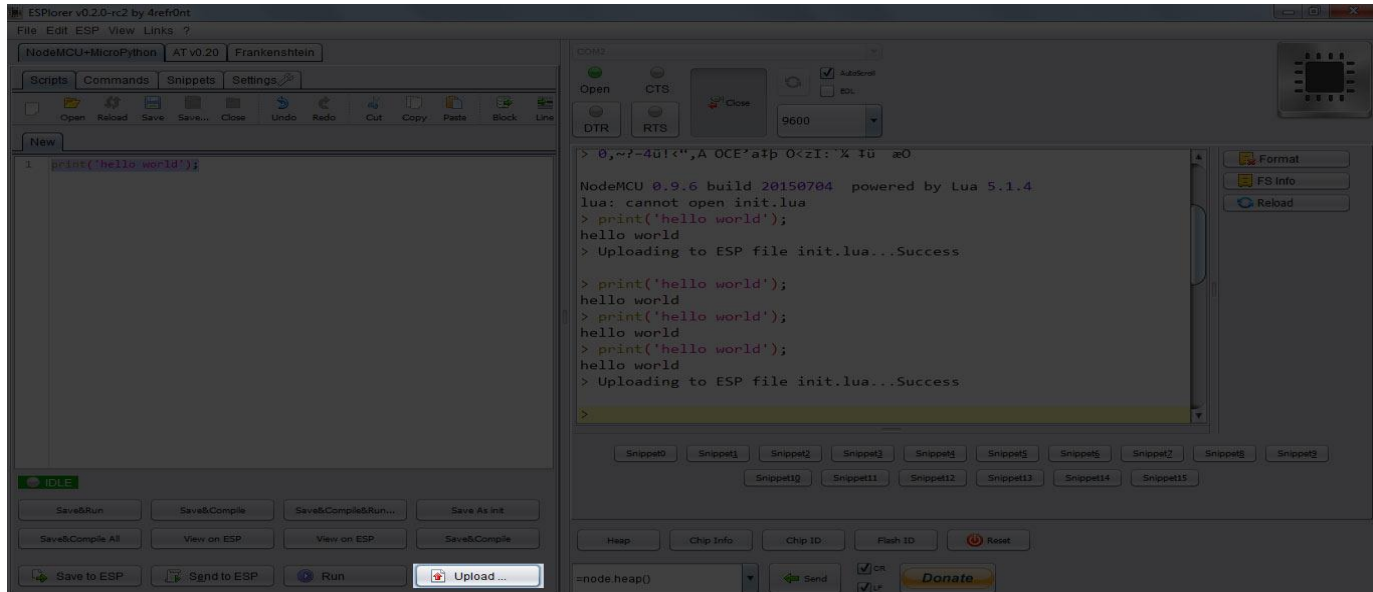
See the response from ESP8266 wifi module after uploading of file.
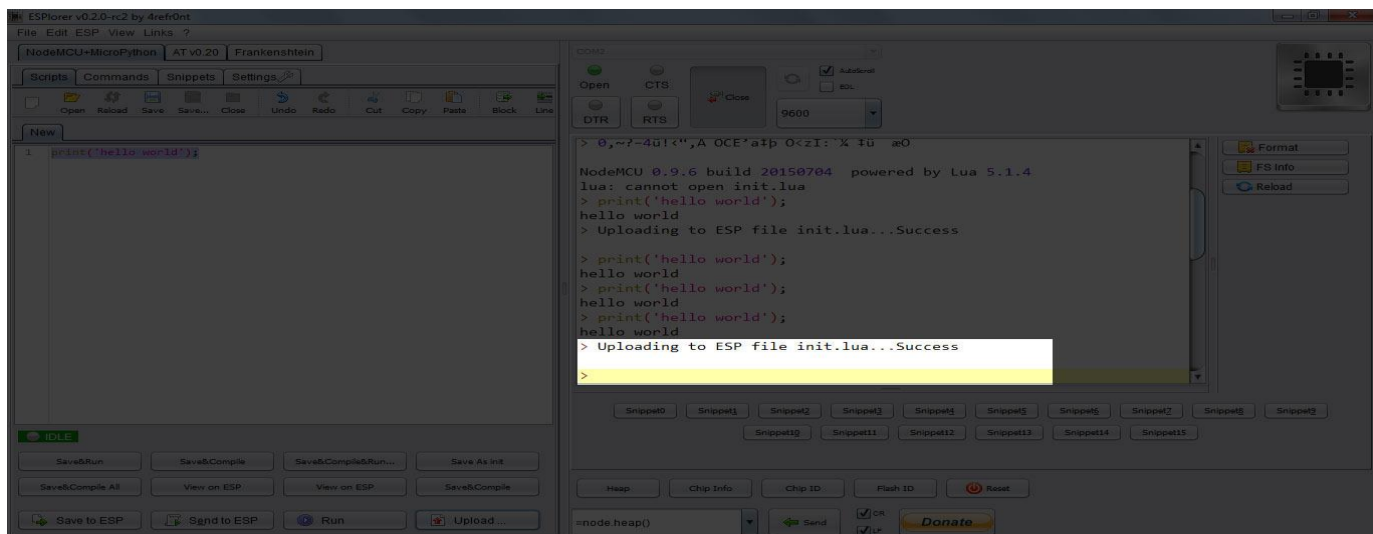
5.2.2 Steps for Configuring Twilio cloud server

To Create a Twilio Account
Go to https://www.twilio.com/
In the top right corner, click on the **SIGN UP** button
You'll be taken to the following screen. Enter your first and last name along with email address.

When selecting a password Twilio will give you the specifics required for a password.

Password requirements:
At least 8 Characters and
Include at least 3 of the following 4 elements:
One Upper case letter
One special character
One lowercase letter
One number

After all information has been entered Select **"Get Started"** Button
Next is the Twilio verification process…

You will enter your phone number. It can either be a cell number or a home number. The website

defaults to using a cell number and there's a **Text Me** option, however, if you are using a home

number, you can select "**call me instead**" option

Once you have entered your number and clicked either "Text Me" or "Call you instead," you will receive a verification code. You will enter this code and hit **Submit**.

Once you have been verified you will be then logged in to your Twilio account and land at the "Getting Started Page". Then select "Get your Twilio number" in the upper left hand corner of the page

Once you have selected your Twilio number you will again be taken to your account's Getting Started Page. Make note of your Twilio number to enter into the TaxSlayer program. In the opt right corner of the page select the Show API Credentials drop down arrow to get the other necessary information to configure the Twilio feature in TaxSlayer.

Once the API information is displayed you have all the necessary information for the Tax Slayer program

5.3 Gadget for Image capturing of culprit and Location tracking of victim

Facts at a glance in rape cases in India :

- Nearly 1 in 5 (18.3%) women reported experiencing rape at some time in their lives.
- Approximately 1 in 20 women and men (5.6% and 5.3%, respectively) experienced sexual violence other than rape.
- Among female rape victims, perpetrators were reported to be intimate partners (51.1%), family members (12.5%), acquaintances (40.8%) and strangers (13.8%).
- 13% of women reported they experienced sexual coercion at some time in their lives.
- In a study of undergraduate women, 19% experienced attempted or completed sexual assault since entering college.
- Among female victims of partner violence who filed a protective order, 68% reported they were raped by their intimate partner and
- 20% reported a rape-related pregnancy

From the above facts we can clearly see women, girls and now a days even the minor kids are getting affected mentally as well as physically with the so called societal issue of rape, not only the victim is affected by this crime but also the entire family has to undergo critical circumstance after the occurrence of this nasty crime.

Even though the victim has undergone the situation of physical violence, sexual molestation, rape etc. our Indian judicial system still requires a valid proof against the culprit to prove him guilty, There number of rape case residing unsolved in our judicial courts and still many of victims are behind the expectation that either one of the day there will be justice prevailed in the entire country regarding the sexual violence.

Some of the statistics on rape cases are as follows:

- In 2016, India recorded 106 rapes a day
- A large number of those raped (2,116) were girls in the age-group of 0 to 12 years and in 36,859 (94.6%) of cases
- The national capital Delhi witnessed the most rape cases at 1,996
- followed by 712 in Mumbai, 354 in Pune and 330 in Jaipur

The solution for providing justice for the women who has undergone the violence is by building a smart surveillance system that is fully autonomous and works without aid of any manual input to the device. The proposed system design is as shown in the above figure.

The gadget captures the image when there a suspected motion in front of the camera, a copy of the captured image is stored on the both device memory and the registered Email Id, even if the culprit destroys the gadget the copy of   culprit image can be recovered from the registered Email id. The device also sends out the location of the victim under the critical situation.

The captured image of the culprit can be hence forth used to show in the judicial courts and prove the culprit guilty thus our proposed gadget assures that women gets complete justice for the critical situation she has underwent.

5.3.1 Installation of Raspbian Operating system

A Raspberry Pi (Either a Model B or Model B+)
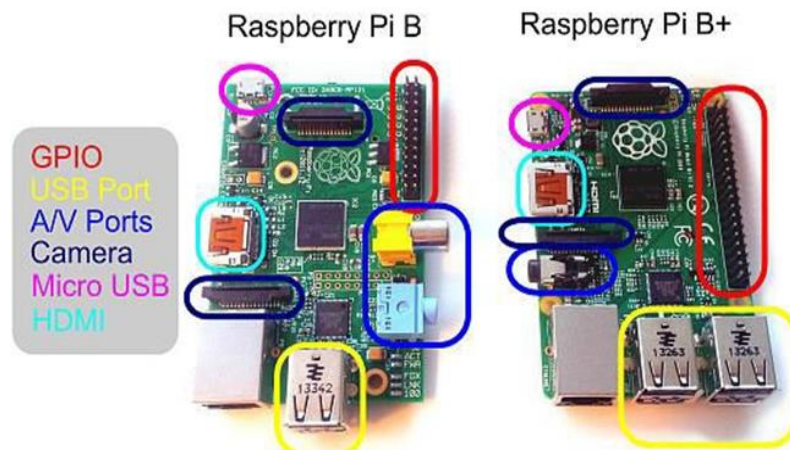
- **SD Card**
  We recommend an 8GB class 4 SD card.

- **Display and connecting cables**
  Any HDMI/DVI monitor or TV should work as a display for the Pi.
  For best results, use one with HDMI input, but other connections are available for older devices.

- **Keyboard and mouse**
  Any standard USB keyboard and mouse will work with your Raspberry Pi.

- **Power supply**
  Use a 5V micro USB power supply to power your Raspberry Pi. Be careful that whatever power supply you use outputs at least 5V; insufficient power will cause your Pi to behave unexpectedly.

- **Internet connection**
  To update or download software, we recommend that you connect your Raspberry Pi to the internet either via an Ethernet cable or a WiFi adaptor.

- **Sound**
  Headphones, earphones or speakers with a 3.5mm jack will work with your Raspberry Pi.

STEPS:
- http://downloads.raspberrypi.org/raspbian_latest
- Download the file "RASPBIAN Debian Wheezy.zip" and extract the image file.
- Insert the SD card into your SD card reader (format the sd card) and check which drive letter was assigned. You can easily see the drive letter (for example G:) by looking in the left column of Windows Explorer. You can use the SD Card slot (if you have one) or a cheap SD adaptor in a USB port.
- Download the **Win32DiskImager** utility from the Source forge Project page (it is also a zip file); you can run this from a USB drive.

- http://sourceforge.net/projects/win32diskimager/files/latest/download
- Extract the executable from the zip file and run the **Win32DiskImager** utility; you may need to run the utility as administrator. Right-click on the file, and select Run as administrator.
- Select the image file you extracted above.
- Select the drive letter of the SD card in the device box. Be careful to select the correct drive; if you get the wrong one you can destroy your data on the computer's hard disk! If you are using an SD card slot in your computer and can't see the drive in the Win32DiskImager window, try using a cheap SD adaptor in a USB port.
- Click Write and wait for the write to complete.
- Exit the imager and eject the SD card

USING WIN32DISKIMAGER

Having plugged in your SD card, (re)start Win32Diskimager. Choose the drive you want to copy the image to (in my case F:).

- **choose the drive with your SD card to write the OS image on**

Then click on the folder icon and choose the unzipped .img file from earlier that you want to put on the SD card. Then click Write, to write the Operating system on the card from the .img file
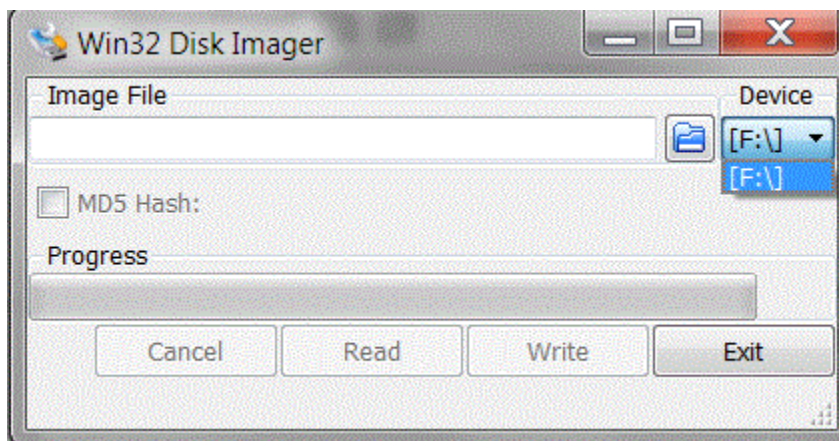
- **Write OS image from .img file to SD card**

You will then be asked to confirm. Check carefully that you are writing to the correct device and if so, click Yes.
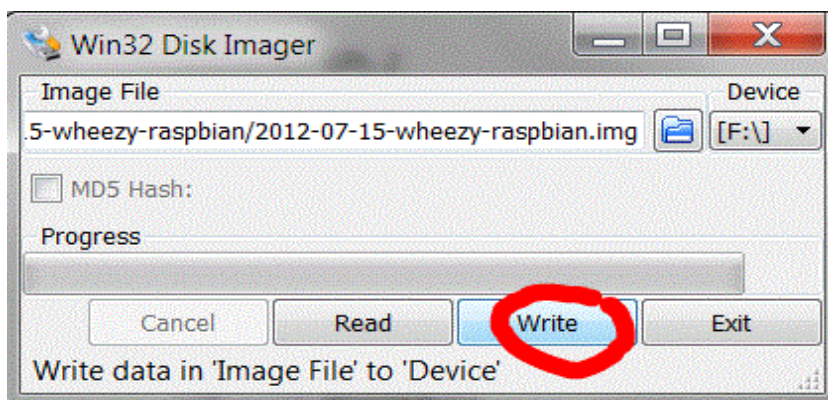
- **Check device and confirm**

The progress bar will show you how far it's got.
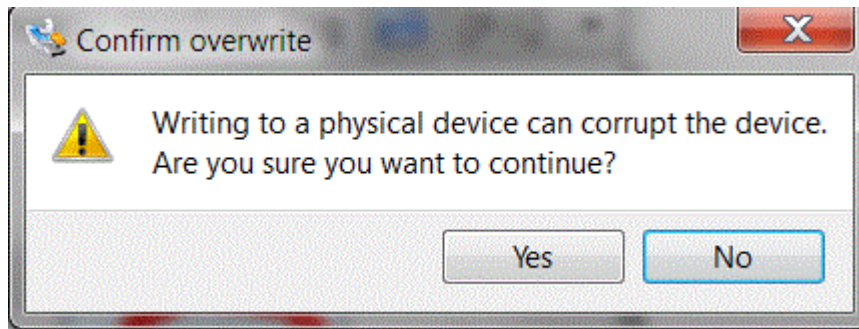
- **Progress indicator**

When it's finished it looks like this.
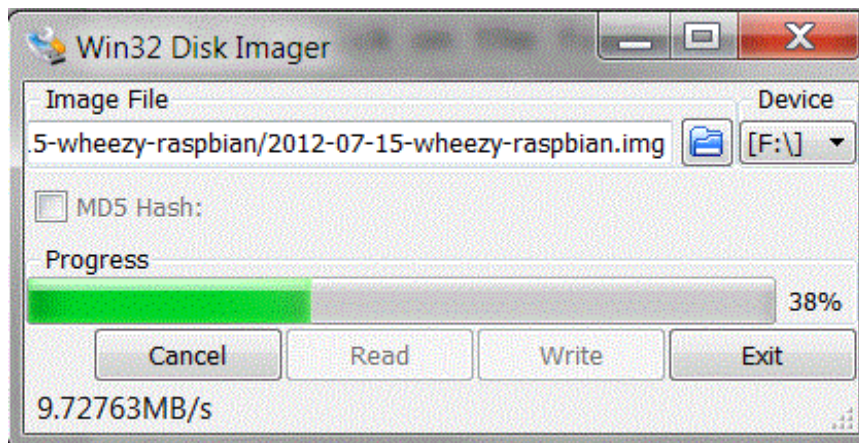
- *Finished*

Then you can eject the card reader and remove the SD card. Then you can try it out in your Raspberry Pi
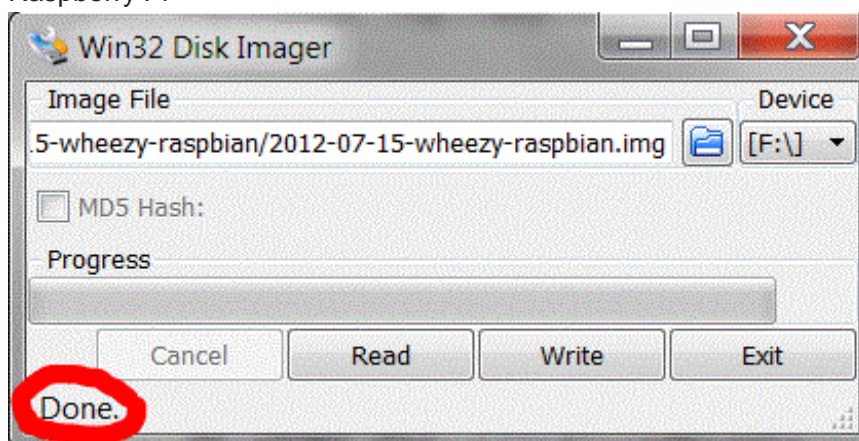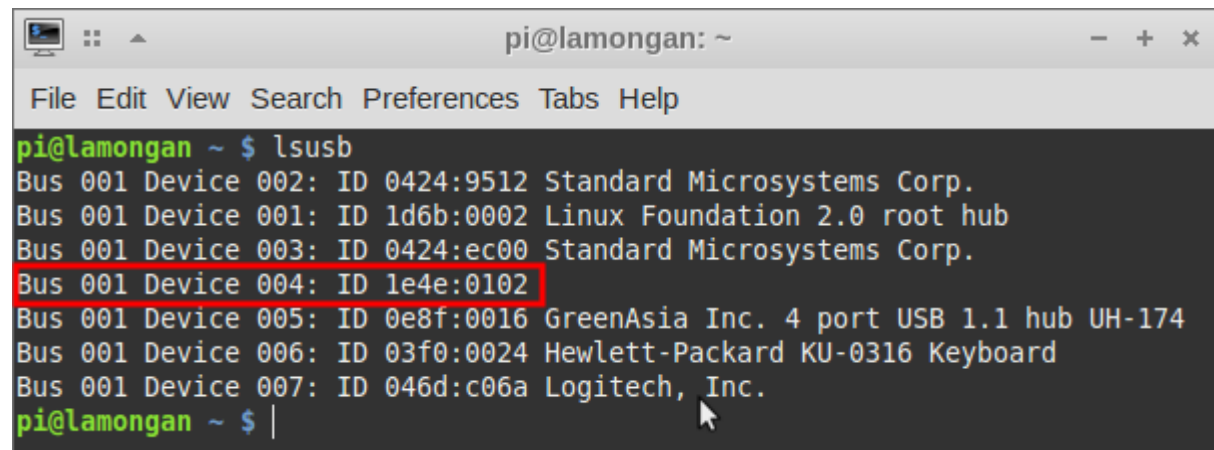
5.3.2 USB Camera Installation

Check if a USB Webcam is Compatible with Raspberry Pi

To check whether your USB web camera is detected on Raspberry Pi or not, plug it into the USB port of your Raspberry Pi, and type lsusb command in the terminal

$ lsusb

```
pi@lamongan ~ $ lsusb
Bus 001 Device 002: ID 0424:9512 Standard Microsystems Corp.
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 001 Device 003: ID 0424:ec00 Standard Microsystems Corp.
Bus 001 Device 004: ID 1e4e:0102
Bus 001 Device 005: ID 0e8f:0016 GreenAsia Inc. 4 port USB 1.1 hub UH-174
Bus 001 Device 006: ID 03f0:0024 Hewlett-Packard KU-0316 Keyboard
Bus 001 Device 007: ID 046d:c06a Logitech, Inc.
pi@lamongan ~ $ 
```

In the above screenshot, the USB web camera is detected as "1e4e:0102", but it doesn't show the maker or the name of the web camera. When we try it with Fedora 20 in a laptop, it is successfully detected as "1e4e:0102 Logitech C170 WebCam."

Take a Picture with USB Webcam

After your USB webcam is successfully hooked up with Raspberry Pi, the next thing to do is to take some pictures to verify its functionality.
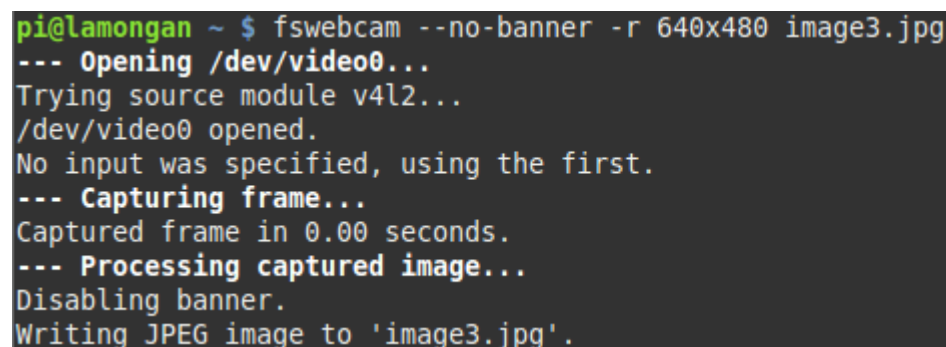
For this, you can install fswebcam, which is a small webcam application. You can install fswebcam directly from the Raspbian repository as follows

$ sudo apt-get install fswebcam

Once fswebcam is installed, run the following command in a terminal to capture a picture from the USB webcam:

$ fswebcam --no-banner -r 640x480 image.jpg

This command will capture a picture with 640x480 resolution, and save it as image.jpg. It will not put any banner in the bottom part of the picture.

```
pi@lamongan ~ $ fswebcam --no-banner -r 640x480 image3.jpg
--- Opening /dev/video0...
Trying source module v4l2...
/dev/video0 opened.
No input was specified, using the first.
--- Capturing frame...
Captured frame in 0.00 seconds.
--- Processing captured image...
Disabling banner.
Writing JPEG image to 'image3.jpg'.
```

5.3.3 Installation of Postfix for Sending Email

In this section, you will install Postfix as well as *libsasl2*, a package which helps manage the Simple Authentication and Security Layer (SASL).

    1. Install Postfix and the libsasl2-modules package:

> **sudo apt-get install libsasl2-modules postfix**

    2. During the Postfix installation, a prompt will appear asking for your **General type of mail configuration**. Select **Internet Site**:
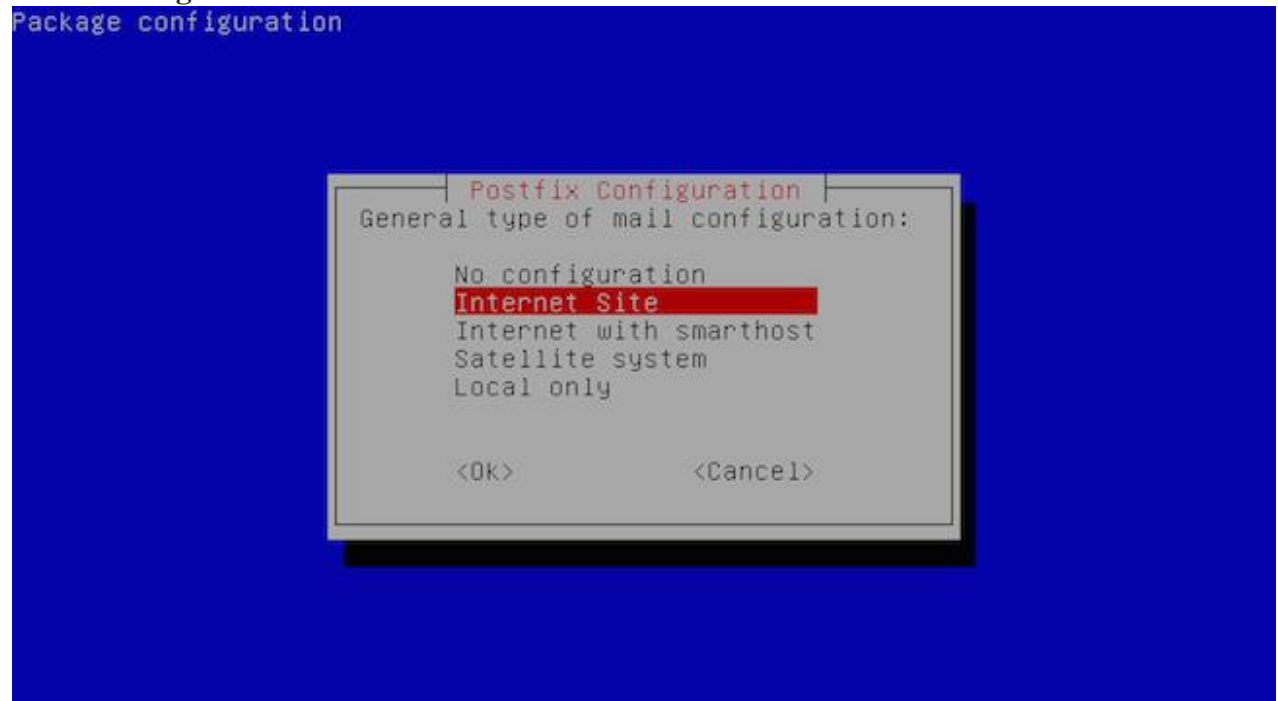
3.   Enter the fully qualified name of your domain. In this example, **fqdn.example.com**
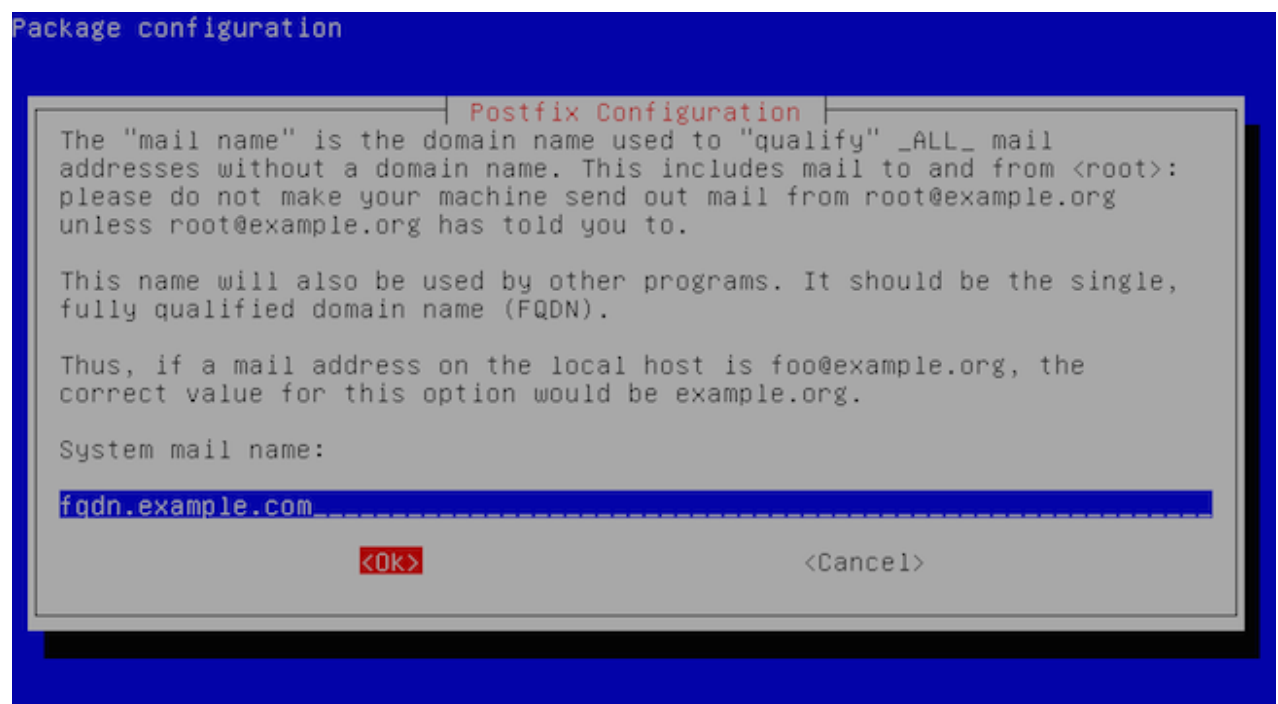
Once the installation is complete, confirm that the myhostname parameter is configured with your server's FQDN:

/etc/postfix/main.cf

```
1   myhostname = fqdn.example.com
```

Generate an App Password for Postfix

When Two-Factor Authentication (2FA) is enabled, Gmail is preconfigured to refuse connections from applications like Postfix that don't provide the second step of authentication. While this is an important security measure that is designed to restrict unauthorized users from accessing your account, it hinders sending mail through some SMTP clients as you're doing here. Follow these steps to configure Gmail to create a Postfix-specific password:

1. Log in to your email, then click the following link: Manage your account access and security settings. Scroll down to "Password & sign-in method" and click **2-Step Verification**. You may be asked for your password and a verification code before continuing. Ensure that 2-Step Verification is enabled.
2. Click the following link to Generate an App password for Postfix:

3. Click **Select app** and choose **other (custom name)** from the dropdown. Enter "Postfix" and click **Generate**.
4. The newly generated password will appear. Write it down or save it somewhere secure that you'll be able to find easily in the next steps, then click **Done**:

Add Gmail Username and Password to Postfix

Usernames and passwords are stored in sasl_passwd in the /etc/postfix/sasl/ directory. In this section, you'll add your email login credentials to this file and to Postfix.

1. Open or create the /etc/postfix/sasl/sasl_passwd file and add the SMTP Host, username, and password information:

/etc/postfix/sasl/sasl_passwd

```
1   [smtp.gmail.com]:587 username@gmail.com:password
```

2. Create the hash db file for Postfix by running the postmap command:

```
sudo postmap /etc/postfix/sasl/sasl_passwd
```

If all went well, you should have a new file named sasl_passwd.db in the /etc/postfix/sasl/ directory.

Secure Your Postfix Hash Database and Email Password Files

The /etc/postfix/sasl/sasl_passwd and the /etc/postfix/sasl/sasl_passwd.db files created in the previous steps contain your SMTP credentials in plain text.

To restrict access to these files, change their permissions so that only the **root** user can read from or write to the file. Run the following commands to change the ownership to root and update the permissions for the two files:

```
sudo chown root:root /etc/postfix/sasl/sasl_passwd /etc/postfix/sasl/sasl_passwd.db
sudo chmod 0600 /etc/postfix/sasl/sasl_passwd /etc/postfix/sasl/sasl_passwd.db
```

Configure the Postfix Relay ServerPermalink

In this section, you will configure the /etc/postfix/main.cf file to use Gmail's SMTP server.

1. Find and modify relayhost in /etc/postfix/main.cf to match the following example:

/etc/postfix/main.cf

```
relayhost = [smtp.gmail.com]:587
```

2. At the end of the file, add the following parameters to enable authentication:

/etc/postfix/main.cf

```
1    # Enable SASL authentication
2    smtp_sasl_auth_enable = yes
3    # Disallow methods that allow anonymous authentication
4    smtp_sasl_security_options = noanonymous
5    # Location of sasl_passwd
6    smtp_sasl_password_maps = hash:/etc/postfix/sasl/sasl_passwd
7    # Enable STARTTLS encryption
8    smtp_tls_security_level = encrypt
9    # Location of CA certificates
10   smtp_tls_CAfile = /etc/ssl/certs/ca-certificates.crt
```

3. Save your changes and close the file.
4. Restart Postfix:

```
sudo systemctl restart postfix
```

5.3.4 Installation of motion software

Type in the command to start the installation.

'**sudo apt-get install motion** '

After the installation is complete, type in the command ' **sudo nano /etc/motion/motion.conf**' and press enter.

Then you have to change some settings in the .conf file. It might be difficult sometimes to find the settings but use **'ctrl + w'** to find it. So follow the steps:

1. Make sure **'daemon' is ON**.

2. Set **'framerate'** anywhere in between **1000 to 1500**.

3. Keep '**Stream_port'** to **8081.**

4. **'Stream_quality'** should be **100.**

5. Change '**Stream_localhost'** to **OFF.**

6. Change '**webcontrol_localhost'** to **OFF.**
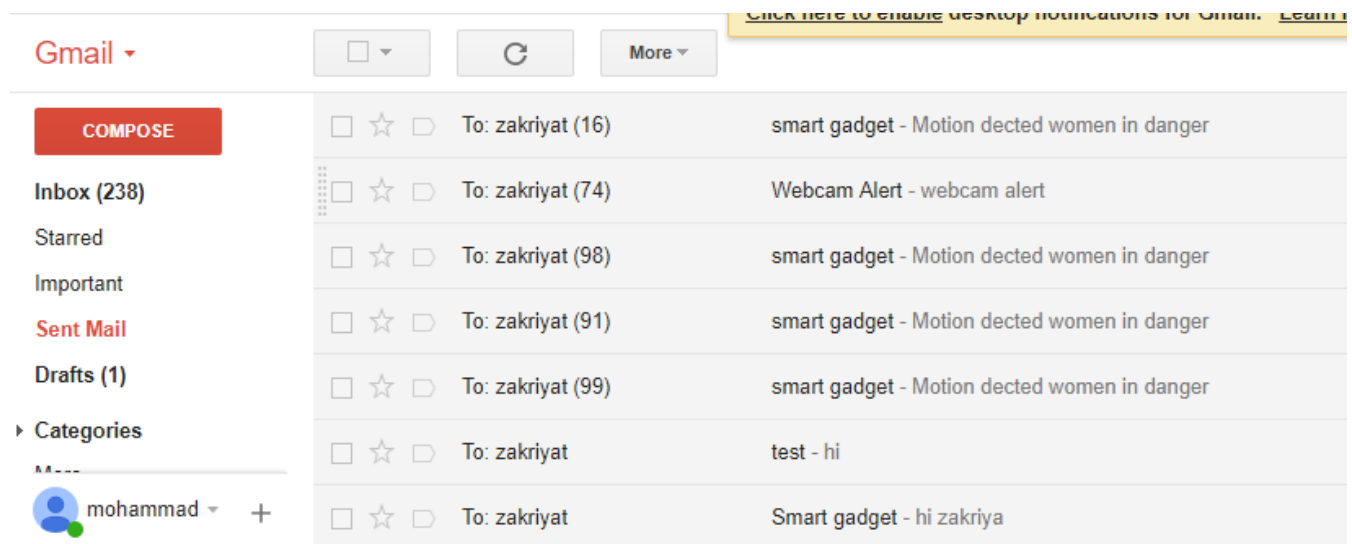
7. Set **'quality'** to **100.**

8. Set '**width**' & '**height**' to **640** & **480.**

9. Set '**post_capture**' to **5.**

10. Press **ctrl** + **x** to exit. Type **y** to save and **enter** to conform.

Again type in the command '**sudo nano /etc/default/motion** ' and press **enter**.

Set ' **start_motion_daemon** ' to **yes.** Save and exit.

5.3.5 The implementation results are as shown in figure
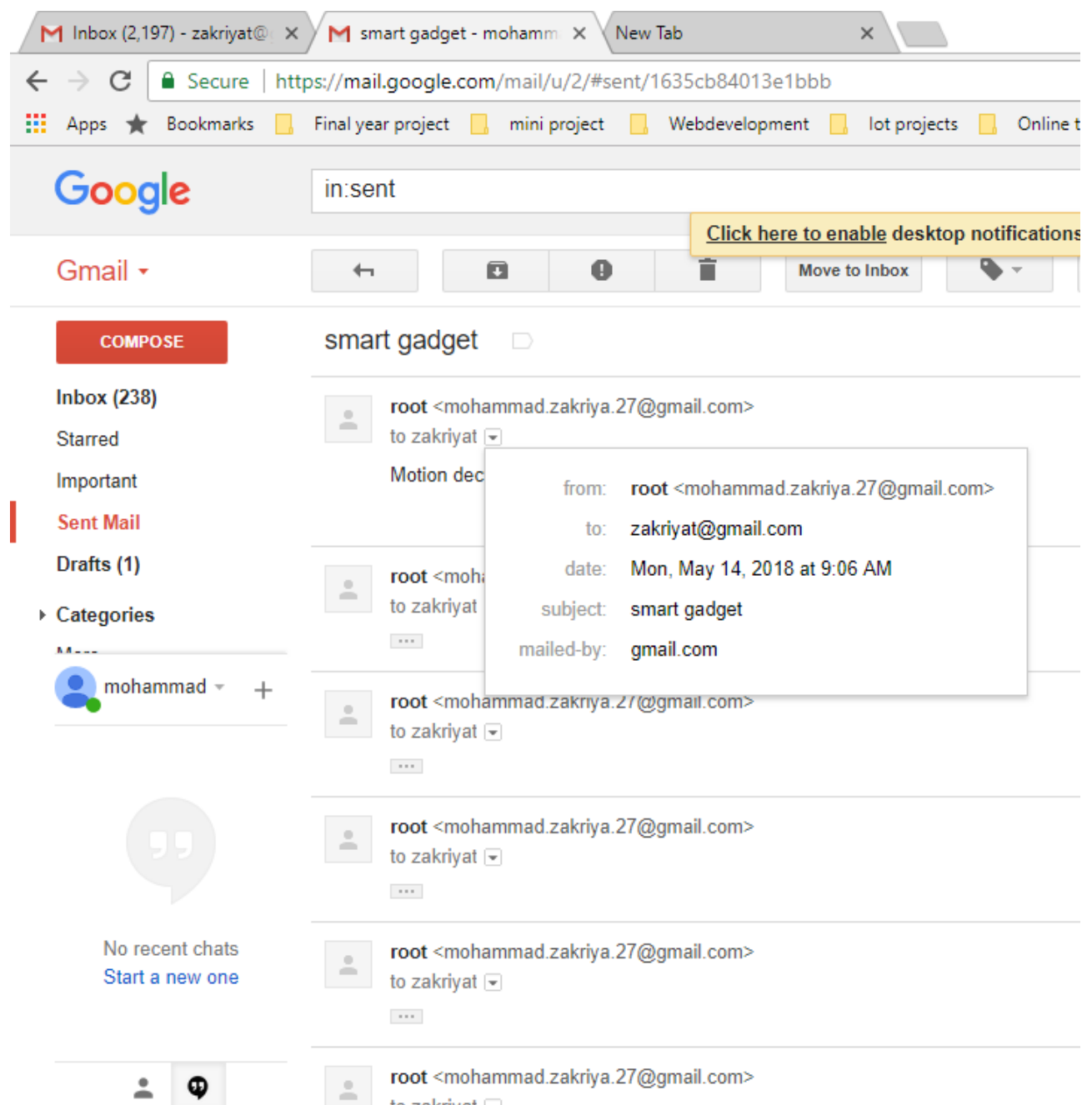
6. Conclusion

The paper mainly focuses on the low cost implementation of the device which can save the life of the women in the critical condition the proposed system provides end to end security solutions for women safety using the advance technologies of IoT along with combined hardware technology like Raspberry pi, Nodemcu. The proposed system not only defends the women in the critical situation of rape, molestation but also the captured image of the culprit is used as a valid proof that can be presented in the Indian Judicial Courts for making the culprit guilty for his committed crime.

The overall system is first of its kind that provides a complete kit solution to the existing women safety problem, with the complete system the women can now travel freely without any hesitations of getting harmed by the societal issues. The further research can be made to make the prototype version of our system into a consumer portable product.

7. References

- Alexandrous Plantelopoulous and Nikolaos.G.Bourbakis, "A Survey on Wearable sensor based system for health monitoring and prognosis," IEEE Transaction on system, Man and Cybernetics, Vol.40, No.1, January 2010.

- B.Chougula, "Smart girls security system," International Journal of Application or Innovation in Engineering & Management, Volume 3, Issue 4, April 2014.

- Vamil B. Sangoi, "Smart security solutions," International Journal of Current Engineering and Technology, Vol.4, No.5, Oct-2014.

- G C Harikiran, Karthik Menasinkai, Suhas Shirol
  Smart Security Solution for Women based on Internet of Things (IOT) International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT) – 2016

- https://www.slideshare.net/iAbhishekSuman/project-report-on-women-safety-and-empowerment?qid=1b357fab-11d4-439f-9178-bc2a68ebe71c&v=&b=&from_search=11

- https://epaper.timesgroup.com/Olive/ODN/TimesOfIndia/shared/ShowArticle.aspx?doc=TOIDEL%2F2017%2F12%2F01&entity=Ar02311&sk=1051FF23&mode=text