Chapter 1

INTRODUCTION

1.1 PROJECT MOTIVATION

Usually we all want a system that uses less man power, computer system for control, more accurate and efficient performance or else more precisely we can say that we want automated systems in our day to day life. In that case if the system has wireless control over the mechanisms and operations in hardware/process then it becomes more user friendly.

As we all know soldiers need to operate army weapons by their own on the risk of their own lives. While living in 21st century we have different technologies by virtue of them human life became easier and stress less. Then why not soldiers????? They also have a right to enjoy their life with ease and relief.

Now a days we can see the different defense news, the 10 Indian soldiers who died in avalanche, became the latest addition to a growing list of causalities suffered by the army in Siachen, also many time there is conflict between Pakistan and India in which unworthy people lost their lives. To overcome such situation we are trying to find a solutions at our level.

Basic idea is generated from the counter strike game. By taking forward to the same concept we are here to propose a system that has automatic control over a sniper through wireless connectivity.

1.2 PROJECT OBJECTIVES

1. To save the man power.
2. To improve secure defense system.
3. To develop a cost effective solution for controlling and monitoring critical situations on field.
4. To control the processes or operations in hazardous environment.

1.3 SIGNIFICANCE OF PROJECT

1. Accurate Tracking and Shooting is possible.
2. Less man power with higher security.
3. Multiple accesses from single user or operator.

1.4 INTRODUCTION TO AUTOMAED SYSTEMS

In today's technologic world the necessity of human interface to complete a task has been reduced.

Automated systems have been incorporated into production lines and machines for years to fulfill the requirement of processing speed. Some tasks are incorporated with time-consuming or inconvenient processes. To avoid such difficulty in production line many manufacturing industries are working to develop automated systems that can easily handle the job and work with hazardous environment.

Automated systems can be used to handle a wide range of tasks. These systems have key components like control system, feedback system to interpret and perform the task properly. In such systems programmable logic allows the system to process data and control it.

1.5 PROPOSED SYSTEM

If we consider the current scenario of our as well as other's defense system, there is a manual operation of weapons like Sniper, Riffles or machine Guns. While operating this manually the soldiers or operator who is operating that weapon must be present on actual war field, but they are doing their duty on the risk of their own life. In case, unfortunately the enemies' bullets strikes them, then there may be chances of losing their lives. By considering all these drawbacks of traditional defense system we have proposed a solution '**IoT BASED SMART SNIPER'.**

So now what '**smart sniper** 'exactly is???

In the project, under named 'IoT based smart sniper' we are using a smart way to control sniper. Here also we are operating sniper manually but in different way, that the soldier or operator who is operating sniper, he/she will not be on actual war field and he/she will operate the sniper from his/her cabin using wireless Wi-Fi module connected to PC.

As per the project name, initially we detect the stationary targets and gun will be controlled by the operator to locate the actual target. Sniper will move in Upward, Downward, Right and Left direction according to the requirement.

For detection we use Webcam on sniper that shows actual on-field video streaming on monitor at control unit. This advanced feature we have used in our project for providing reliability to operator while performing the tasks.

Chapter 2

LITERATURE REVIEW

2.1 WHAT IS AUTOMATION

- **AUTOMATION:-**

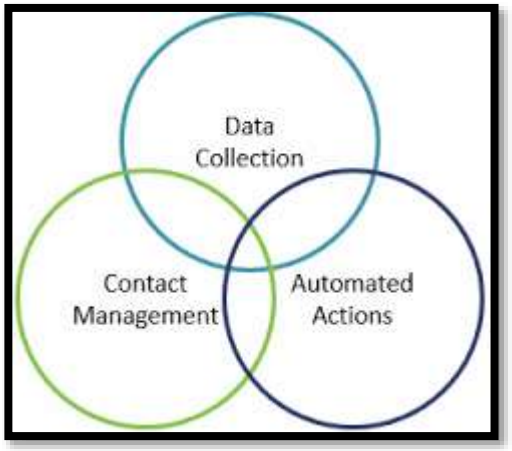

FIG. AUTOMATION

Automation or automatic control is nothing but the use of various control systems in industry for operating processors, boilers, heaters and ovens and other networks. This reduces the human intervention and also saves the time.

The biggest advantage of automation is that it saves labor, saves energy, raw materials and also increases productivity with improved quality. Automation can be done with the help of open loop closed system or closed loop control system. In closed loop system feedback is used to calculate the error signal so that the process can be controlled.

- **TYPES OF AUTOMATION :-**

1. Discrete control(ON/OFF):-

This is the most elementary control action mode which has only two fixed positions that are ON and OFF.

These are popularly used in large scale systems with slow process rate. An examples are the thermostats used on household appliances, liquid level controller system for large volume tanks.

2. Continuous control:-

The continuous control system is usually a feedback control system in which measurements are taken from sensors and compared with reference signal to generate an error signal. According to an error signal adjustments are done to improve the accuracy. Such kind of automation is used in manufacturing, aircraft, communications and other industries.

In this type of control action mode output of the controller changes smoothly in response to the input error or rate of change of error.

3. Open and closed loop:-

Open loop and closed loop are two types of control systems. In open loop control system feedback is not present while on other hand in closed loop system feedback from output is given and compared with reference signal to generate an error signal. According to an error signal adjustments are done to improve the accuracy.

2.2 WHAT IS IoT

The Internet of Things (IoT) is a network of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

A thing, in the Internet of Things, can be physical device or sensor which senses the physical quantity like temperature, pressure, flow, moisture, etc. With the help of assigned IP address they are able to transfer data over a network.

IoT has evolved from the convergence of wireless technologies, micro-electromechanical systems (MEMS), micro services and the internet.

➢ **TERMINOLOGIES USED IN IOT :-**

- **Internet of Things:** A network of internet-connected objects able to collect and exchange data using embedded sensors.
- **Internet of Things device:** Any stand-alone internet-connected device that can be monitored and/or controlled from a remote location.
- **Internet of Things ecosystem:** All the components that enable businesses, governments, and consumers to connect to their IoT devices, including remotes, dashboards, networks, gateways, analytics, data storage, and security.
- **Physical layer:** The hardware part of IoT that includes sensors and other physical devices.
- **Network layer:** It transmits data collected by the physical layer to different devices.
- **Application layer:** This includes the protocols and interfaces used by devices to identify and communicate with each other.
- **Remotes:** They are nothing but entities that controls the network including smartphones, tablets, PCs, smart watches, connected TVs, and nontraditional remotes.
- **Dashboard:** Displays information about the IoT ecosystem to users and enables them to control their IoT ecosystem.
- **Analytics:** Software systems that analyze the data generated by IoT devices. The analysis can be used for a variety of scenarios, such as predictive maintenance.
- **Networks:** The internet communication layer that enables the entity to communicate with their device, and sometimes enables devices to communicate with each other.

2.3 PREFERRED RESEARCH

➢ **LASTEC DEVELOPES OPTICAL TARGET LOCATOR:-**

An optical target locator (OTL) has designed and developed by Laser science and technology center (LASTEC), Delhi. For detection of passive or active optical threats they uses laser based portable surveillance device. The system function is based on cat's eye effect .when laser beam illuminated on

any optical system it returns some back scattered energy. After that by using retro reflected energy we can locate optical targets against a static background.

The system has an important role in detection of any active/passive surveillance device from their front-end optics using the retro reflected signal. There is electronic sensors as in Lesser Range Finders(lords) can be detected by this approach and eye or passive sensors like binoculars, day sight or night vision device(NVD) .The threat could be in terms of a NVD or a sniper equipped with a day sight or any other electro/optical sibilance device. Binoculars sibilance cameras LRF designates etc.

- **TARGET DETECTING DEFENCE HUMANOID SNIPER**

In this paper, by using image processing a new method of defense system has been implemented. The main function is bring out the best target tracking technology. This humanoid sniper is designed to overcome foreign attacks at the border of country. Control unit and humanoid unit are two main modules in defense system. At control unit side has a laptop in which Graphical User Interface (GUI) created with the help of MATLAB. Image processing is used to transmit control signals.

The control signal is received by humanoid unit, at a remote location and responds according to the processed control signal. Different image processing techniques are used to process control signal. The humanoid does image processing by the combination of edge detection, scale space analysis, thermal image processing and virtual 3D sizing in 2D image processing and color detection. The working modes of humanoid- (1) Auto Targeting and Auto Shooting (Fully Autonomous) (2)Auto Targeting and Manual Shooting.(Semi-Autonomous).(3)Manual Targeting and Manual Shooting (User Oriented).

- **A REAL-TIME SURVEILLANCE MINI-ROVER BASED ON OPEN CV-PYTHON-JAVA USING RASPBERRY PI 2.**

Where there is a high need of security for both personal and commercial property and assets the real-time surveillance is a vital component in any situation or environment. There are different technologies which provides us such surveillance. The best thing is that surveillance involves not only the assortment of necessary sensors and devices using appropriate tools, but also should be provided in the most optimized way for obtaining feed and data while keeping the minimum expenditure. Our project main aim to develop a low-cost, real-time video surveillance mini-rover which will be capable of providing real-time video streaming and roam around in the area which we want to observe. Our target was to use hardware which very low in cost and easily available.

- **LOW COST REAL-TIME SYSTEM MONITORING USING RASPBERRY PI.**

This paper is all about the design and implementation of a low-cost system monitoring based on Raspberry Pi, a single board computer which follows Motion Detection algorithm written in Python programming language. In addition, the system uses the motion detection algorithm to significantly decrease storage usage and save investment costs. The algorithm for motion detection is being implemented on Raspberry Pi, which enables live streaming camera along with detection of motion. The live video camera can be accessed from any web browser by putting IP address even from mobile in real-time.

- **LAB OF THINGS (LOT)**

Nowadays people live and work replaces by the usage of number of devices and sensors has increased. Some of the frequently used devices in use at home includes light, security cameras, doors, water heaters, windows, thermostats and power meters and more. Sensors can be deployed on these devices for detecting temperature, humidity, motion and

distance. For security purposes of the house we use surveillance camera and monitoring. With the eternity of sensors and devices, there is need to develop effective interconnection and manage them. There is also need to monitor the status and data collected. Deploying devices and sensors for field studies are growing exponentially with increase in several devices and geographic dispersion. Here given one example, if a researcher works in three different domains: work starts with some initial field works and later analysis on the data from that experimental works. Field work can be at a diverse set of locations, and hence it becomes difficult to deploy and monitor the field work. To overcome this difficulty, LoT is being used in real world applications.

Lab of things (LoT) provides deployment and monitoring of the field studies by interconnected devices across geographic dispersion and allows collection of data easier for storage in the cloud. Lot works as a flexible platform for experimental research and smart home. Working: lab of things offers software framework connecting several devices in a home and beyond home. The devices include IP cameras, Z-wave sensors, door sensor, custom devices built using .net gadgeteer, and more.

LoT minimizes the barriers of doing research with connected devices. It consists of two client core components: windows azure and home OS. Home OS is installed on a windows PC in each home. This one is known as home hub. Lab of things uses home OS for implementing application scenarios. The home OS hub accomplishes interconnection between devices and sensors through device drivers, and permits lot applications to access functionality of devices through a set of apes.

- **LoT Applications:-**

LoT can be used for the purposes of Home automation, elderly care, and paralysis patient. Let us consider a paralysis patient, who is not able to switch on/off the light. LoT reduces that barrier by providing textile based capacitive sensor. In this case the sensor being used is fixed to any cloth to the patient present in the wheel chair. The sensor works on the basis of gestures. The patient can use their hand gestures to on/off the light.

While considering the elderly care scenario in LoT, one of the challenges for senior citizens who live alone is social abuse. While seniors are known to be a helpless population, these challenges can be addressed by the Lab of Things Alerts App, a Z-Wave door sensor, web camera and relevant driver.

Technically, each and every time the door opens, the LoT Alerts App invokes the web camera that looks the door to take a photograph. The image can then be sent to a dedicated caregiver through e-mail. In case of home automation, the devices in house are interconnected. By measuring the temperature and humidity can able to open or close the window. Providing door sensor able to open/close the door. And also by providing pressurized sensor in bed, when the person lays down on the bed, the light gets automatically off and in other case, the lights gets automatically on. LoT can be used to develop different apps for different purposes by using relevant sensors and drivers to confirm proper use of devices. This can be a welcome innovation for many applications.

Chapter 3

AUTOMATION WITH RASPBERRY PI

3.1 WHY RASPBERRY PI-3

Parameter	R-Pi	R-Pi 2	R-Pi 3
CPU	ARM1176JZF-S	ARM Cortex-A7	ARM Cortex-A53
CPU speed	700MHz single core	900MHz quad core	1,200MHz quad core
RAM	512MB	1GB	1GB
GPU	BCM Video core IV	BCM Video core IV	BCM Video core IV
Storage	SDHC slot	Micro SDHC slot	Micro SDHC slot
USB Ports	2	4	4
Wi-Fi	No built-in Wi-Fi	No built-in Wi-Fi	802.11n & Bluetooth 4.1

TABLE. COMPARISON OF R-PI MODULES

As described, proposed system requires Wi-Fi connectivity for wireless connection between DFU (Detection & Firing Unit) and deadly eye (control unit). From above comparison, Raspberry Pi-3 has inbuilt Wi-Fi connectivity, which makes R-pi compatible to work with wireless transmission and reception of data. Also it has 4 USB ports so that it can handle 4 devices at a time. With 1200 MHz frequency it provides greater speed than others which is the prior requirement of proposed system for frame transmission of video.

3.2 HOW IT WORKS FOR AUTOMATION

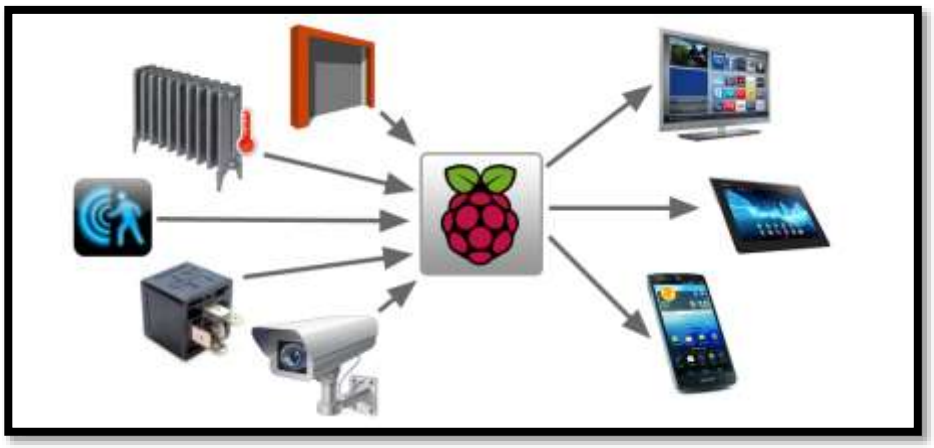

FIG. AUTOMATION WITH R-Pi

Today, the Internet of Things is the most trending technology, that stands alongside automation. It is a very simple concept where devices in our home or wherever they are, have the capability to communicate with each other through internet. Usually sensors are used with this technology to pass data over the internet. We can imagine a sensor installed anywhere which uploads data like temperature, humidity, soil purity to the internet, and this data will be visible from anywhere.

Here we have proposed an IOT based weapon automation system using raspberry pi that automates sniper and allows user to control it easily through internet. Our proposed system consists of dc motors and Wifi connector interfaced with raspberry pi. After connecting to the system through Wi-Fi, the user is allowed to send commands to circuit. The circuit receives the commands over IOT by connecting to internet using wifi connector and then the raspberry processor processes these commands. Thus we automate movement of sniper over internet using raspberry pi.

Chapter 4

PROJECT DESIGN FLOW

4.1 ARCHITECTURE:-

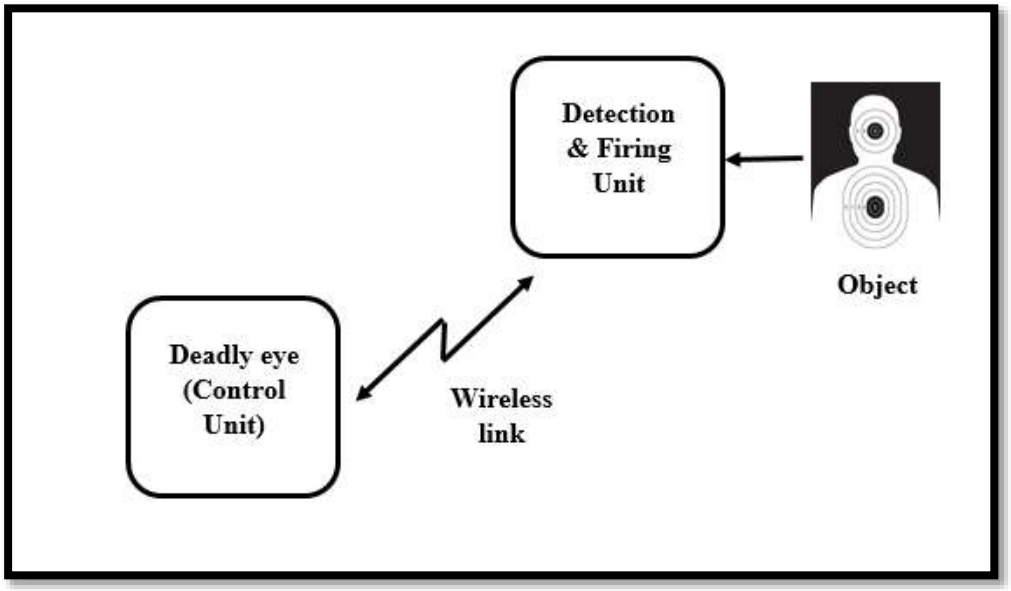

FIG.ARCHITECTURE OF DESIGNED SYSTEM

System consist of two units named as Detection & Firing Unit (DFU) and deadly eye that is control unit. DFU is implemented with Raspberry Pi-3 module interfaced with DC motors and USB web camera. Deadly eye consist of GUI created with python which has control buttons of sniper. Wireless link is created between these two, by virtue of router connected to R-Pi. DFU takes the data or live video from actual war field and send it to the Deadly eye. Referring to the data coming from DFU operator can control the detection of target and can destroy it.

4.2 FLOWCHART:-

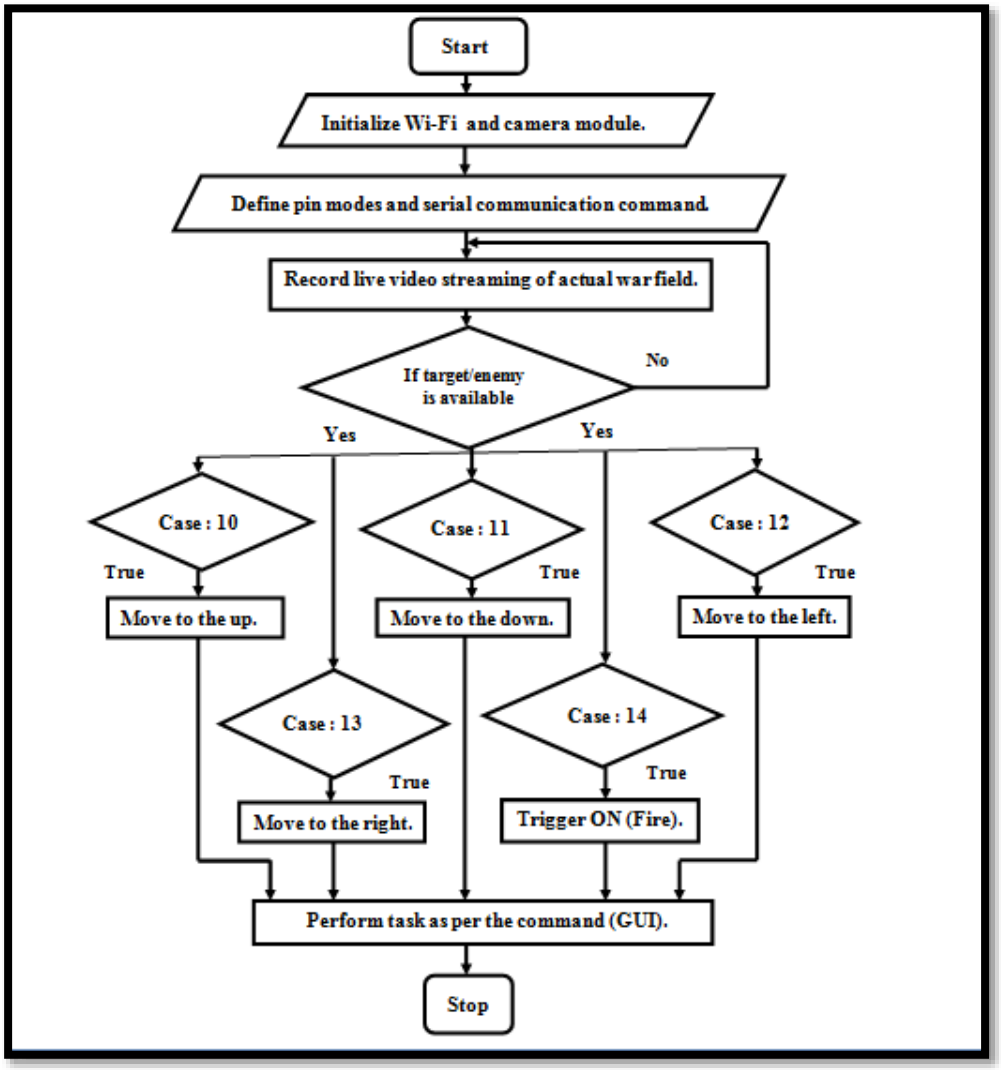

FIG.FLOWCHART.

Chapter 5

PROJECT IMPLEMENTATION

5.1 BLOCK DIAGRAM:-

To overcome the drawbacks of existing system, we have proposed the system, which includes wireless monitoring and control of sniper. The proposed system will reduce the man power and provides the higher security. The system is more user friendly.

With the help of camera mounted on sniper, the detected object will be displayed on user screen. Also object will be tracked for shooting remotely with the help of Wi-Fi Module and Sniper movement mechanisms. Once the static object is get tracked/detected then sniper trigger is operated and then static object will be shooted by Sniper Trigger mechanisms.

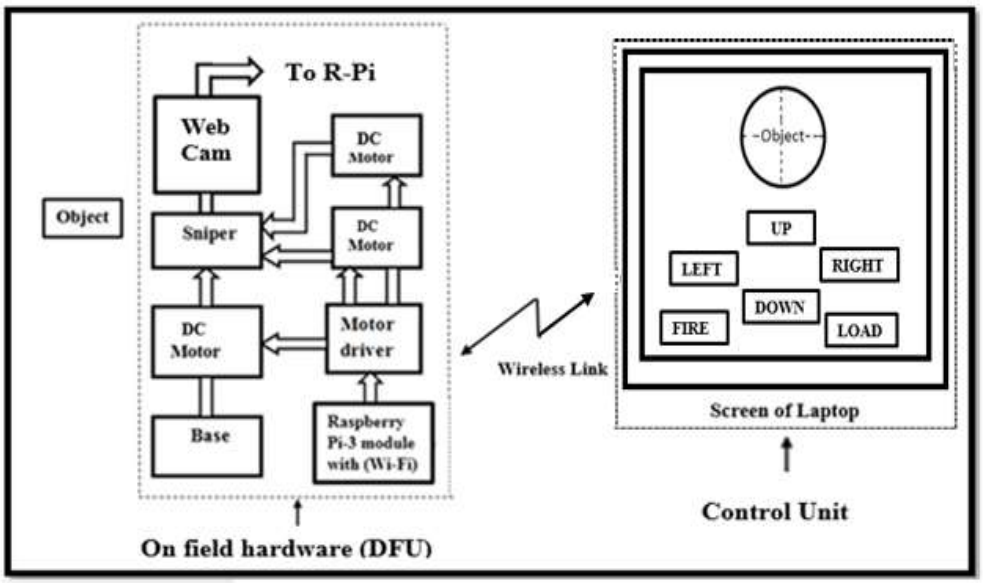

FIG.BLOCK DIAGRAM.

5.2 PROJECT METHODOLOGY

As our project name suggest we are going to prepare the smart sniper for military application.

Here we will use the RPi-3 based camera for object detection, which can detect both active and passive objects. Camera is interfaced with Raspberry Pi-3 module so that we can take the live view on display.

The base should be perfect so that it can handle the sniper in case of vibration. Three DC motors are required- two for rotation of sniper and another one for the triggering control.

As soon as the object is detected operator can see the picture on laptop and control the sniper to shoot the target.

5.3 HARDWARE USED:-

- **Raspberry Pi-3 Module :-**

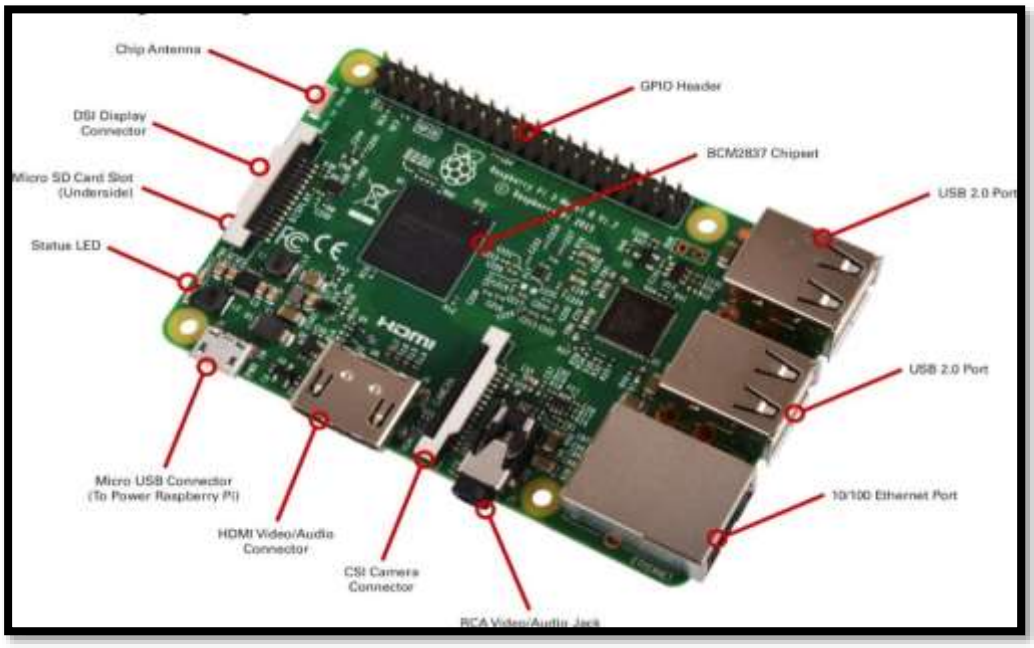

FIG.RASPBERRY PI-3 MODULE.

The Raspberry Pi 3 Model B is the third generation Raspberry Pi. It is powerful credit-card sized single board computer which can be used for many applications such as automation, robotics.

The Raspberry Pi 3 Model B has more powerful processer and it is 10 times faster than the first generation Raspberry Pi. Also it has inbuilt wireless LAN & Bluetooth connectivity which makes it more powerful.

- **Specifications :-**

1. Processor: - Broadcom BCM2387 chipset.
2. GPU: - Dual Core Video Core IV Multimedia Co-Processor.
3. Memory:-1GB LPDDR2.

4. OS: - Boots from Micro SD card, running a version of the Linux operating system or Windows 10 IoT.
5. Power: - Micro USB socket 5V1, 2.5A.

- **Connectors :-**

1. Ethernet:-10/100 BaseT Ethernet socket
2. Video Output :-HDMI (rev 1.3 & 1.4 Composite RCA (PAL and NTSC)
3. Audio Output:- Audio Output 3.5mm jack, HDMI USB 4 x USB 2.0 Connector
4. GPIO Connector :- 27 GPIO pins as well as +3.3 V, +5 V and GND supply lines
5. Camera Connector :-15-pin MIPI Camera Serial Interface (CSI-2)
6. Display Connector:- Display Serial Interface (DSI) 15 way flat flex cable connector with two data lanes and a clock lane

- **GPIO Pin Configuration :-**

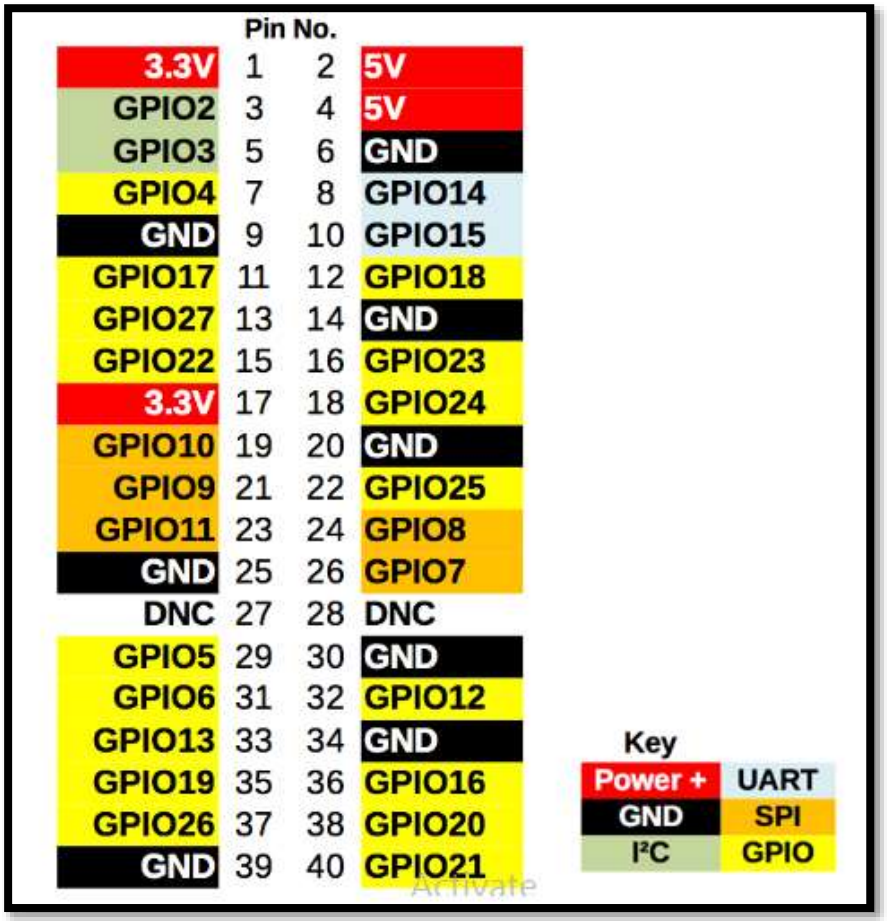

FIG. GPIO PIN CONFIGURATION OF R-PI

➢ BCM2837 Quad Core Cortex A53 Processor :-

FIG.BCM2837 QUAD CORE CORTEX A53 PROCESSOR**.**

- **Features:-**

1. New BCM2837 chip
2. Quad-core 64-bit ARM cortex A53 CPU
3. Clocked at 1.2GHz
4. ~50% faster than Pi 2
5 .400MHz VideoCore IV GPU
6. 1GB LPDDR2-900 SDRAM
7. New BCM43438 chip for WiFi/BT
8. 802.11n Wireless LAN
9. Bluetooth 4.1

➢ DC Motor :-

FIG. DC MOTOR.

A **DC motor** is nothing but a class of rotary electrical machines. Which converts the direct current electrical energy into mechanical energy. DC motors consists either electromechanical or electronic mechanism as internal mechanism, which changes the direction of current flow periodically in part of the motor.

Speed of DC motors can be controlled, by changing the strength of current or by using either a variable supply voltage in its field windings.

DC motors have several applications like DC motors small in size are used in tools, toys, and appliances. The universal motors required direct current to operate but those motors are lightweight motor, used for portable power tools and appliances. Some application like Propulsion of electric vehicles, elevator and hoists, drives for steel rolling mills used the large DC motors.

For robotics applications DC Geared motors are used. These motors are very easy to operate and easily available in market with standard size. Dc Geared motor is available with nut and threads on shaft to connect and internal threaded shaft for connecting it to wheel.

- **Comparison chart for different DC motors :-**

Parameter	45 rpm	10 rpm	3.5 rpm
torque	2 kgcm	10 kgcm	12 kgcm
weight	125 gms	125 gms	125 gms
No-load current	60 mA (Max)	60 mA (Max)	60 mA (Max)
Load current	300 mA (Max)	300 mA (Max)	300 mA (Max)
shaft diameter	4 mm	6 mm	6 mm

TABLE.COMPARISON OF DC MOTORS

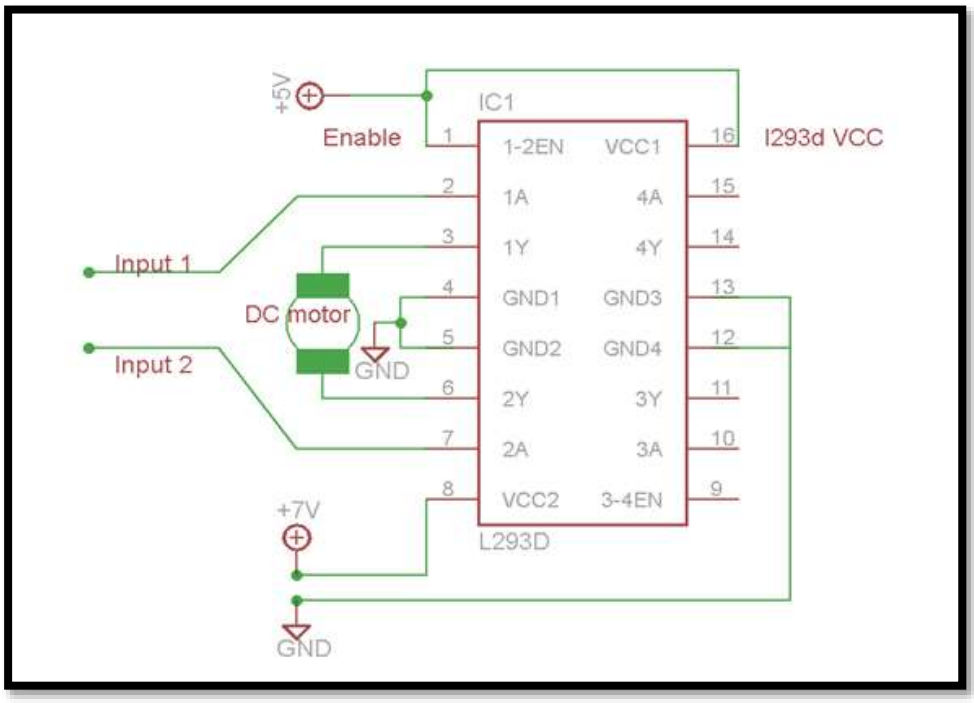

FIG.CONNECTION OF DC MOTOR.

➢ DC Motor Driver :-

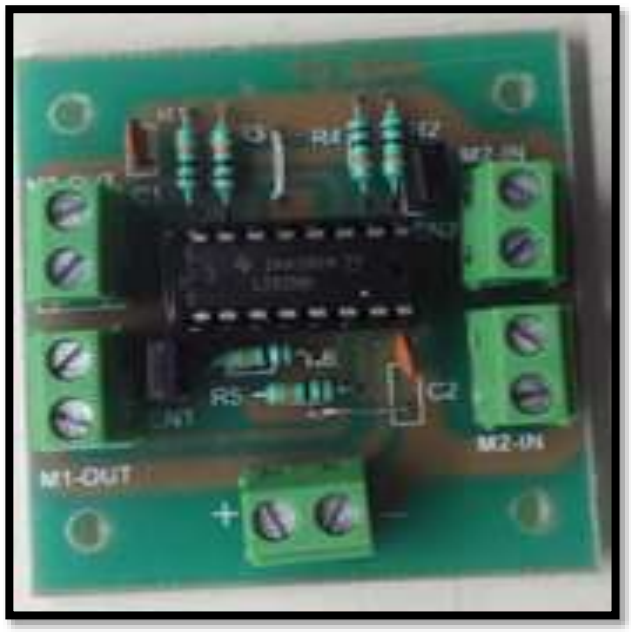

FIG.DC MOTOR DRIVER.

To connect the motors IC L293D is a typical Motor driver IC is used. Which permits the DC motor to drive on either direction. It is a 16 pin IC which provides the control of two DC motors simultaneously in either directions. It means that there is control two DC motor with a single L293D IC.

It operates on the H-bridge concept. IC consists the H-bridge circuit. The circuit allows the voltage to be flow in either directions It requires to change the direction of the motor to rotate the motor in clockwise or anticlockwise direction. H-bridge IC are ideal for controlling two DC motors simultaneously and independently. Its size is also compact due to this it is used in robotics application.

- **Voltage specification:-**

VCC is the internal voltage that is 5v required for the operation ; Motor driver IC L293D does not use this voltage for driving the motor. Separate power supply VSS is required for driving the motors provide motor. IC L293d use this supply to drive the motor. If you want to operate a motor at 12V then it requires Supply of 12V across VSS Motor supply.

The maximum 36 voltage supply for VSS motor. It can supply a max current of 600mA per channel. Hence it drive motors Up to 36v and it is possible to drive big motors with this L293D.

Pin 16 is the VCC voltage used for its own internal Operation. The maximum voltage range is from 5v to 36v.

- **L293d IC(Motor Driver):-**

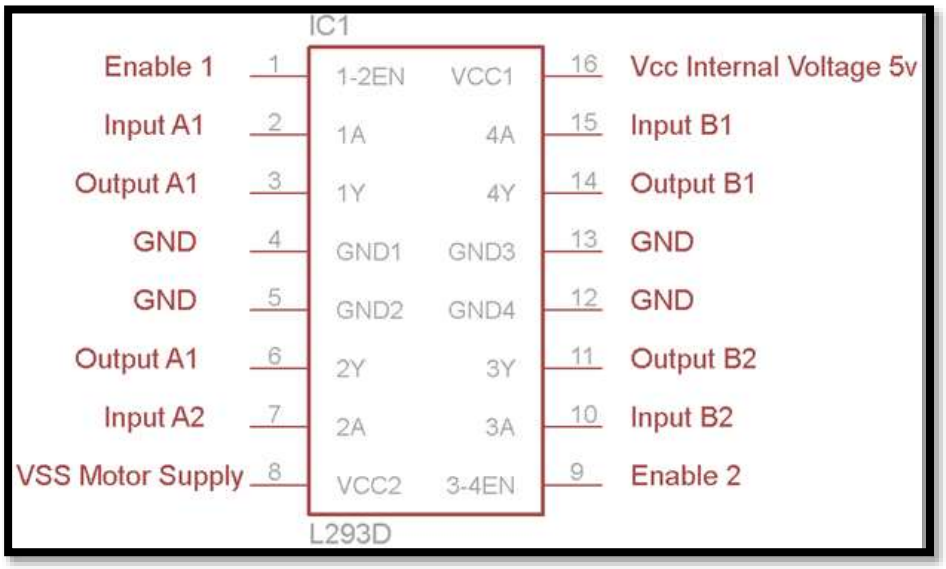

FIG.PIN DIAGRAM OF L293D.

As shown in the pin diagram there are 4 input pins of L293D, pin no 2 & 7 on the left side and pin no15 & 10 on the right side. Left input pins are used to regulate the rotation of the motor which is connected across left side and right input pins are used to regulate the motor on the right hand side. LOGIC 0 or LOGIC 1 are the logic at input pins which regulate the motors in either direction.

L293D Logic Table:-

Pin 3 & 6 are output pins where Motor connected on left side output pins. Logic 1 and Logic 0 are the logic used for rotating the motor in clockwise.

• **Clockwise Direction: -** Pin 2 = Logic 1 & Pin 7 = Logic 0 |

• **Anticlockwise Direction**:-Pin 2 = Logic 0 & Pin 7 = Logic 1

• **Idle [No rotation] [Hi-Impedance]:-** Pin 2 = Logic 0 & Pin 7 =Logic 0

• **Idle [No rotation]:-** Pin 2 = Logic 1 & Pin 7 = Logic 1

Similarly the motor connected on right side on pin 15 & 10 can also operate.

Two Enable pins on L293D. Pin 1 and pin 9, are enable 1 and enable2 pins respectively used for driving the motor, it must be high. In H-bridge left side motor can drive setting the pin 1 i.e. enable 1 to high. And for right H-Bridge it need to make the pin 9 i.e. enable 2 to high. It operates like switch. If anyone of the either pin1 or pin9 goes low then the motor in the relative side was get suspend its working or stop working.

- **USB Webcam**

Quantum 500-LM PC camera is simply used for live video streaming in short video chatting. It has 5MP (interpolated) sensor and 8 white lights. These lights helps to go the extra stride by performing in an all impressive manner even in dark. The webcam comes equipped with USB 2.0 interface and has a maximum frame rate of 30fps. It sports a focus range of 4-cm to infinity and has an integrated microphone.

FIG. USB WEBCAM

- **Specification**

1. Inbuilt sensitive microphone.
2. Image Sensor High Quality CMOS Sensor
3. Image Resolution 5 Mega Pixels (Interpolated) 8 white lights
4. Potentiometer to switch on 8 lights when in dark
5. Image Control Color saturation, brightness, sharpness and brightness is adjustable
6. Snap shot switch for taking still pictures
7. Anti-flicker 50Hz,60Hz or outdoor
8. Resolution Hardware : 500K pixels
9. Image Quality: RGB24 or I420
10. Interface: USB2.0
11. Frame Rate: 30 fps (MAX)
12. Lens : f=6.0 F=2.0
13. Focus Range 4cm to infinity

➢ **Wireless connection between DFU and deadly eye**

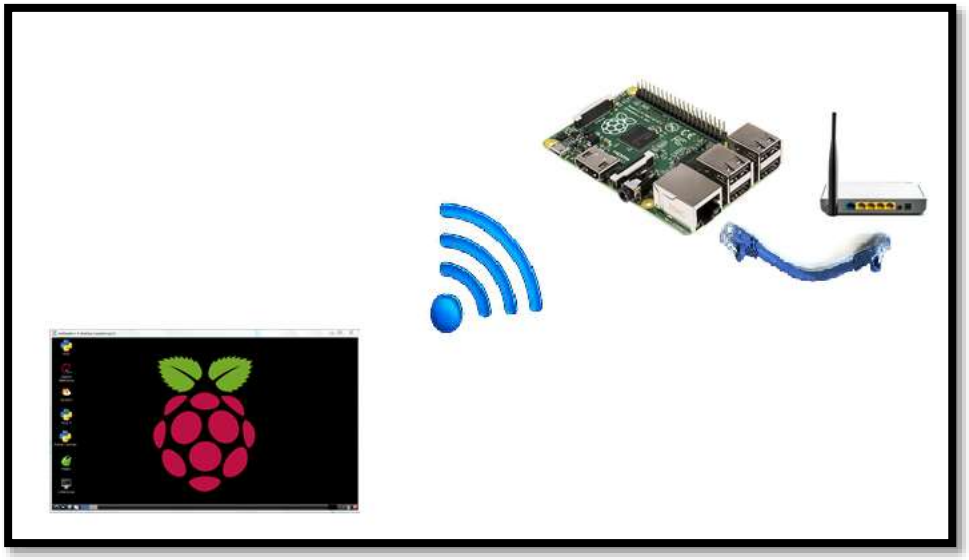

FIG. WIRELESS CONNECTION BETWEEN R-Pi AND USER END

There are two ways to connect raspberry pi with user end, wired and wireless.

In wired connection both are connected to each other through LAN cable.

And in wireless connection Router and R-Pi are connected to each other through LAN cable. All interfaced hardware can be accessed on raspbian OS by connecting Wi-Fi to the same router that is connected to the R-Pi as shown in Fig.

In designed system video transmission takes place over wireless transmission media and operator can send command wirelessly through the same media to hardware.

5.4 MECHANICAL ASEEMBLY:-

➢ Gear train mechanism :-

To transmit the power from one shaft to another, two or more gears are made to mesh with each other. Such a combination is called **train of toothed wheels or gear train**. Depends upon the velocity ratio required and the relative position of the axes of shafts the nature of the train is decided. A gear train may consist of spur, bevel or spiral gears.

Types of Gear Trains:

Depending upon the arrangement of wheels, there are four types of gear train:-

1. Simple gear train
2. Compound gear train
3. Reverted gear train
4. Epicyclic gear train.

In the first three types of gear trains, the axes of the shafts over which the gears are mounted are fixed relative to each other. In proposed assembly **simple gear train** mechanism formed with **spur gears** which has 1:2 teeth ratio is used for vertical movement of sniper. That means for two turns of driver gear, driven or follower gear will have single turn.

- **Simple Gear Train :-**

In simple gear train mechanism only one gear is mounted on each shaft. Pitch circles are used to represent the gears. When the distance between two shafts is small, the two gears 1 and 2 are made to mesh with each other to transmit motion from one shaft to the other. It may be noted that the motion of the driven gear is opposite to the motion of driving gear.

Speed ratio can be given as,

$$Speed\ ratio = \frac{Speed\ of\ driver}{Speed\ of\ driven} = \frac{No.of\ teeth\ on\ driven}{No.of\ teeth\ on\ driver}$$

$$\frac{N_1}{N_2} = \frac{T_2}{T_1}$$

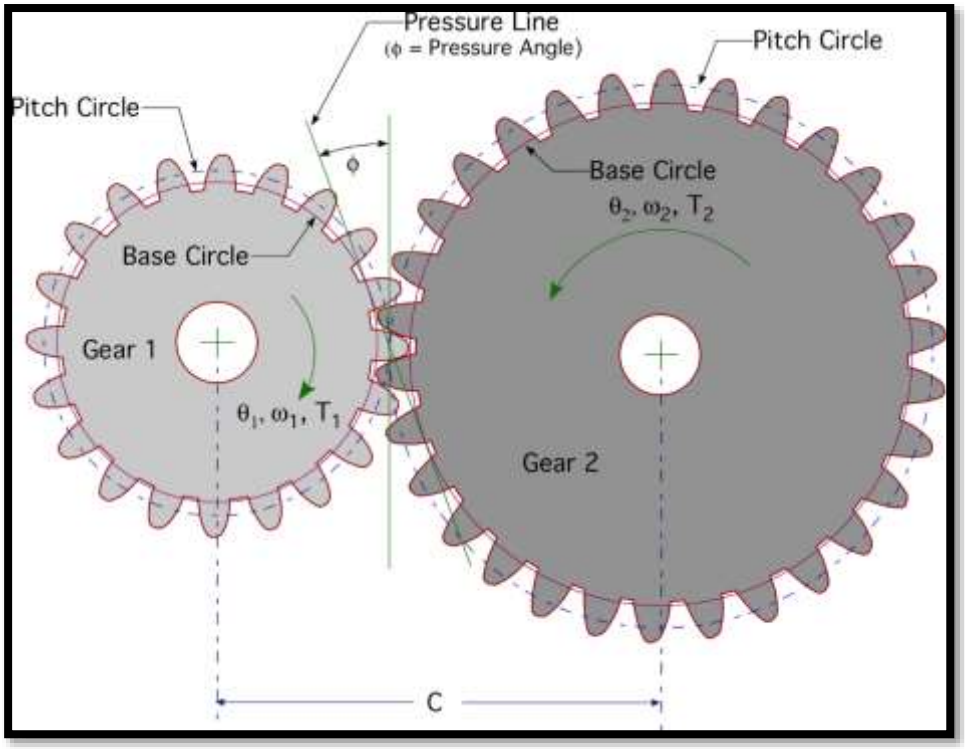

FIG. GEAR TRAIN ASSEMBLY (1:2)

- **Cam :-**

Transforming rotary motion into linear motion or vice versa a rotating or sliding piece in a mechanical linkage used known as cam. It is often a part of a rotating wheel or shaft that strikes a lever at one or more points on its circular path. The cam can be seen as a device that rotates from circular to reciprocating motion.

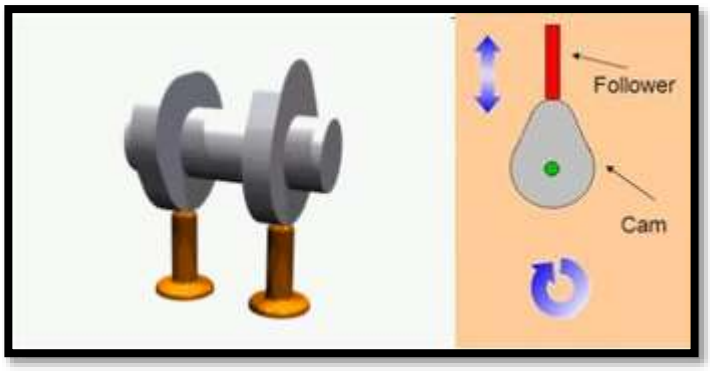

FIG. CAM ASSEMBLY

For **load and triggering** mechanism **cylindrical cam or barrel cam** is used. In this type of a cam the follower rides on the surface of a cylinder.

These cams are principally used to convert rotational motion to linear motion parallel to the rotational axis of the cylinder. A cylinder may have several grooves cut into the surface and drive several followers. Internal grooves are used, so that follower will not shift from it's position. Cylindrical cams can provide motions that involve more than a single rotation of the cylinder and generally provide positive positioning, removing the need for a spring or other provision to keep the follower in contact with the control surface.

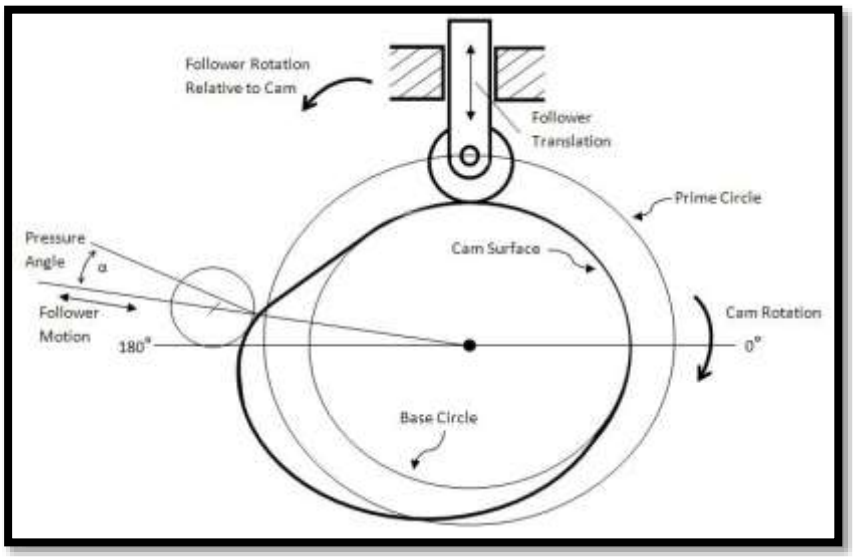

FIG. DETAILED STRUCTURE OF CYLINDRICAL CAM

As shown in fig. load and trigger acts as follower and the wheels on motor works as cam. Both followers are rest on the surface of cam, as motor rotates cam will rotate and circular motion is converted into linear or reciprocating motion with the help of follower.

- **Metal box foundation :-**

Motor used for horizontal movement is assembled inside the box, which is made up of metallic square rod. For the 180˚ horizontal movement circular platform of acrylic sheet is used and base motor shaft is coupled to the platform.

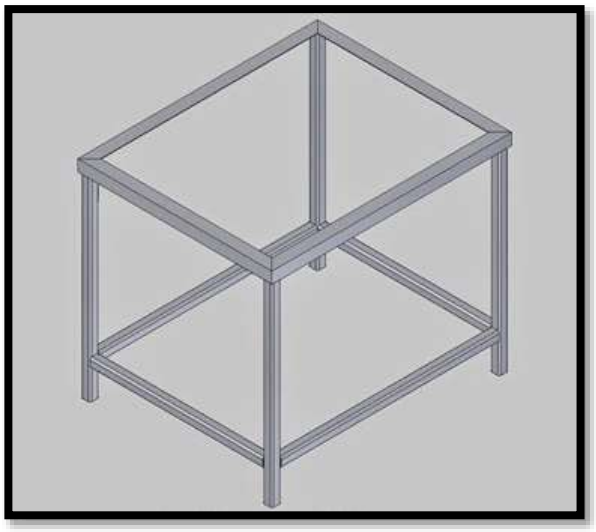

FIG. FOUNDATION OF METAL BOX FOR BASE

On above assembly acrylic sheet is placed and motor foundation is done below the sheet and sniper is assembled above the sheet. For the perfect finishing filing and welding is done.

5.5 SOFTWARE USED:-

➢ PuTTY :-

PuTTY is a free and open-source terminal emulator, serial console and network file transfer application. It supports several network protocols, including SCP, SSH, Telnet, rlogin, and raw socket connection. It can also connect to a serial port.

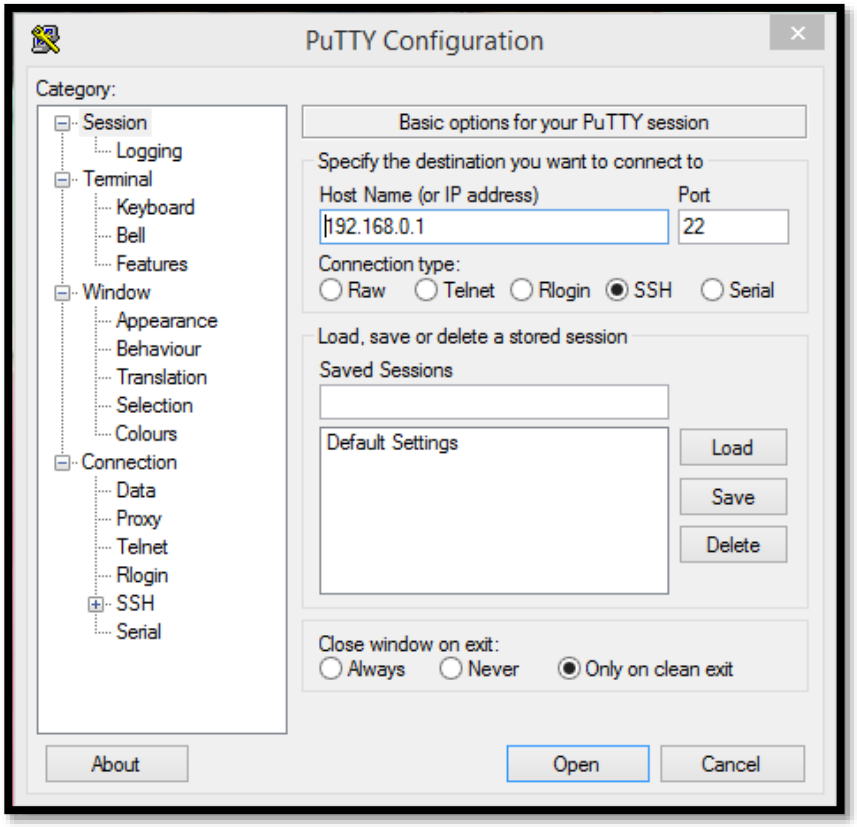

FIG. PUTTY GUI

➢ Raspbian OS :-

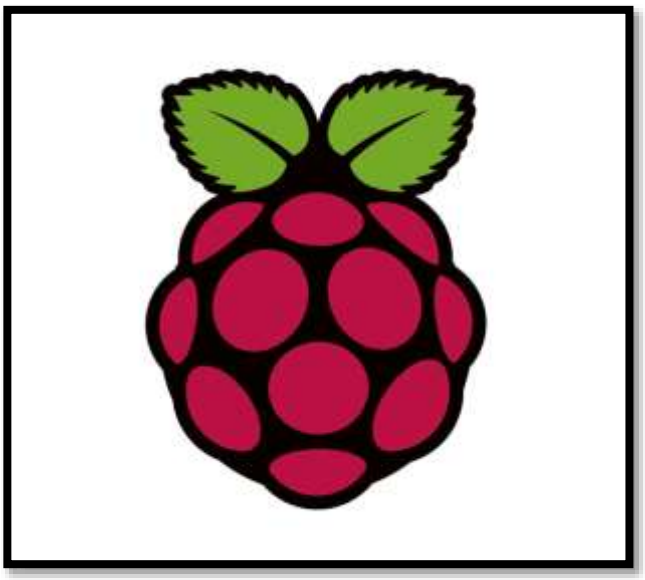

FIG.RASPBERRY PI SYMBOL

Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. It is a version of Linux built specifically for the Raspberry Pi. It comes packed with all the software. It has LibreOffice as an office suite, a web browser, email program, and some tools to teach programming. Raspbian provides more than a pure OS, it comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on Raspberry Pi.

Chapter 6

RESULTS AND DISCUSSION

6.1 Actual implementation:-

6.2 ADVANTAGES:-

- Less Cost.
- Less power required.
- Saves man power.
- Provides security and safety.

6.3 APPLICATIONS:-

- Military applications.
- For security purpose in crowded areas.
- Research and development.

6.4 APPROXIMATE COST:-

Sr. No.	Component	Cost (Rs)
1.	Raspberry Pi-3 module	3500
2.	Web Camera	1500
3.	DC motors	1500
4.	Motor driver	700
5.	Sniper	500
6.	Miscellaneous	500
7.	Total	8200

TABLE. APPROXIMATE COST

6.5 FUTURE SCOPE:-

- **We can implement such sniper on quad copter.**

FIG.SNIPER IMPLEMENTED ON QUAD COPTER FOR TARGET DETEVTION

- **Target detection using facial biometrics.**

To achieve more accuracy in target detection many techniques can be used and facial biometrics is one of them. It uses face representations for face verifications.

In this technique face decomposition has been used and part based discriminant information is used. The purpose of these decompositions is

to represent facial images as a linear combination of basis images which are related to facial parts based on Non-negative Matrix Factorization (NMF).

Principal Component Analysis (PCA) is one of the NMF algorithms, which represents a facial image as a linear combination of basis images. PCA does not allow negative elements in the linear combination of the basis images.

- **Automatic face verification using Elastic Graph matching (EGM)**

With the help of database, face verification and identification becomes more complicated because it includes computer vision, pattern recognition, and computational intelligence. There are some major problems of face verification are aging, illumination, head pose, facial expression, image size and quality.

To avoid such complications, All India Institute of Ayurveda (AIIA) has developed a new algorithm for face verification that is Discriminant Elastic Graph Matching (DEGM). In this algorithm the reference object graph is created by overlaying a rectangular elastic sparse graph on the object image. Stochastic optimization is used for graph matching.

Framework of DEGM can be summarized as it selects every discriminant node and combine them to measure similarity.

- **Electromagnetic triggering mechanism**

Electromagnetic coil is used for triggering to achieve greater velocity than previous method.

6.6 TROUBLE SHOOTING:-

The most important part during development of any project is troubleshooting. It can be categorized by,

1. Hardware troubleshooting.
2. Software troubleshooting.

1. Hardware troubleshooting:-

We tried different modules of programs to check the working of Raspberry Pi-3 module. Initially we have tried code for 5v dc motor, but it is insufficient to handle the weight of gun. Then we have used 12v DC motor with 45rpm.

For motor drivers initially we have used 9v dc supply but it is insufficient, that's why we have used 12v dc with maximum possible current on dual power supply.

For triggering purpose we have used reciprocating mechanism, which is failed many times but worked finally.

2. Software troubleshooting:-

While creating buttons on GUI using python code , we faced many problems to create the buttons on desired position on displaying page.

While writing the program, GPIO pins of RPi-3 were interchanged, so the program was not working properly when downloaded on RPi-3 module.

Chapter 7

CONCLUSION AND REFERENCES

7.1 CONCLUSION:-

We all know that traditionally, soldiers have to operate their guns/riffles/snipers at the risk of their lives to protect the country's borders. But there we observe the disadvantages of this conventional method.

The proposed system helps to control the snipers remotely from the safe places, from where soldiers can detect enemies and fire if any danger is anticipated. The system can be used in remote areas at the war fields or line of control. The system uses Wi-Fi for the communication between sniper and base station.

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