CHAPTER-1

INTRODUCTION

1.1 INTRODUCTION

A surveillance robot is electro-mechanical machine which is guided by computer, Mobile phone or programming and is thus able to do tasks on its own. The Robot Institute of America define "A robot is a reprogrammable multifunctional manipulator designed to move material parts, tools or specialized device through variable programmed motions for the performance of a variety of tasks." Conventionally, wireless controlled surveillance robots use IOT.

This is IOT base Surveillance robot. This robot is controlled IOT base. There are use separate device these are Motor driver module, Node MCU controller Esp8266 WiFi module and blynk android apps. As a transmitter use android mobile these send the command to receivers. The input command are processed by components and jobs done by custom bot. Specialize in robotic solutions for the home with our snow removal robots, remote controlled lawnmowers and even a robotic cooler to provide you with refreshment and entertainment. In the military travel and operate in dangerous areas and in medical industry to assist in procedures.

Consideration for overall safety must be taken into account in order to reduce potential injuries. Since communication between the robot and the controller is wireless, robots can perform effectively. The new design must allow the robot to manipulate.

1.2 Background Study:

In 1898, Nikola Tesla built the first propeller driven radio controlled boat, which can be regarded as the original prototype of all modern day uninhabited aerial vehicles and precision guided weapons. Records state that it is the first among all remotely controlled vehicles in air, land or sea. It was powered by lead-acid batteries and an electric drive motor. The vessel was designed in such a way that it could be maneuvered alongside a target using instructions received from a wireless remote-control transmitter. Once in its position, a command would be sent to detonate an explosive charge contained within the boat's forward compartment.

The weapon's guidance system introduced a secure communications link between the pilot's controller and the surface running torpedo in an effort to assure that control could be maintained even in the presence of electronic counter measures. Wireless controlled unmanned vehicles which are used nowadays typically use RF circuits for motion and control. But RF circuits suffer from the disadvantage of limited working range which results in limited control. As RF circuits' follows LOS (Line of sight) approach, it fails miserably in NLOS (Non-Line of Sight) conditions involving obstacles and barriers. To overcome these, one method was proposed by Awab Farikhetal, (2010) which typically makes use of the IOT technology along with a microcontroller based circuit for maneuver and control of these unmanned robotic vehicles. Similarly, Ashish Yadav et al, (2012) also proposed the construction of an unmanned vehicle which could be especially used for ground combat using a similar

technology. Recently, Sabuj Das Gupta et al (2013) discussed in detail about how the method described in could be implemented using a microcontroller by providing the necessary circuit details and the software code. We implemented the design of an unmanned vehicle using the same technology as described in the papers mentioned earlier, modified the existing circuit and code described in paper and gave a thorough and detailed analysis of the design paradigm which is the best possible explanation to our knowledge till date in.

1.3 Scope of project

Scientific

Remote control vehicles have various scientific uses including hazardous environments, working in the Deep Ocean, and space exploration. The majority of the probes to the other planets in our solar system have been remote control vehicles, although some of the more recent ones were partially autonomous. The sophistication of these devices has fueled greater debate on the need for manned spaceflight and exploration.

Military and Law Enforcement

Military usage of remotely controlled military vehicles dates back to the first half of 20th century. Soviet Red Army used remotely controlled Tele tanks during 1930s in the Winter War and early stage of World War II.

Search and Rescue

UAVs will likely play an increased role in search and rescue in the United States. This was demonstrated by the successful use of UAVs during the 2008 hurricanes that struck Louisiana and Texas.

Recreation and Hobby

See Radio-controlled model. Small scale remote control vehicles have long been popular among hobbyists. These remote controlled vehicles span a wide range in terms of price and sophistication. There are many types of radio controlled vehicles. These include on-road cars, off-road trucks, boats, airplanes, and even helicopters.

1.4 Objectives

To build a cost effective and efficient robotic system, programmed to provide a platform for surveillance purpose, thus acting as a substitute for human in hazardous activities like mining, exploration, patrolling sensitive areas and for various applications that are at a safer distance. Now the main goal are:

a. To capture the picture, video and audio from desired areas and then be able to use it as required.
b. To monitoring office, military, hospital, school and agricultural places.
c. To understand and surveillance by a wireless camera.
d. To learn the working and functioning of the electro-mechanical machine.

CHAPTER-2

Literature Review

.

2.1.1 Wheeled Platform of mechanical structure

Fig.2.2.1: Wheel platform.

2.2.1 Basic part of a robot vehicle

Basically a Electro Mechanical Robot consists of the following basic, yet important parts-
A mechanical device, such as a wheeled platform, arm, or other construction, capable of interacting with its environment.

- o A mechanical device, such as a wheeled platform, arm, or other construction, capable of interacting with its environment.
- o Sensors on or around the device those are able to sense the environment and give useful feedback to the device.
- o Systems that process sensory input in the context of the device's current situation and instruct the device to perform actions in response to the situation.

In the manufacturing field, robot development has focused on engineering robotic arms that perform manufacturing processes. In the space industry, robotics focuses on highly specialized, one-of-kind planetary rovers. Unlike a highly automated manufacturing plant, a planetary rover 14 operating on the dark side of the moon - without radio communication - might run into unexpected situations. At a minimum, a planetary rover must have some source of sensory input, some way of interpreting that input, and a way of modifying its actions to respond to a changing world. Furthermore, the need to sense and adapt to a partially unknown environment requires intelligence (in other words, artificial intelligence). From military technology and space exploration to the health industry and commerce, the advantages of using robots have been realized to the point that they are becoming a part of our collective experience and everyday lives.

2.2.2 Features

* Operating Voltage: 3-6V DC.
* Wheels: 6cm.

* Bottom Plats Thickness of about 3 mm.
* Length: about 25.3cm.
* Width: about 14.8cm.
* Tire Diameter: 6.6cm.
* Simple mechanical structure, easy for installation.
* Adopts 4 DC motors for better power, speed and load capacity.
* Large and stable Chassis, easy for expansion.
* Speed test encoding disk.
* When Powered at 6V, this robot can reach speeds up to 0.6m/sec.
* The height between two chassis can be change by varying the length of the copper pillar.
* 20 slot Speed Encoder, more accurate than other 6 or 10 slot encoders.
* This kit is great for DIY Learning, Academic Research, Hobby Projects and Robot Competitions.

2.3 Robot wheel

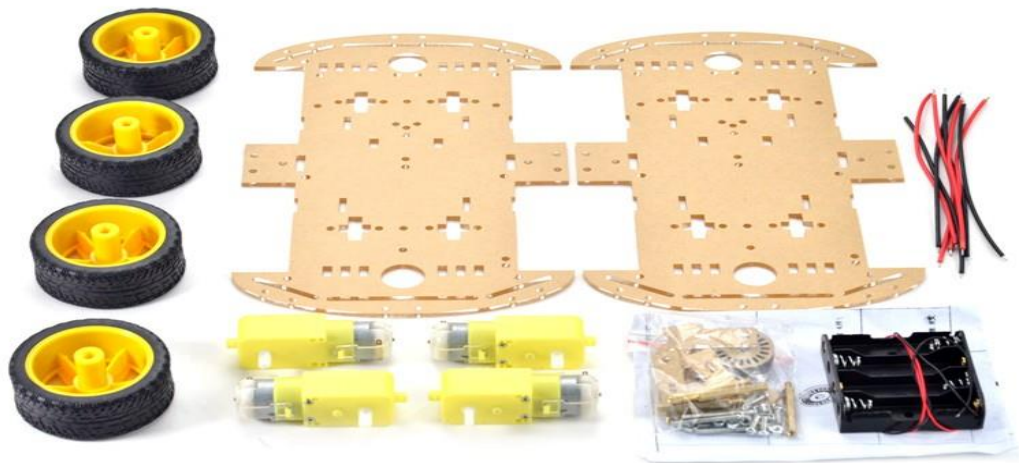Fig.2.3: Robot wheel.

2.3.1 Robot different parts

Fig.2.3.1: Difference parts of Robot.

2.4 Node MCU ESP8266 and its works

2.4.1 Programming language of Node MCU ESP8266

In fact, you already are; the Arduino language is merely a set of C/C++ functions that can be called from your code. Your sketch undergoes minor changes (e.g. automatic generation of function prototypes) and then is passed directly to a C/C++ compiler (aver-g++).

2.4.2 Node MCU ESP8266 IDE Software

The open-source Node MCU ESP8266 Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.

2.4.3 Node MCU ESP8266

It is based on the project, and built on the Espresso if Non-OS SDK for ESP8266.
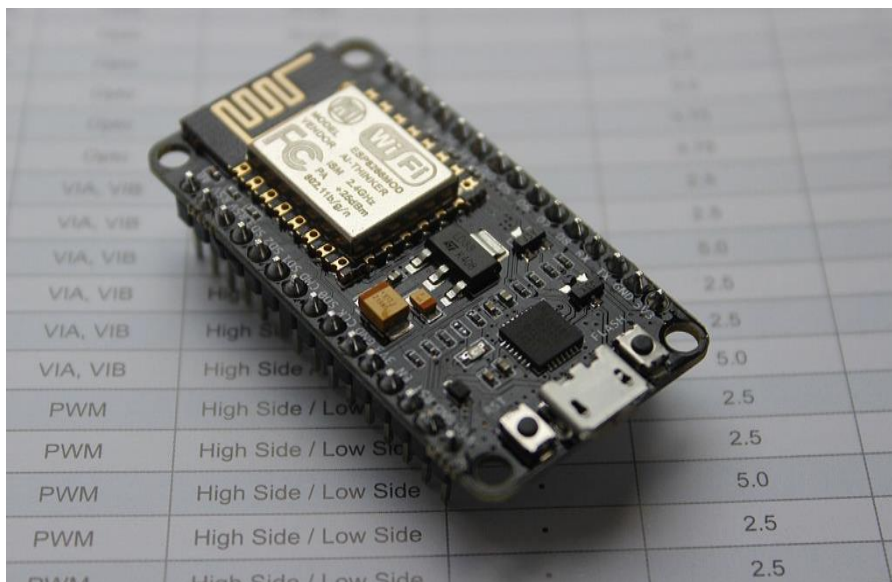

Fig.2.4.3: Node MCU ESP8266
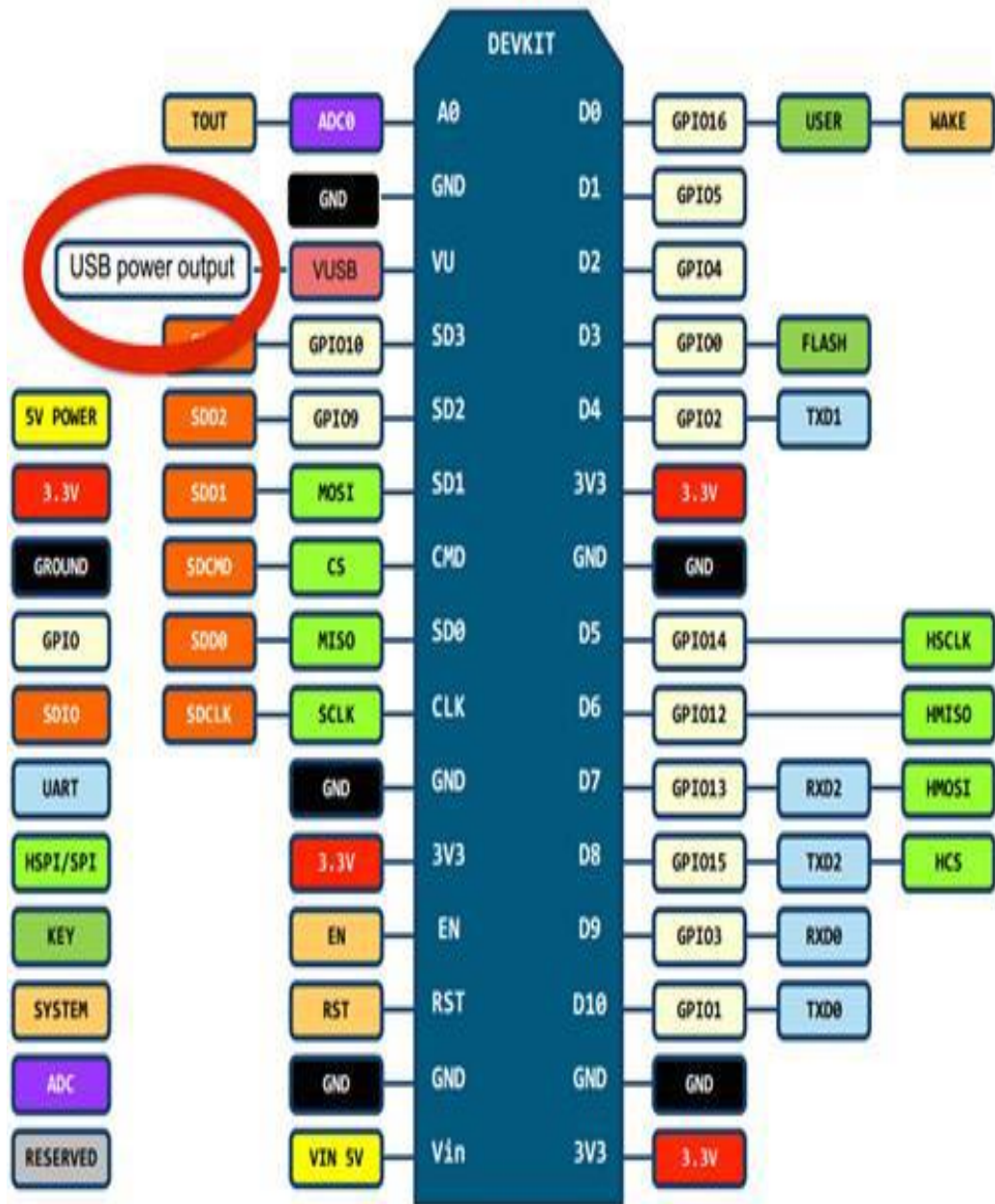
2.4.4 PIN DIAGRAM OF NODE MCU (ESP 8266):

Fig.2.4.4: Diagram of Node MCU (ESP8266).

Node MCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Express if system and a hardware which is based on the esp12 module. The term node MCU by default refers to the firmware rather than the kits.

2.4.5 Specification of Node MCU ESP8266

Node MCU is V3 is a development board which runs on the ESP8266 with the Espressif Non-OS SDK, and hardware based on the ESP-12 module. The device features 4 MB of flash memory, 80 MHz of system clock, around 50k of usable RAM and on chip wifi Transceiver.

2.4.6 ESP8266 Feature:
- Open-source.
- Smart.
- WI-FI enabled.
- USB-TTL included.
- Plug & Play.
- Interactive.
- Programmable.
- Low cost.
- Simple.

2.4.7 Advantages:
- Low energy consumption.
- Integrated support for WI-FI network.
- Reduced size of the board.
- Low Cost.

2.4.8 Disadvantages:
- Need to learn a new language and IDE.
- Less pin out.

2.5 Programming
The Arduino Uno can be programmed with the Arduino software (download). Select "Arduino Uno from the Tools > Board menu (according to the microcontroller on your board). For details, see the reference and tutorials.

2.6 Power

The Node MCU ESP8266 can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery.

 The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and VIN pin headers of the POWER connector.

The board can operate on an external supply from 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may become unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

- VIN. The input voltage to the Node MCU ESP8266 when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- 5V, This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.
- 3V3. A 3.3-volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- GND. Ground pins.
- IOREF. This pin on the Node MCU ESP8266 board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs to work with the 5V.

2.7 Remote section

This section's main component Node MCU and ESP8266 Wi-Fi module. Here we get a tone from our cell phone by using aux wire to DTMF Decoder IC namely MT8870 which decodes the tone into digital signal of 4bit.

2.8 Control section

Node MCU is used for controlling whole the process of robot. Node MCU reads commands sent by ESP8266 module and compare with define code or pattern. If commands are match Node MCU sends respective command to driver section.

2.9 HC-SR04Ultrasonic Sensor

An Ultrasonic Sensor is a non-contact type device that can be used to measure distance as well as velocity of an object. An Ultrasonic Sensor works based on the properties of the sound waves with frequency greater than that of the human audible range.

Fig.2.9: HC-SR04 Ultrasonic Sensor.

Using the time of flight of the sound wave, an Ultrasonic Sensor can measure the distance of the object (similar to SONAR). The Doppler Shift property of the sound wave is used to measure the velocity of an object
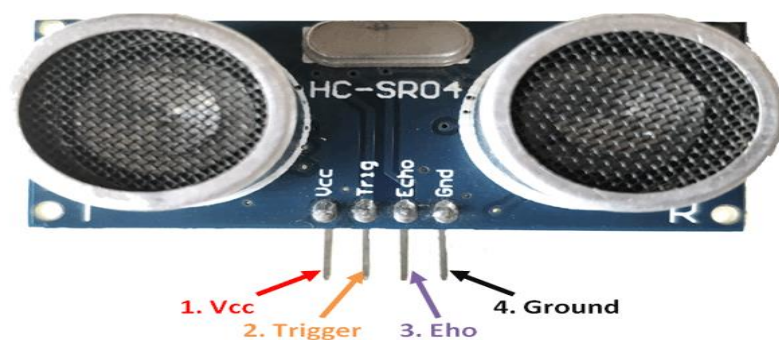

Fig.2.9.1: Pin Configuration of Ultrasonic Sensor.

2.9.1 Ultrasonic Sensor Pin Configuration

Pin Number	Pin Name	Description
1	vcc	The Vcc pin powers the sensor, typically with +5V
2	Trigger	Trigger pin is an Input pin. This pin has to be kept high for 10us to initialize measurement by sending US wave.
3	Echo	Echo pin is an Output pin. This pin goes high for a period of time which will be equal to the time taken for the US wave to return back to the sensor.
4	Ground	This pin is connected to the Ground of the system.

2.9.2 HC-SR04 Sensor Features

- Operating voltage: +5V
- Theoretical Measuring Distance: 2cm to 450cm
- Practical Measuring Distance: 2cm to 80cm
- Accuracy: 3mm
- Measuring angle covered: <15°
- Operating Current: <15mA
- Operating Frequency: 40Hz

2.9.3 HC-SR04 Ultrasonic Sensor - Working

As shown above the HC-SR04 Ultrasonic (US) sensor is a 4 pin module, whose pin names are Vcc, Trigger, Echo and Ground respectively. This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. The module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver. The sensor works with the simple high school formula that

$$\textbf{Distance} = \textbf{Speed} \times \textbf{Time}$$

The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the Ultrasonic receiver module as shown in the picture below

Fig.2.9.3: HC-SR04 Ultrasonic Sensor – Working.

Now, to calculate the distance using the above formulae, we should know the Speed and time. Since we are using the Ultrasonic wave we know the universal speed of US wave at room conditions which is 330m/s. The circuitry inbuilt on the module will calculate the time taken for the US wave to come back and turns on the echo pin high for that same particular amount of time, this way we can also know the time taken. Now simply calculate the distance using a microcontroller or microprocessor.

2.9.4 How to use the HC-SR04 Ultrasonic Sensor

HC-SR04 distance sensor is commonly used with both microcontroller and microprocessor platforms like Arduino, ARM, PIC, Raspberry Pie etc. The following guide is universally since it has to be followed irrespective of the type of computational device used.

Power the Sensor using a regulated +5V through the vcc ad Ground pins of the sensor. The current consumed by the sensor is less than 15mA and hence can be directly powered by the on board 5V pins (If available). The Trigger and the Echo pins are both I/O pins and hence they can be connected to I/O pins of the microcontroller. To start the measurement, the trigger pin has to be made high for 10uS and then turned off. This action will trigger an ultrasonic wave at frequency of 40Hz from the transmitter and the receiver will wait for the wave to return. Once the wave is returned after it getting reflected by any object the Echo pin goes high for a particular amount of time which will be equal to the time taken for the wave to return back to the sensor.

The amount of time during which the Echo pin stays high is measured by the MCU/MPU as it gives the information about the time taken for the wave to return back to the Sensor. Using this information, the distance is measured as explained in the above heading.

2.9.5 Applications

- Used to avoid and detect obstacles with robots like biped robot, obstacle avoider robot, path finding robot etc.
- Used to measure the distance within a wide range of 2cm to 400cm.
- Can be used to map the objects surrounding the sensor by rotating it.

- Depth of certain places like wells, pits etc can be measured since the waves can penetrate through wate.

2.10 Camera introduction

An Internet protocol camera, or IP camera, is a type of digital video camera commonly employed for surveillance, and which, unlike analog closed circuit television (CCTV) cameras, can send and receive data via a computer network and the Internet. Although most cameras that do this are webcams, the term "IP camera" or "Netcom" is usually applied only to those used for surveillance.

An IP camera is typically either centralized (requiring a central network video recorder (NVR) to handle the recording, video and alarm management) or decentralized (no NVR needed, as camera can record to any local or remote storage media). The first centralized IP camera was Axis Net eye 200, released in 1996 by Axis Communications.

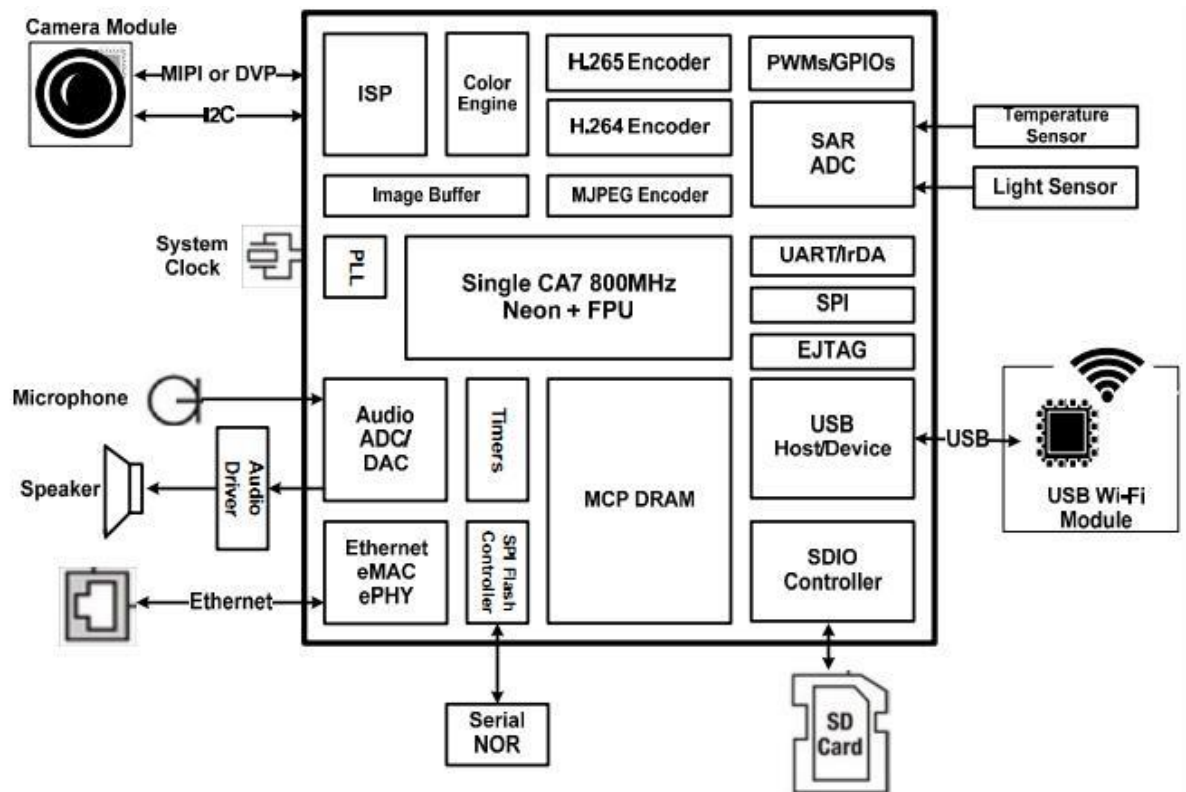Fig.2.10: IP Camera.

2.10.1 Block Diagram of IP Camera

Fig.2.10.1: Block diagram of IP Camera.

2.10.2 Features:

Smallest storage size (16GB - 8D*24H*30FPS).
Speed-up video connection (<1 sec).
Multi-user viewing.
Night Vision included.
HD 720P OV9712 with ICR.
H.380 compression format.
IPhone, I-Pad & Android Mobile phone, ONVIF.
10pcs IR lids, 0LUX (IR-ON).
3.6MM HD Lens, IR-CUT.

Pan/tilt with 6pc presets.

2.10.3 Specifications:

Imaging sensor: Megapixel CMOS sensor.

Lens of the Pixel: 1 Megapixel.

Image Resolution: 1280*720(720).

Lens: 3.6mm, angle:80°.

PTZ angle od adjustment: Horizontal:0°- 335°, vertical: -20°(down)- 90°(up).

Day and Night Vision: IR CUT switch automatic.

Minimum Illumination: 0.2Lux @ (F2.0, AGC ON), 0 Lux with IR.

Video Compress Standard: H.264.

Frame Rate: 30 fbs.

Compressed Video Stream: High Definition (720p). fluency (VGA).

Audio Compression Standard: ADPCM.

Audio Compression Code Stream: Adaptive Streaming.

Communication Interface: 1 piece RJ45 10M/100M Adaptive Ethernet interface.

WAP: Wi-Fi(IEEE802.11b).

Memory Function: Supports Micro SD card (Max. 64GB).

Infrared Range: 16-32ft.

Power Dissipation: 3W (MAX).

Rated Power: DC 5V 2A.

Dimensions: 5.3 in. x 4.1 in. x 4 in.

Weight: .7lbs.

2.11 DC geared motor

A DC gear motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line. DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of

electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

Fig.2.11: DC gear Motor.

Specifications:

Ratio of 1: 120.

Working voltage: 3V ~ 6V.

No-load current voltage: 6V ≤250mA , 3V ≤160mA.

No-load speed: 250 ± 10% rpm @ 6V , 110 ± 10% rpm @ 3V.

With dual axis.

Package Included:

1 x TT motor.

2.12 Motor driver L293D
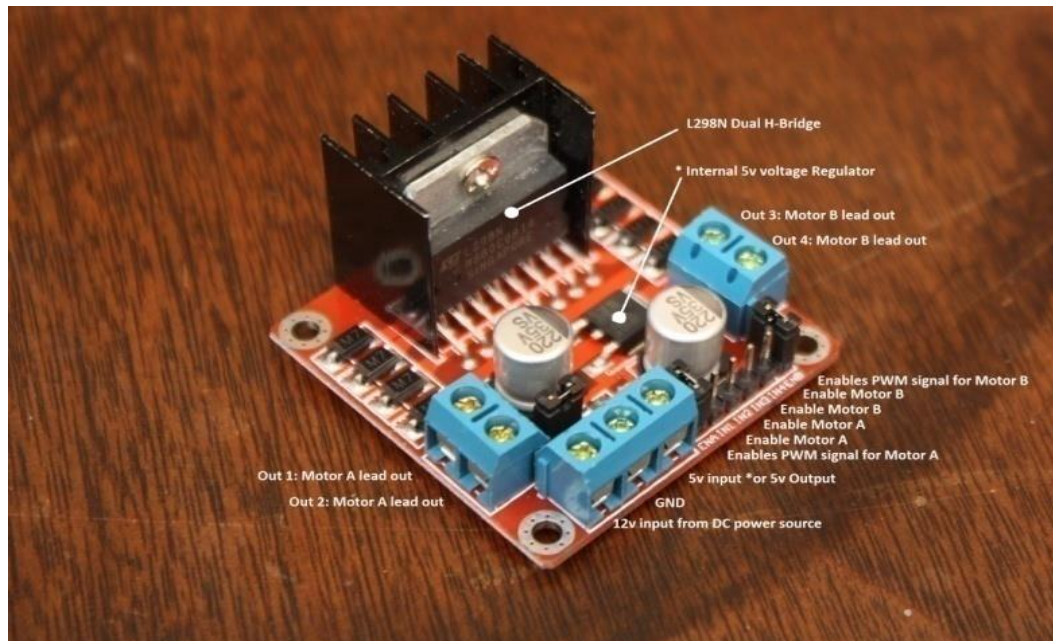

Fig.2.12: Motor driver L293D

2.12.1 Usage:

H-Bridges are typically used in controlling motors speed and direction, but can be used for other projects such as driving the brightness of certain lighting projects such as high powered LED arrays.

2.12.2 Working System:

An H-Bridge is a circuit that can drive a current in either polarity and be controlled by *Pulse Width Modulation (PWM).

* Pulse Width Modulation is a means in controlling the duration of an electronic pulse. In motors try to imagine the brush as a water wheel and electrons as the flowing droplets of water. The voltage would be the water flowing over the wheel at a constant rate, the more water flowing the higher the voltage. Motors are rated at certain voltages and can be damaged if the voltage is applied to heavily or if it is dropped quickly to slow the motor down. Thus PWM. Take the water wheel analogy and think of the water hitting it in pulses but at a constant flow. The longer the pulses the faster the wheel will turn, the shorter the pulses, the slower the water wheel will turn. Motors will last much longer and be more reliable if controlled through PWM.

Pins:

- Out 1: Motor A lead out.
- Out 2: Motor A lead out.
- Out 3: Motor B lead out.
- Out 4: Mo (Can actually be from 5v-35v, just marked as 12v).
- GND: Ground.
- 5v: 5v input (unnecessary if your power source is 7v-35v, if the power source is 7v-35v then it can act as a 5v out).
- EnA: Enables PWM signal for Motor A (Please see the "Arduino Sketch Considerations" section).
- In1: Enable Motor A.
- In2: Enable Motor A.
- In3: Enable Motor B.
- In4: Enable Motor B.
- EnB: Enables PWM signal for Motor B (Please see the "Arduino Sketch Considerations" section).

Specifications:

- Double H bridge Drive Chip: L298N.
- Logical voltage: 5V Drive voltage: 5V-35V.
- Logical current: 0-36mA Drive current: 2A (MAX single bridge).
- Max power: 25W.
- Dimensions: 43 x 43 x 26mm.
- Weight: 26g.

2.13 Driver section

Driver section consist motor driver and four DC geared motors. Motor driver is used for driving motors because Node MCU ESP8266 does not supply enough voltage and current to motor. So we add a motor driver circuit to get enough voltage and current for motor. By collecting commands from Node MCU ESP8266 motor driver drive motor according to commands.

2.14 Battery & power-bank

An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices. When a battery is supplying power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that when connected to

an external circuit will flow and deliver energy to an external device. When a battery is connected to an external circuit, electrolytes are able to move as ions within, allowing the chemical reactions to be completed at the separate terminals and so deliver energy to the external circuit. It is the movement of those ions within the battery which allows current to flow out of the battery to perform work. Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved to additionally include devices composed of a single cell.

Primary (single-use or "disposable") batteries are used once and discarded; the electrode materials are irreversibly changed during discharge. Common examples are the alkaline battery used for flashlights and a multitude of portable devices. Secondary (rechargeable batteries) can be discharged and recharged multiple times; the original composition of the electrodes can be restored by reverse current. Examples include the lead-acid batteries used in vehicles and lithium-ion batteries used for portable electronics.

Batteries come in many shapes and sizes, from miniature cells used to power hearing aids and wristwatches to battery banks the size of rooms that provide standby power for telephone exchanges and computer data centers.

According to a 2005 estimate, the worldwide battery industry generates US $48 billion in sales each year, with 6% annual growth.

Batteries have much lower specific energy (energy per unit mass) than common fuels such as gasoline. This is somewhat offset by the higher efficiency of electric motors in producing mechanical work, compared to combustion engines.

Fig.2.14: Battery & Power Bank.

2.15 Connecting wire

A wire is a single, usually cylindrical, flexible strand or rod of metal. Wires are used to bear mechanical loads or electricity and telecommunications signals. Wire is commonly formed by drawing the metal through a hole in a die or draw plate. Wire gauges come in various standard sizes, as expressed in terms of a gauge number. The term wire is also used more loosely to refer to a bundle of such strands, as in "multi-standard wire", which is more correctly termed a wire rope in mechanics, or a cable in electricity.

Fig.2.15: Connecting wire

CHAPTER-3

Methodology

3.1 Methodology

In DESIGN AND FABRICATION OF CUSTOM BOT basic concept is custom bot is controlled by mobile phone via hotspot. The custom bot is controlled by specific phone application. Node MCU ESP8266 Wi-Fi module main function is connecting the mobile phone with custom bot via hotspot. The program needs to be downloaded from a web server, in the run. That means, you must have an online connection to the Internet. For development purpose that is welcome, but for normal operation it is cumbersome. The robot control is difficult, because the motors starts turning from above 600 (control range 0-1023) on, and stop at below 300. This was not taken into consideration.
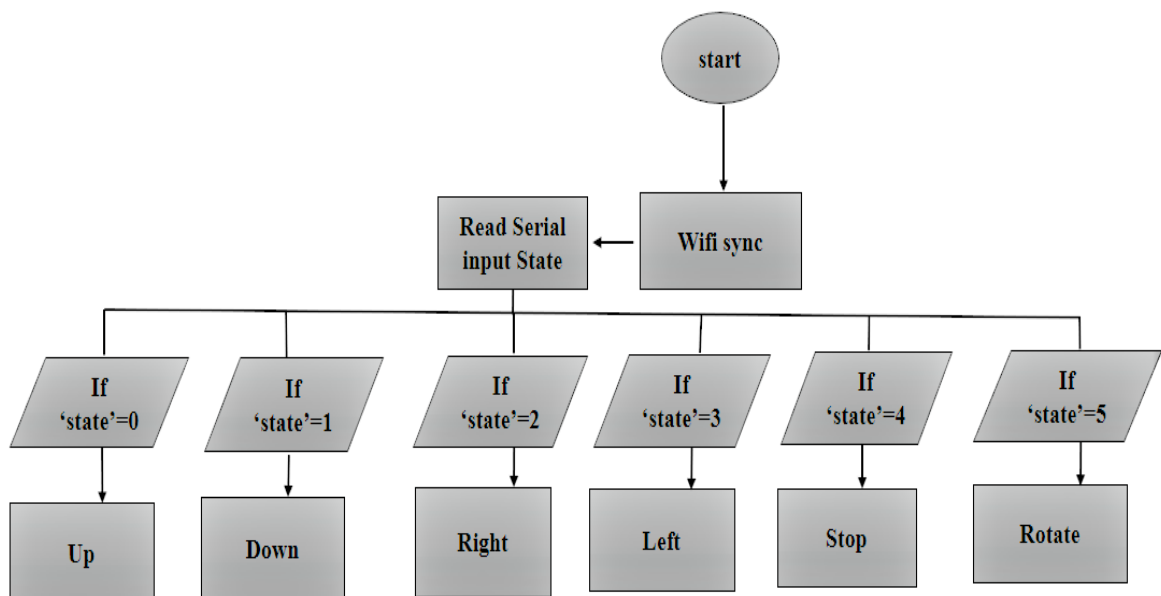
3.2 Flow Chart:
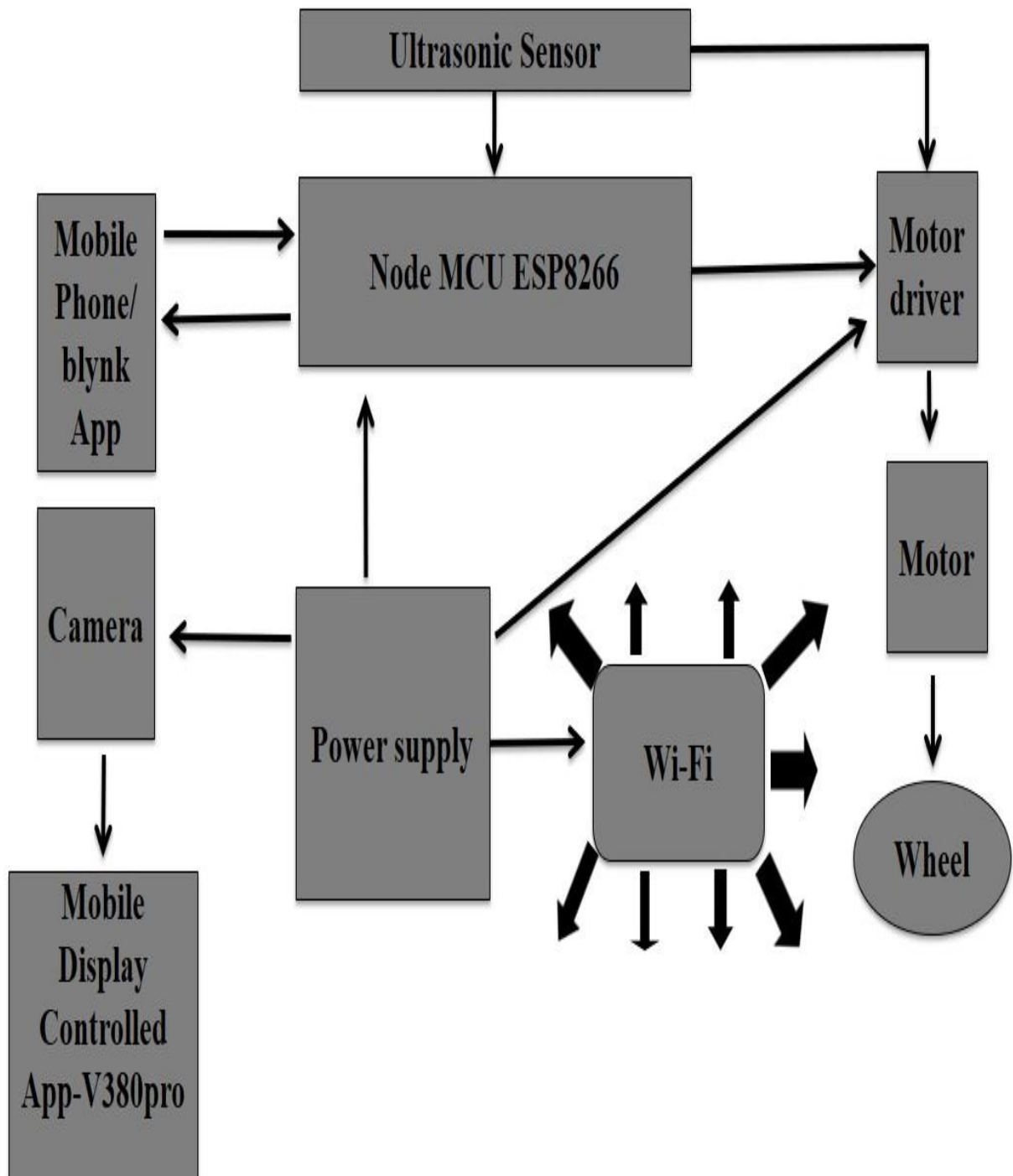

Fig.3.2: Working Condition.

3.3 Block diagram:

Fig.3.3: IOT based Wi-Fi controlled Robot.

3.4 Circuit diagram and description
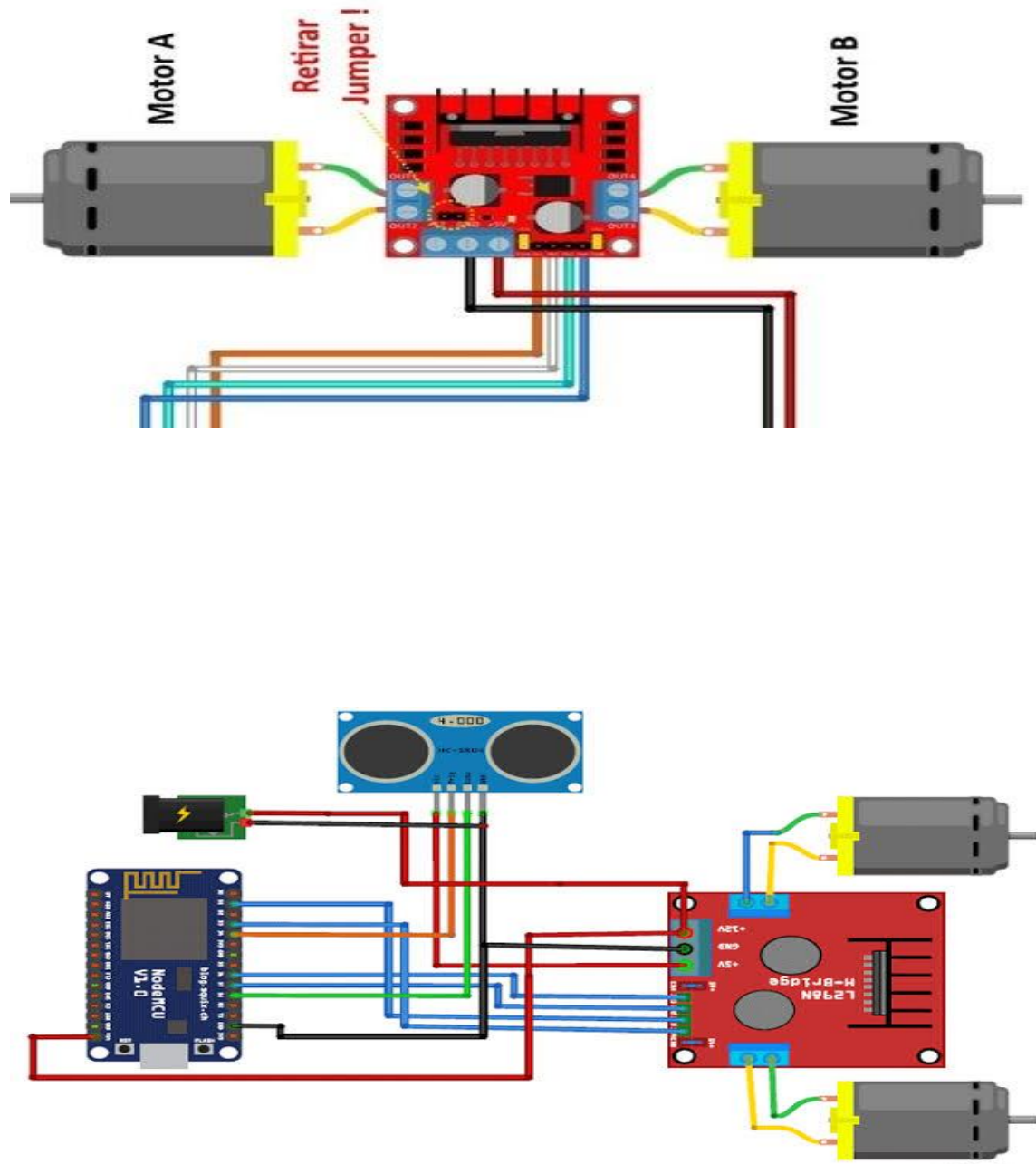
Step 1: Hardware Connection:

Fig. 3.4: Circuit diagram.

Specifications:

- Double H bridge Driver Chip: L298N.
- Logical voltage: 5V.
- Drive voltage: 5V-35V.
- Logical current: 0-36mA.
- Drive current: 2A (MAX single bridge).
- Max power: 25W.
- Note: Built-in 5v power supply, when the driving voltage is 7v-35v. But we recommend you not to power up your microcontroller with on-board 5v power supply.

1: Connect the both motor to the motor driver as shown in the image above.

2: Connect the motor driver to node MCU as given below:

- GPIO2(D4)- IN3.
- GPIO15(D8)-IN1.
- GPIO0(D3)-IN4.
- GPIO13(D7)-IN2.
- GPIO14(D5)-Enb-A.
- GPIO12(D6)-Enb-B.

Supply Connections:

- +12v - Positive terminal of the battery to be connected.
- GND - Ground terminal of the battery to be connected.
- +5v - +5v input (unnecessary if your power source is less than +7v to +9v, if the power source is greater than +9v to +35v then it can act as a 5v out).
- 4: Input Connections:
- (Motor A) ENA - Enables PWM signal for Motor A.
- IN1 -Enable Motor A.
- IN2 - Enable Motor A.
- (Motor B) ENB - Enables PWM signal for Motor B.
- IN3: Enable Motor B.
- IN4: Enable Motor B.

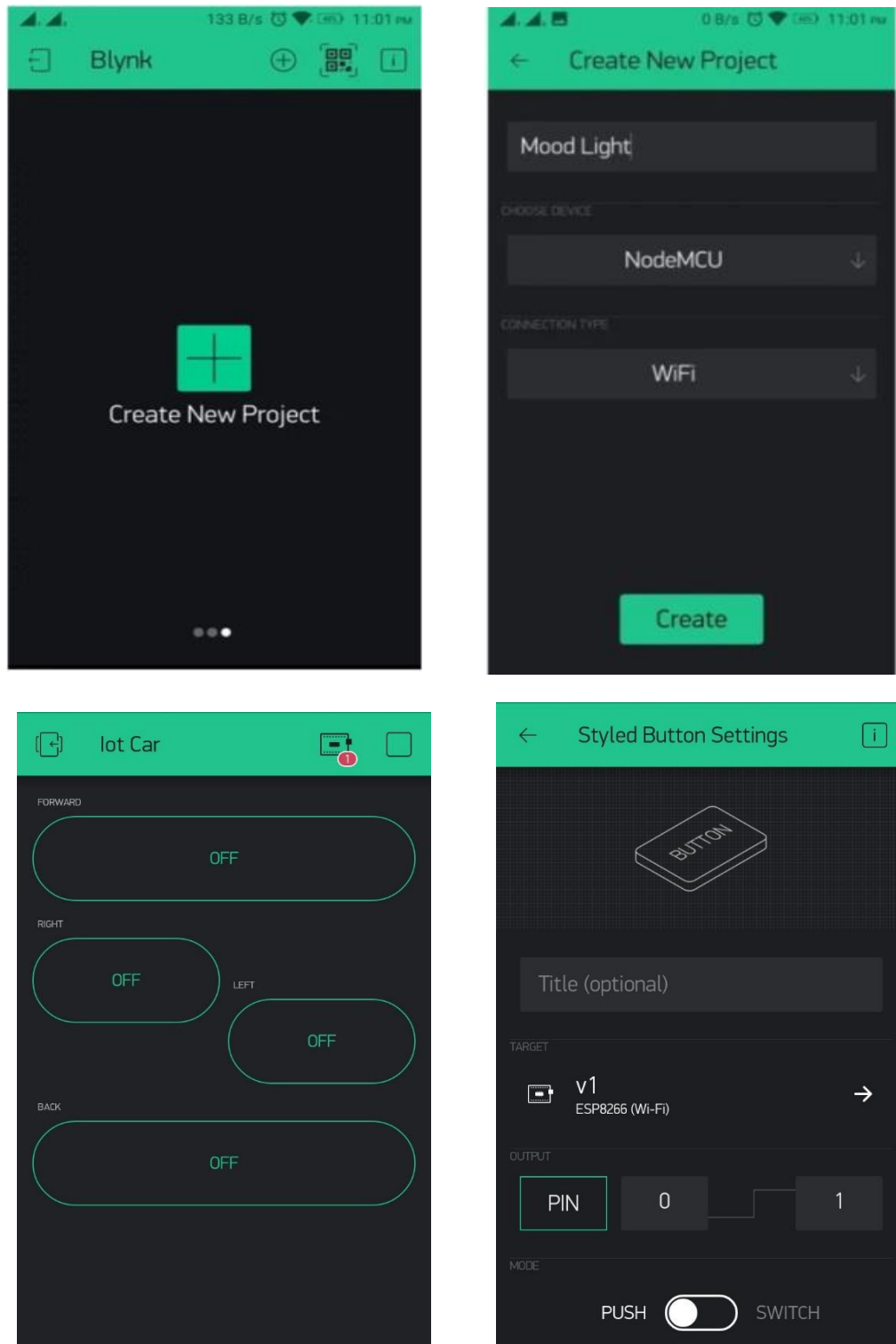## 3.5 Software connection procedure

Step 2: Software Connection

Fig.3.5: Software Connection.

1. Blynk setup

2. Node MCU ESP8266 setup

- Open the blynk app.
- Click on new project.
- Select the Node MCU board and Wi-Fi connection.
- Click on the plus symbol present on the right corner of app and and select style Button.
- Now click on the Style Button & named it Forward also select the virtual pin v1 because i have written the code for v1 and slide the button from split to merge, set the value range from 0-1023 because it helps in easy control of robot for larger values.
- All it done for back, right & left, here virtual pin are v2, v3&v4 periodically.
- Set the value range from 0-1023 because it helps in easy control of robot for larger values.
- ESP8266 Board Package.

The Boards Manager window opens, scroll the window page to bottom till you see the module with the name ESP8266. Once we get it, select that module and select version and click on the Install button. When it is installed it shows Installed in the module as shown in the figure and then close the window.

- Selecting ESP8266 Arduino Board

To run the ESP8266 with Arduino we have to select the Board: "Arduino/Genuine Uno" and then change it to Node MCU 1.0 (ESP-12E Module) or other ESP8266 modules depending on what you have This can be done by scrolling down, as shown in the figure

- Connecting ESP8266 to the PC

Now we connect the ESP8266 module to our computer through USB cable as shown in the figure. When module is connected to the USB, COM port is detected eg: here COM5 is shown in the figure.

3.6 Working principle

Description:

Wi-Fi electro mechanical Robot Car- In today's tutorial, we will learn how to control a robot car using Node MCU, ESP8266 wifi module, Motor driver and blynk application is given below: -

1.The Style button will be used to control the Forward…Reverse…. right …and left movement. As this project is based on Wi-Fi, it means this electro-mechanical robot car can be controlled from anywhere around the world. For remote controlling, an IP camera can be used for live video streaming. We will make a separate video on how to use the IP cameras.

2. Here We used an ultrasonic sensor to make a safely dodges obstacles present on its way, the speed of the robot car is not constant.

3. All the connections are exactly the same as explained in the L298N motor driver getting started Tutorial. The only modification is the addition of the Node MCU ESP8266 wifi module. The Node MCU pin is connected with the Arduino's pin number 2 and the Node MCU Rx pin is connected with the Arduino's pin number 3 while the Node MCU ground pin is connected with the Arduino ground.
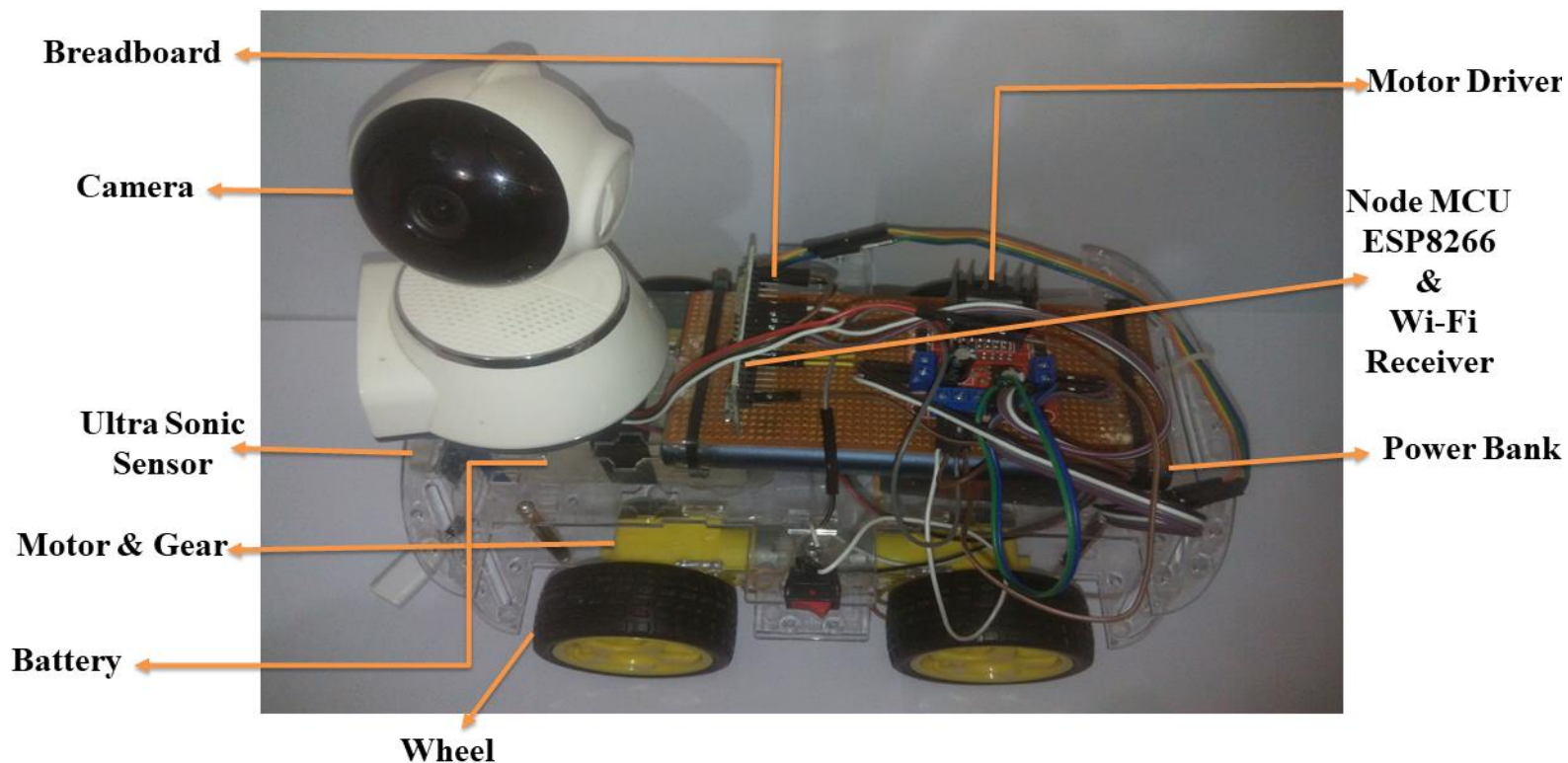

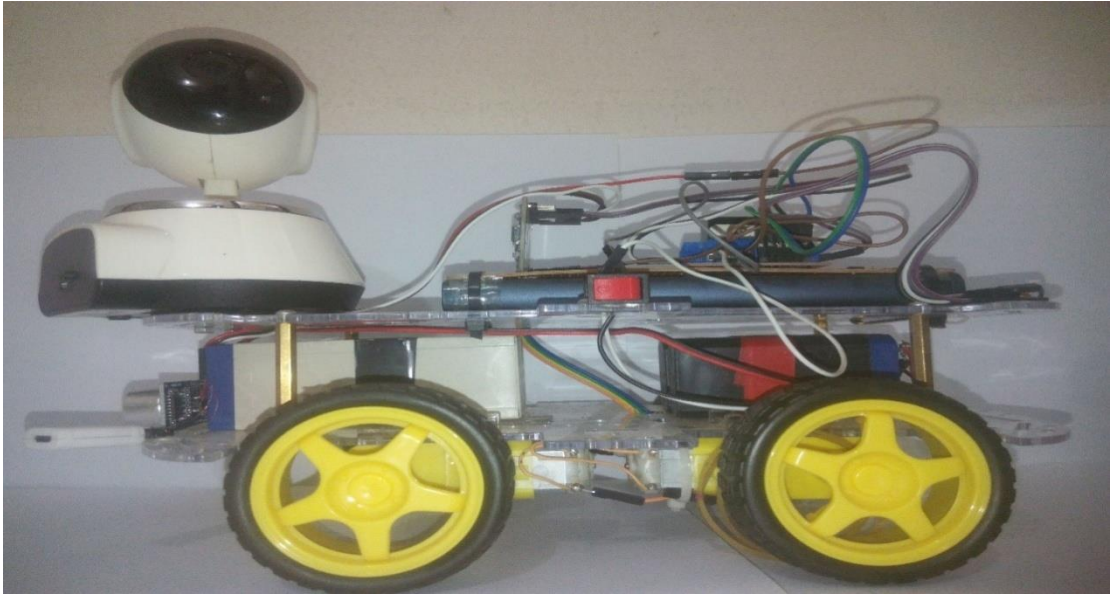Fig.3.6: IOT based Wi-Fi controlled robot

3.7 Image of project
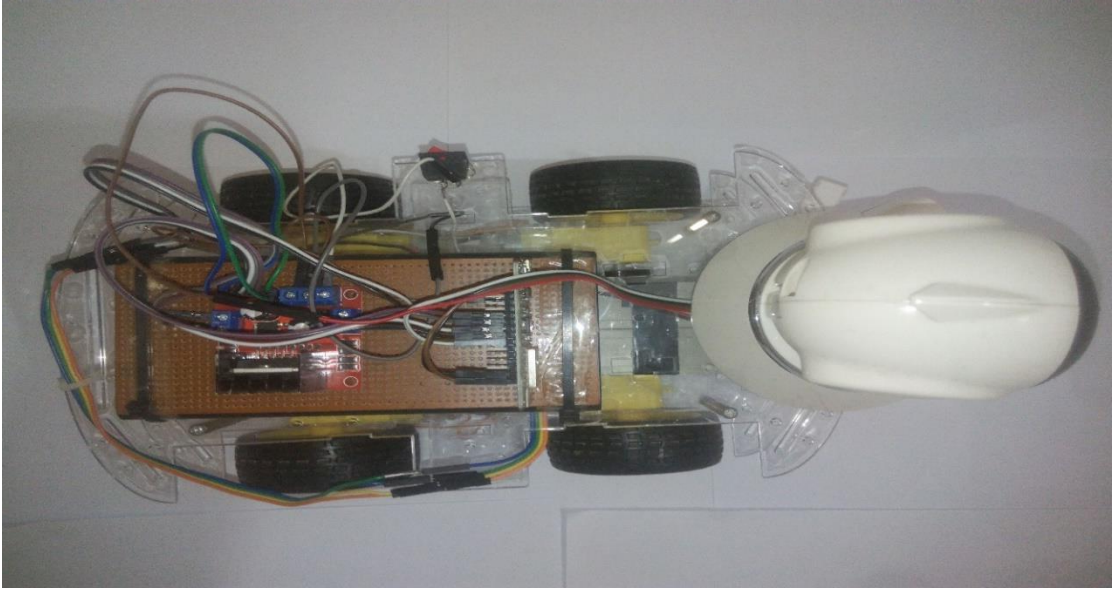

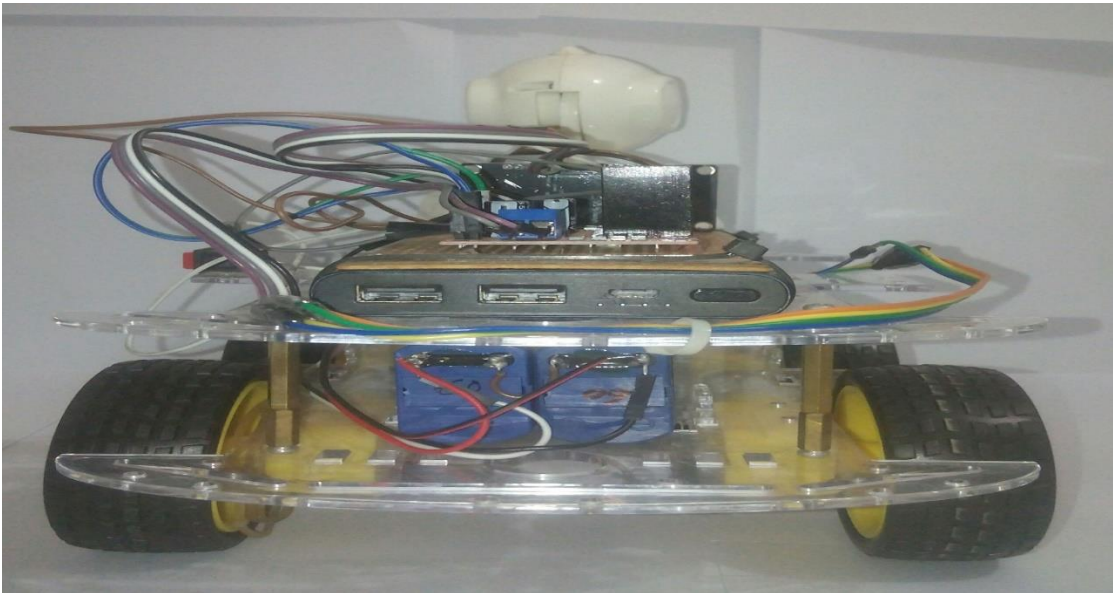Fig.3.7.1: Side view.

Fig. 3.7.2: Front view.

Fig.3.7.3: Top view.

Fig.3.7.4: Rear view.

CHAPTER-4

Result and Discussion

4.1.1 About Proteus

It is a software suite containing schematic, simulation as well as PCB designing.

ISIS is the software used to draw schematics and simulate the circuits in real time. The simulation allows human access during run time, thus providing real time simulation.

ARES is used for PCB designing. It has the feature of viewing output in 3D view of the designed PCB along with components. The designer can also develop 2D drawings for the product.

4.1.2 Features

ISIS has wide range of components in its library. It has sources, signal generators, measurement and analysis tools like oscilloscope, voltmeter, ammeter etc., probes for real time monitoring of the parameters of the circuit, switches, displays, loads like motors and lamps, discrete components like resistors, capacitors, inductors, transformers, digital and analog Integrated circuits, semi-conductor switches, relays, microcontrollers, processors, sensors etc.

4.2 Result

The electro mechanical Robot control system has the ability to move in different directions such as left, right, forward, and backward and stop according to user's joysticks (use Blynk mobile app) and to capture images of remote location. This is a robot with wireless visual system that the user can observe and control the movements via joysticks (use Blynk mobile app).

4.3 Cost Estimation

Sl. No.	Particulars	Quantity	Unit Price (BDT)	Total Price (BDT)
1	Node MCU esp8266	1	500	500
2	HC-SR04 Ultrasonic Sensor	1	250	250
3	Camera-B85C	1	2500	2500
4	4 wheel mechanical car kit	1	800	800
5	L293Dmotor driver module	1	200	200
6	4 v rechargeable dc battery	4	100	400
7	5 v 10000mH Power bank	1	1000	1000
8	Varo board	1	50	50
9	Connecting wire	30	2	60
Total TK				5760

CHAPTER-5

Conclusion

5.1 Advantages of Surveillance Robot

- It has wireless control facilities.
- It can maintain public surveillance systems (Surveillance of a locality, street, traffic junctions, etc.)
- It can work without any nose.
- It has higher range of communication.
- App's can be install from open source software.
- It can be modified easily.

5.2 Disadvantage

- It cannot run through much rough surface.
- When mobile network system fails, the device operation will not work.
- It cannot solve the problems, but it finds the problems.
- A person needs to operate it.

5.3 CONCLUSION

The project carried out by using the node mc and motor drive in the field of mechanical department. New things and new technology are being invented. As the technology grows day by day, it can imagine about the future in which thing may occupy every place. User friendly and less complex, which can readily be used in order to perform. Several tedious and repetitive tasks. Though it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial and research application. The chassis of robot made by aluminum it give the efficiency and more speed to robot. The command coding are entered in robot it is very easy to understand. Though it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial and research application.

5.4 REFERENCE

[1] Motor driver ic- datasheet available part. Publishers New York,1989

[2] instructables.instumentiton, volume: 10.2 general method of Mechanical, London 1994.

[3] Al- Sahib Nabeel.K&Azeez.Z Mohammed created "Internet Remote Control Interface for a Multi-Purpose Mobile Robot". 1994

[4] Andreasson.J, Gavert.M created "The Vehicle Dynamics Library Overview and Applications Modelon". 1990

[5] CunoPfister created "Getting started with Internet of Things". 2012

[6] Joy deep Biswas created "Wifi Localization and Navigation for Autonomous Indoor Mobile Robots". 1994

[7] SudhaJamthecreated"IoT Disruptions: The Internet of Things - Innovations & Jobs " 1999.

[8] Tom nguyen ,joshslonaker created "Semi-Autonomous wireless control robot". 2015

[9] M.S.Sreejith, Steffy Joy created "Conceptual design of a wifi and gaps based robotic library using an intelligent system. 2011

[10] C.W.Warren ,S.G.Buckley created "Mobile robotic over wifi network using arduino technology". 2001

[11] HarshitGulati, ShriyannshVaishya created "Bluetooth and wifi control rescue robot". 1991

[12] 'Wi-Fi Robot For Video Monitoring & Surveillance System' by Pavan.C, Dr. B. 1989.Sivakumar, International Journal of Scientific & Engineering Research Volume 3, Issue 8, August-2012 ISSN 2229-5518[2] www.wifibot.com[3] 'Networking and Internet Applications' by SangayYeshi[4]

[13] rakeshmondal.info/L293D-Motor-Drive.1988.

[14]] Dr. Shaik Mahaboob Basha, Abdul Khayyum. S.K, Amarendra.B, Sajid.S.K. "Design Of Security Robot in Night Vision Using Wireless Video Camera And Ultrasonic Sensor" Geethanjali Institute of Science And Technology, Nellore, Andhra Pradesh, India. (2017)

5.5 APPENDIX

● Programming explanations and code of the project is as follows:

Code

```
#include <ESP8266WiFi.h>
// You should get Auth Token in the Blynk App.
// Go to the Project Settings (nut icon).
char auth[] = "i7Wau70sJFRCoPi2NOqoa8MFH84ds4nS";

// Your WiFi credentials.
// Set password to "" for open networks.
char ssid[] = "Student";
char pass[] = "iotstudent";



inttrigPin = D0;
intechoPin = D1;
long duration;
int distance;

intpinValue = 0;
int pinValue1 = 0;
int pinValue2 = 0;
int pinValue3 = 0;
int pinValue4 = 0;

int rmotor1 = D8;
int rmotor2 = D7;
int lmotor1 = D6;
int lmotor2 = D5;

//int en1 = D3;
//int en2 = D4;


void setup()
{
  // Debug console
Serial.begin(9600);
pinMode(rmotor1, OUTPUT);
pinMode(rmotor2, OUTPUT);
pinMode(lmotor1, OUTPUT);
pinMode(lmotor2, OUTPUT);
pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
pinMode(echoPin, INPUT); // Sets the echoPin as an Input
  // pinMode(en1, OUTPUT);
  // pinMode(en2, OUTPUT);
  // digitalWrite(en1,HIGH);
```

```
//  digitalWrite(en2,HIGH);


// You can also specify server:
//Blynk.begin(auth, ssid, pass, "blynk-cloud.com", 80);
//Blynk.begin(auth, ssid, pass, IPAddress(192,168,1,100), 8080);
}
BLYNK_WRITE(V0) // V0 is the number of Virtual Pin
{
pinValue = param.asInt();
Serial.println(pinValue);
}
BLYNK_WRITE(V1) // V0 is the number of Virtual Pin
{
  pinValue1 = param.asInt();
Serial.println(pinValue1);
}
BLYNK_WRITE(V2) // V0 is the number of Virtual Pin
{
  pinValue2 = param.asInt();
Serial.println(pinValue2);
}
BLYNK_WRITE(V3) // V0 is the number of Virtual Pin
{
  pinValue3 = param.asInt();
Serial.println(pinValue3);
}
BLYNK_WRITE(V4) // V0 is the number of Virtual Pin
{
  pinValue4 = param.asInt();
Serial.println(pinValue4);
}

void loop()
{
Blynk.run();

  // Clears the trigPin
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
  // Sets the trigPin on HIGH state for 10 micro seconds
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
  // Reads the echoPin, returns the sound wave travel time in microseconds
  duration = pulseIn(echoPin, HIGH);
  // Calculating the distance
  distance = duration * 0.034 / 2;
  // Prints the distance on the Serial Monitor
Serial.print("Distance: ");
```

```
Serial.print(distance);
Serial.println("CM");

  if (distance >= 15)
  {

   //front
   if (pinValue == 1)
   {
digitalWrite(rmotor1, HIGH);
digitalWrite(rmotor2, LOW);
digitalWrite(lmotor1, HIGH);
digitalWrite(lmotor2, LOW);
   }

   //back
   if (pinValue3 == 1)
   {
digitalWrite(rmotor1, LOW);
digitalWrite(rmotor2, HIGH);
digitalWrite(lmotor1, LOW);
digitalWrite(lmotor2, HIGH);
   }

   //rite
   if (pinValue2 == 1)
   {
digitalWrite(rmotor1, HIGH);
digitalWrite(rmotor2, LOW);
digitalWrite(lmotor1, LOW);
digitalWrite(lmotor2, LOW);
   }
   //left
   if (pinValue1 == 1)
   {
digitalWrite(rmotor1, LOW);
digitalWrite(rmotor2, LOW);
digitalWrite(lmotor1, HIGH);
digitalWrite(lmotor2, LOW);
   }
  }
  else
  {
digitalWrite(rmotor1, LOW);
digitalWrite(rmotor2, LOW);
digitalWrite(lmotor1, LOW);
digitalWrite(lmotor2, LOW);
  }
  //back
  if (pinValue3 == 1)
```

```
  {
digitalWrite(rmotor1, LOW);
digitalWrite(rmotor2, HIGH);
digitalWrite(lmotor1, LOW);
digitalWrite(lmotor2, HIGH);
  }
```

END