A

PROJECT REPORT ON

"Design and Development of Robot based System For Precision Farming"

Submitted to the Savitribai Phule University, Pune in the partial fulfillment of the requirement for the award of the degree

Of

BACHELOR OF ENGINEERING

In

ELECTRICAL ENGINEERING

Submitted By

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DEPARTMENT OF ELECTRICAL ENGINEERING

AMRUTVAHINI COLLEGE OF ENGINEERING

SANGAMNER-422608 2022-23

AMRUTVAHINI COLLEGE OF ENGINEERING
SANGAMNER-422608

CERTIFICATE

This is to certify that the project report entitled

"Design and Development of Robot based System For Precision Farming"

Has satisfactorily completed by

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In fulfillment of the requirement for the degree of Electrical Engineering of Savitribai Phule Pune University, Pune. For academic year 2022-23.

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"Design and Development of Robot based System For Precision Farming"

INTERNAL EXAMINAR **EXTERNAL EXAMINAR**

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Abstract

In traditional method of agricultural works, the equipment used to perform above operations are expensive and inconvenient to handle. So, farmers need advance technologies to perform agricultural processes.

The purpose of this work is to design and develop the robot which can perform operations like Ploughing, Seed Sowing, Grass Cutting, Water Sprinkling. This robot gets power supply from solar panel, so it does not need any external power supply. The whole system is controlled by android application using Bluetooth interfacing with PIC18F4520 which sends the signals to the robot for required mechanisms and movement of the robot. The ploughing of firm and plantation of seeds is automatically done by using dc motor. Constant distance is maintained for sowing of seed. Sprinkler is used to provide water to crop. It has rotating nozzles to sprinkle the water on crop. The grass cutting mechanism consists of rotating blades having a sharpened knife edge on both sides to cut the waste grass efficiently.

This robotic vehicle will minimize the labor cost, increase the speed and accuracy of the work. It includes multiple operations, so it is cost effective. Energy required for this machine is less as compared with tractors

ACKNOWLEDGEMENT

Electrical engineering department where knowledge is considered s wealth and it is proved that the power of mind is the ways of sun; when concentrated they illuminate.

First & foremost, we express our gratitude toward our Prof. **M. S. Gadakh** who kindly consented to act our guide. We cannot thanks enough, and almost contagious positive attitude and critical comment are largely responsible for a timely and enjoyable completion of this assignment. We appreciate his enlightens guidance especially his pursuit for the perfect work will help in long run.

We would like to express our deep gratitude regard to **Dr. M. A. Venkatesh** (Principal Amrutvahini College of Engineering), and **Dr. S. S. Kadlag** (Head of Department) & **Prof. M. S. Gadakh** (Project coordinator) for their support.

We are also graceful to our entire staff of AVCOE, our friends and parents without their support this task is difficult.

Ms. Ghule Sakshi Balasaheb

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Ms. Zanzurne Radhika Bhaurav

Mr. Zope Dipesh Sudhir

(B.E.ELECTRICAL)

INDEX

Sr No	Name of Abbreviation	Full Form
1	Vmp	Maximum Power Voltage
2	Imp	Maximum Power Current
3	Isc	Short Circuit Current
4	Voc	Open Circiut Voltage
5	I/O	Input/Output
6	PAN	Personal Area Network
7	FHSS	Frequency Hopping Spread Spectrum
8	USART	Universal Synchronous Asynchronous Receiver Transmitter
9	VCC	Voltage Common Collector
10	GND	Ground
11	TXD	Transmit Data
12	RXD	Receive data
13	AGM	Absorbent Glass Mat
14	NO	Normally Open
15	NC	Normally Closed
16	CO	Change Over

CHAPTER 1

INTRODUCTION

In India there are 70 percentage of population chooses agriculture as a primary occupation. In the current generation we do not have sufficient skilled man power specifically in agricultural sector. A manual farming consumes more time & leads to more pollution. The main purpose for developing Automation in Agricultural field is decreasing labor and decreasing time required to perform the processes on crops so that human efforts will get reduce up to 90 percent. Automation is required for safety and health of workers especially when worker have to perform harmful duties.

Some of the previously developed robotics applications are Crop Seeding it involves autonomous precision seeding combines robotics with geomapping. Geomapping means map is generated which shows soil properties at every point on field. Crop Monitoring and Analysis is provided by drone companies like Precision Hawk offers farmer combined packages which include robotic hardware and analysis software. Other applications are Fertilizing and irrigation system, Crop weeding and Spraying system, Autonomous tractors, Picking and harvesting system.

Government of India has been taken major initiatives in agriculture sector are Pradhan Mantri Kisan Sanman Nidhi Yojana (PMKSNY), Transport and Marketing Assistance scheme to provide financial assistant for transport and marketing of agriculture product, Pradhan Mantri Krishi Sinchai Yojana (PMKSY). All these schemes are provided to give financial support to farmers in event of failure of any of the notified crop as a result of the notified crops as a result of natural calamities, pests and diseases.

The system uses basic components like Solar panel, DC motor, Battery, Relay, Motor driver, Relay driver, Bluetooth Module and PIC18F4520 controller. The whole process is controlled by microcontroller. The solar panel is used to charge the battery. This battery used to power vehicle movement as well as to the motor that is used for grass cutting. The ploughing of field and plantation of seed is done by using DC motor. Distance between the two seeds are controlled and varied by using microcontroller. When the robot reaches the end of the field, we can change the direction with the help of Bluetooth command. The advantage of this solar powered multi-function Agri-robot is that it does not require any fuel or petrol to work, as it works on the solar energy. The circuit model is less complex and compact due the use of PIC18F4520 controller.

1.2 NEED OF PROJECT

- The manual method of farming requires more labours and consumes more time, so automation is required important in agricultural field.

1.3 AIM OF THE PROJECT

- To develop agricultural robot working on energy generated using solar power to preform functions like Automatic Ploughing, Seed Sowing, Grass Cutting and Water Sprinkling.

1.4 OBJECTIVES OF THE PROJECT

- To design Automatic Ploughing System.
- To design Sowing System.
- To design Grass Cutter System.
- To design Sprinkler System.
- To design Solar Photovoltaic Power System.

CHAPTER 2

2.1 LITERATURE SURVEY:

The automation in the agriculture could help farmers to reduce their efforts. The vehicles are being developed for the processes for Ploughing, seed sowing, Grass cutter, Sprinkler. All of these functions have not yet performed using a single vehicle. In this the robots are developed to concentrate in an efficient manner and also it is expected to perform the operations autonomously. This idea implements the vehicle to perform the functions such as ploughing, seed sowing, grass cutting and water spraying. Energy required for this machine is less as compared with tractors and agricultural instrument pollution is also a big problem which is eliminated by using solar plate.

As there are no efficient equipment's to aid the farmers. There is a need for new techniques to be implemented. Previously the idea was formulated, design options were finalised. Few of them are described here.

In "Automated Seed Sowing Agribot using Arduino", Saurabh Umarkar and Anil Karwankar, discussed that the process of seed sowing is a key component of agriculture field. For many varieties of crops, high-precision planting has been developed for a wide range of seed sizes, resulting to uniform seed distribution in seed spacing along the travel path. Wifi is used as receiver. Main drawback of the system is robot moves in only one direction. Whenever there is obstacle power supply is automatically turned off[5].

In "Agribot: Arduino Controlled Autonomous Multipurpose Farm Machinery Robot for Small to medium scale cultivation", M. D. I. Sujon, R. Nasir and Jayasree Baidya determined the effects of various seeding techniques and machines. The robot is performing farming using analogy of ultrasonic detection in order to change its position. The main disadvantage of this system is it does not work well on all types of soil[6].

In "Autonomous seed sowing agricultural robot", P. V. S. Jayakrisna, et.al, discussed that the robot capable of performing operations like automatic ploughing, seed sowing. It also provides manual control when required. It checks the humidity with the help of humidity sensors. The main component here is the AVR at mega microcontroller that controls the entire process. Initially the robot tills the entire field and proceeds to ploughing, simultaneously sowing seeds side by side[7]. Disadvantage of this robot is on the field the robot operates on automated mode, but outside the field is strictly operated in manual mode.

In "GPS based Autonomous Agriculture Robot" developed by S. Kareemulla et.al, the system benefits farmers by performing basic operation of seed sowing. This machine's operation is simple. It is possible to increase the total yield percentage effectively. Labour problem can be reduced. As compared to the manual and tractor-based sowing, time and energy required for this robot machine is less[8]. Also, wastage of seed is less. The disadvantage of model is it consists of only sowing operation.

The above research papers helped to understand the various aspects posed by the research on the agricultural robot. The robots designed in the above literature surveys have many issues with movement of the robot and grass cutting. These problems are effectively solved in this work.

CHAPTER 3

HARDWARE DESIGN

3.1 BLOCK DIAGRAM

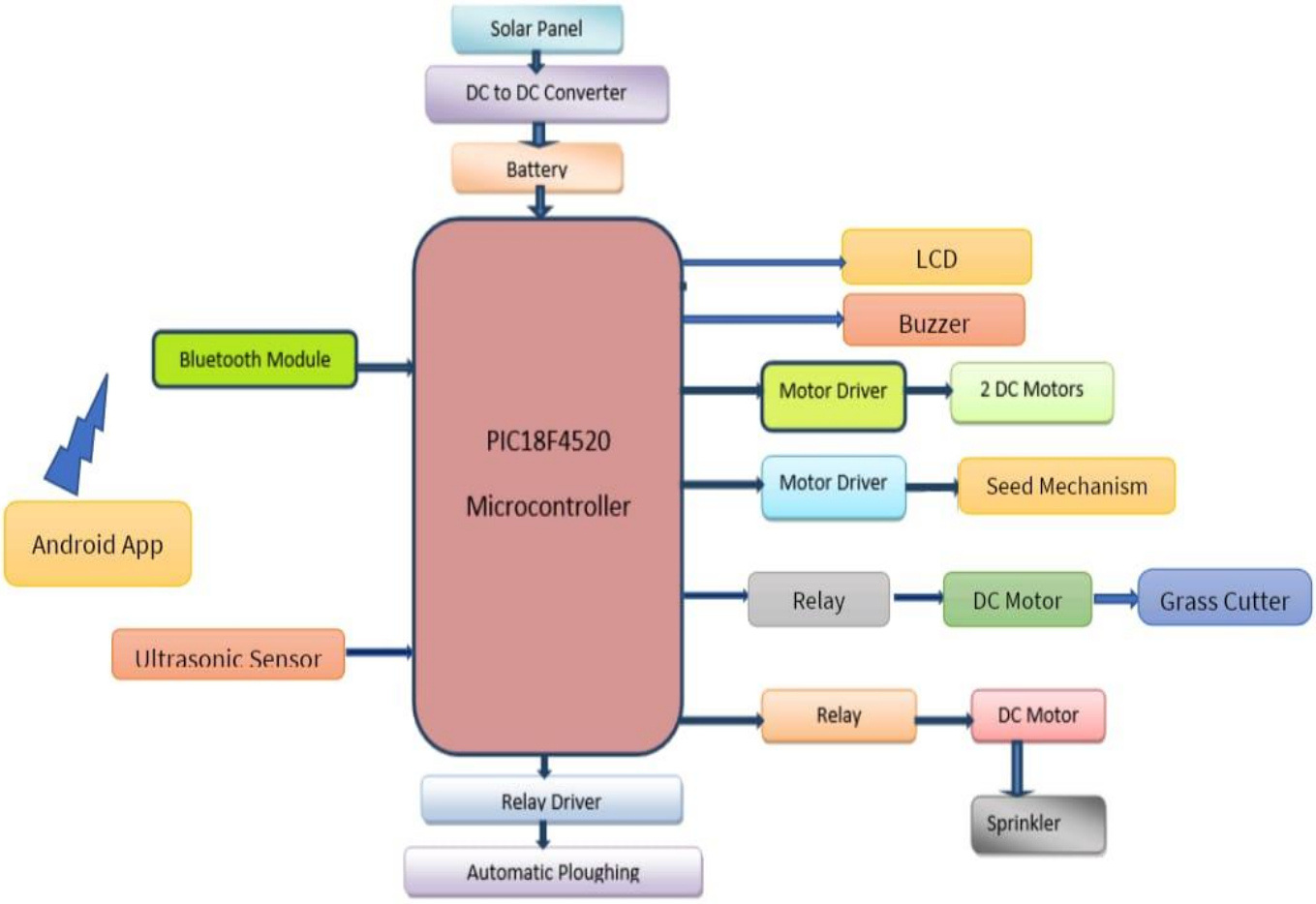


Fig.1: Block Diagram

3.1.1 BLOCK DIAGRAM DESCRIPTION:

The block diagram consists of PIC18f4520 microcontroller which is controller for the whole system as shown in Fig.1, solar panel connected to the battery for storing energy and further it is given to power supply charging circuitry which is providing +5 V for pic board and +12 V supply for driving DC motors using relay motor driver module. Bluetooth HC05 is connected with PIC and wirelessly with Android smartphone to controlling the whole system. In grass cutting operation machine uses two revolving blades to cut a grass surface to an even height. The main wheels are powered by DC motor which is regulated by a Relay switch and movement of wheels is controlled by a remote controller.

3.2 COMPONENTS REQUIRED:

3.2.1. PV SOLAR PANEL

The solar panels are devices that convert light into electricity. Solar panel consists of photovoltaic cells arranged in an order. Photovoltaic cell is nothing but a solar cell. Photo resembles light and voltaic is electricity. Solar cell is made by semiconductor material silicon. Solar panel is connected to DC-DC converter which charges the battery. When a light ray from the Sun is incident on the solar cell, some amount of energy is absorbed by this material. Absorbed energy is enough for the electrons to jump from one orbit to other inside the atom. The cells have one or more electric field that directs the electrons which creates current.

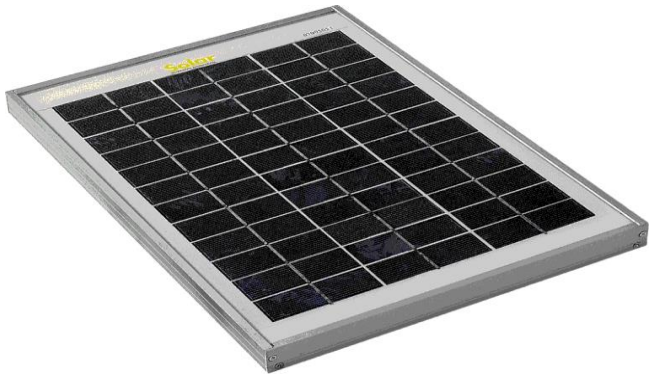


Fig.2: PV Solar panel

Features:

1. Parameters

Nominal Peak Power	5W
Maximum Power Voltage (Vmp)	18.0V
Maximum Power Current (Imp)	0.28A
Short – Circuit Current(Isc)	0.32A
Open – Circuit Voltage(Voc)	21.5V
Optimized Cell Efficiency (%)	17.2%

2. Additional Data

Number of cells	36 series
Dimensions	291*160*25mm
Net Weight	0.74Kgs/pc
Module Name	LL-5w-12v

3. Cell Type

Polycrystalline silicon photovoltaic cell

3.2.2. PIC MICROCONTROLLER (PIC 18F4520):

Microcontroller is a compact integrated circuit designed to govern a specific operation in an

embedded system. A typical microcontroller includes processor, memory and input/output (I/O) peripherals on a single chip. PIC microcontrollers are very popular and industrialists; this is only cause of wide availability, low cost, large user base & serial programming capability. In our project we are choosing a PIC18F4520 microcontroller because of its maximum speed, amount of RAM and sufficient number of I/O pins.

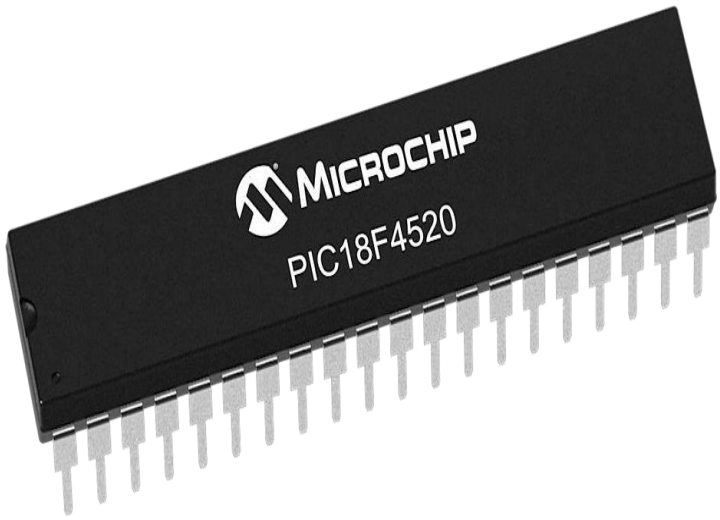


Fig.3: PIC Microcontroller

Features:

- Operating Frequency: DC – 40 MHZ
- Program Memory (Bytes): 32768
- Program Memory (Instructions): 16384
- Data Memory (Bytes): 1536
- Data EEPROM Memory (Bytes): 256
- Interrupt Sources: 20
- I/O Ports: Ports A, B, C, D, E
- Timers: 4
- Capture/Compare/PWM Modules: 1
- Enhanced Capture/Compare/PWM Modules: 1
- Serial Communications: MSSP, Enhanced USART
- Parallel Communications (PSP): Yes
- 10-Bit Analog-to-Digital Module: 13 Input Channels
- Resets (and Delays): POR, BOR, RESET Instruction, Stack Full, Stack Underflow (PWRT, OST), MCLR (optional), WDT
- Programmable High/Low-Voltage Detect: Yes
- Programmable Brown-out Reset: Yes
- Instruction Set: 75 Instructions, 83 with Extended Instruction Set Enabled
- Packages: 40-Pin PDIP 44-Pin QFN 44-Pin TQF

PIN DIAGRAM:

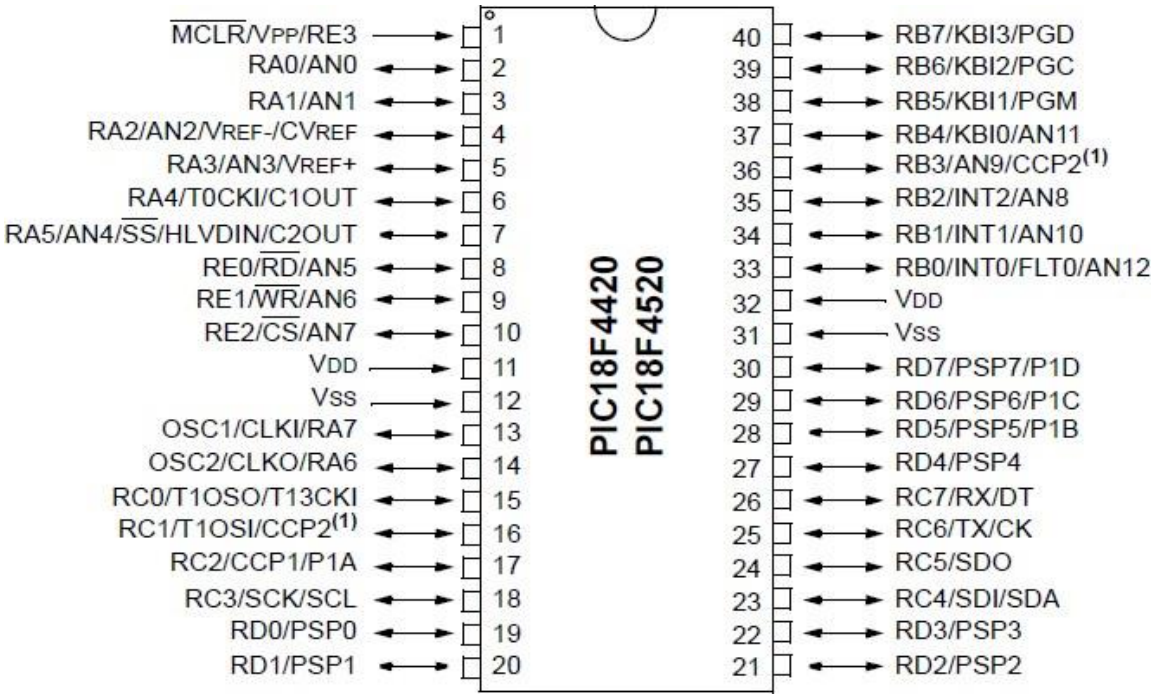


Fig.4: Pin Configuration of PIC18F4520

3.2.3. Bluetooth Module HC-05

- It is used for many applications like wireless headset, game controllers, wireless mouse, wireless keyboard and many more consumer applications.
- It has range up to 100m which depends upon transmitter and receiver, atmosphere, geographic & urban conditions.
- It is IEEE 802.15.1 standardized protocol, through which one can build wireless Personal Area Network (PAN). It uses the frequency-hopping spread spectrum (FHSS) radio technology to send data over air.
- It uses serial communication to communicate with devices. It communicates with microcontroller using serial port (USART).

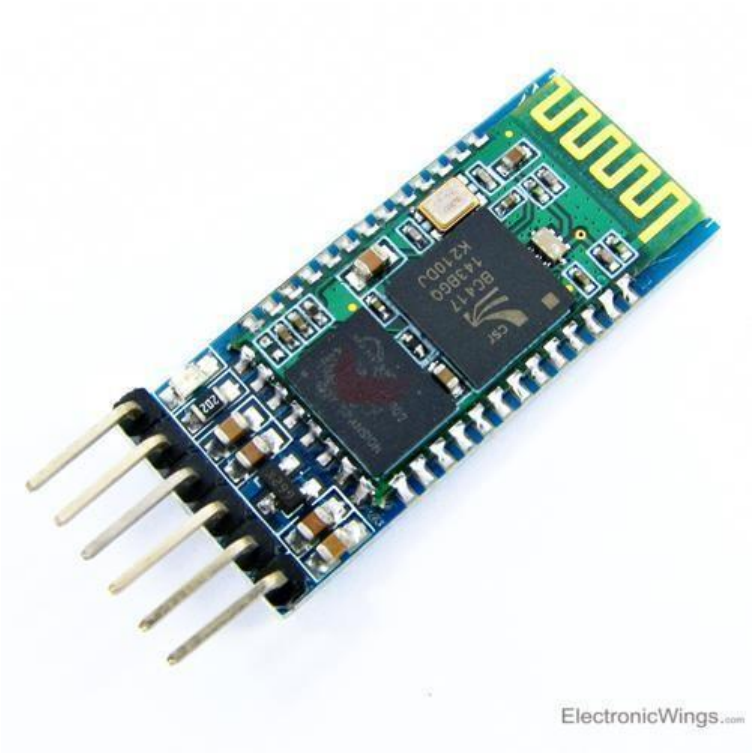


Fig.5 : HC-05 Bluetooth Module

Pin Description

Fig.6: Bluetooth pin description

The Bluetooth serial modules allow all serial enabled devices to communicate with each other using Bluetooth.

1. **Key/EN:** It is used to bring Bluetooth module in AT commands mode. If Key/EN pin is set to high, then

this module will work in a command mode. Otherwise by default it is in data mode. Default baud rate of HC-05 in command mode is 38400bps and 9600 in data mode.

HC-05 module has two modes,

1) **Data mode:** Exchange of data between devices.
2) **Command mode:** It uses AT commands which are used to change setting of HC-05. To send these commands to module serial (USART) port is used.

2. **VCC:** Connect 5 V or 3.3 V to this Pin.
3. **GND:** Ground Pin of module.
4. **TXD:** Transmit Serial data (wirelessly received data by Bluetooth module transmitted out serially on TXD pin)
5. **RXD:** Receive data serially (received data will be transmitted wirelessly by Bluetooth module).
6. **State:** It tells whether module is connected or not.

3.2.4. Ultrasonic Sensor
Ultrasonic Ranging Module HC - SR04

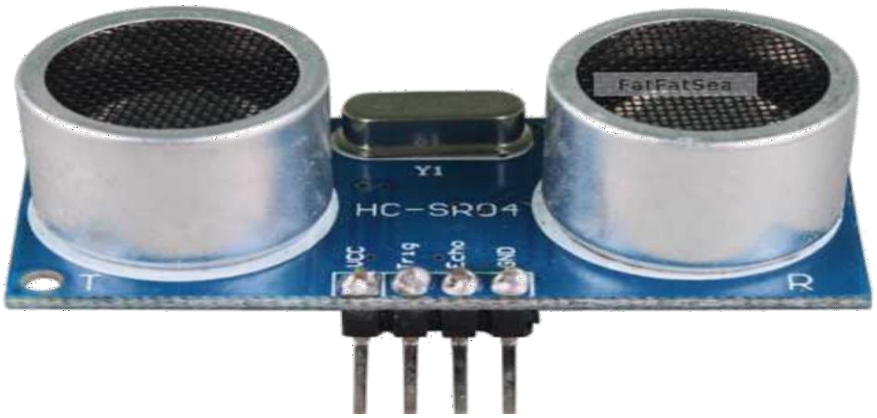


Fig.7: Ultrasonic Sensor

Table 1: Electric Parameters of Ultrasonic Sensor

Working Voltage	DC 5 V
Working Current	15mA
Working Frequency	40Hz
Max Range	4m

Min Range	2cm
Measuring Angle	15 degree
Trigger Input Signal	10uS TTL pulse
Echo Output Signal	Input TTL lever signal and the range in proportion
Dimension	45*20*15mm

3.2.5. LM7805:

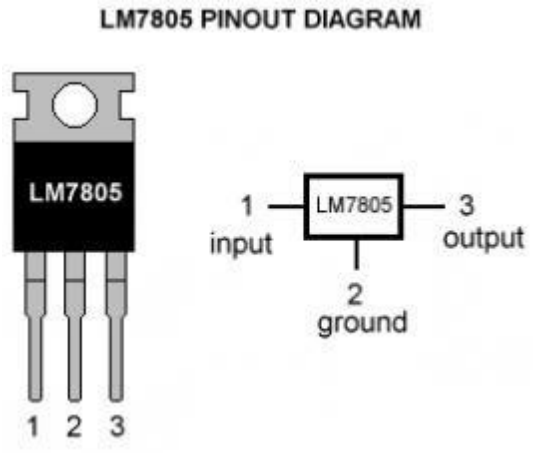


Fig.8: LM7805

Features

- Output Current up to 1A.
- Output Voltages of 5V.
- Thermal Overload Protection.
- Short Circuit Protection.
- Output Transistor Safe Operating Area Protection.

Description

The MC78XX/LM78XX/MC78XXA series of three terminal positive regulators are available in theTO-220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

3.2.6. BATTERY:

A rechargeable battery is a type of electrical battery which can be charged, discharged into a load, and recharged many times, as opposed to a disposable or primary battery, which is supplied fully charged and discarded after use. In our project we are using 12V-7AH lead acid rechargeable battery. By connecting a battery to the solar panel, we can store the energy generated by the solar cells and this energy can be used when required.

Fig.9: 12V 7Ah Battery

General Features

- Absorbent Glass Mat (AGM) technology for efficient gas recombination of up to 99% and freedom from electrolyte maintenance or water adding.
- Not restricted for air transport-complies with IATA/ICAO Special Provision A67.
- UL-recognized component.
- Can be mounted in any orientation.
- Computer designed lead, calcium tin alloy grid for high power density.
- Long service life, float or cyclic applications.
- Maintenance-free operation.
- Low self-discharge.

3.2.7 DC MOTOR:

A DC motor in simple words is a device that converts electrical energy (direct current system) into mechanical energy. Here we are using three DC motors, two are used to control the position of solar panel. Geared DC motors can be defined as an extension of DC motor which already had its insight details demystified here. A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM . The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This Insight will explore all the minor and major details that make the gear head and hence the working of geared DC motor.

Specification

- Nominal Voltage 6V.
- Maximum Current 115mA.
- Stall Torque 36 g.cm
- Size 25*15*20
- Weight 18g
- Shaft Diameter 2mm
- Torque 4kg.cm

Fig.10: Motor

3.2.8 RELAY:

Relays are electromechanical switches. They have very high current rating and both AC and DC motors can be controlled through them because motor will be completely isolated from the remaining circuit. Relays are used as driving circuit for motor, they are used to rotate the motor in forward or reverse direction. Each motor uses two relays hence there are total 6 relays connected to pins of microcontroller which are 20-24.

Fig.11: Relay

- **Normally Open (NO):** Contacts connect the circuit when the relay is activated, the circuit is disconnected when the relay is inactive.
- **Normally Closed (NC):** Contacts disconnect the circuit when the relay is activated, the circuit is connected when the relay is inactive.
- **Change Over (CO):** It's the common contact.
- **Coil:** It's the electromagnet coil inside relay.
- **Relay ratings:**
- **Coil rating:** It's the Voltage at which the coil gets fully activated. Some also have coil resistance mentioned on them. Relay coil voltage rated 6V and 12V are the most commonly available.

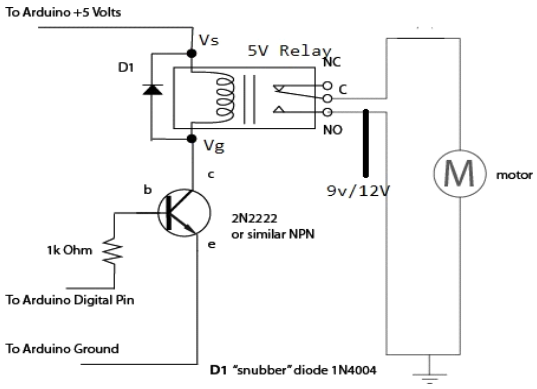


Fig.12: Motor and Motor Driver

3.2.9 BUZZER

Fig.13: Buzzer

Features

- sealed: yes

- operating power: 3-6V DC / 25mA
- extremely compact, ultrathin construction
- no electrical noise
- low current consumption yet high sound pressure level

Specifications

- tone type: single
- operating voltage: 3-6V DC
- rated voltage: 5V DC
- current consumption: 25mA
- osc. frequency: 3.2kHz
- sound level: 87dB
- connector type: PCB
- body color: gray
- weight: 0.056oz

3.2.10 TRANSISTOR BC547:

A transistor is a semiconductor device used to amplify or switch electronic signal and electrical

power. It is composed of semiconductor material usually with at least three terminals for connections to an external circuit.

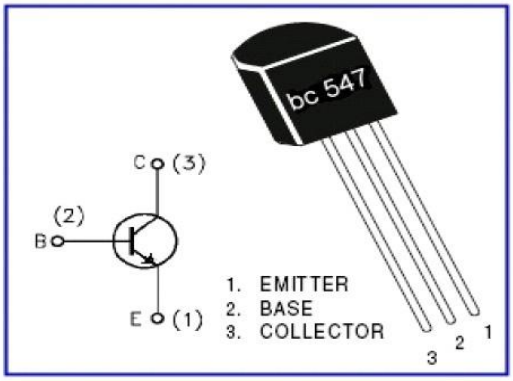


Fig.14: Transistor BC547

3.2.11 DIODE:

A diode is a two terminal electronic component that conducts primarily in one direction. It has low resistance to the current in one direction and high resistance in other. The most common function of a diode is to allow an electric current to pass in one direction while blocking current in the opposite direction. This unidirectional behaviour is called rectification and it is used to convert ac to dc. Here we use 1N4007 diodes.

Fig.15: 1N4007 Diode

3.3 SOLAR CIRCUIT DIAGRAM

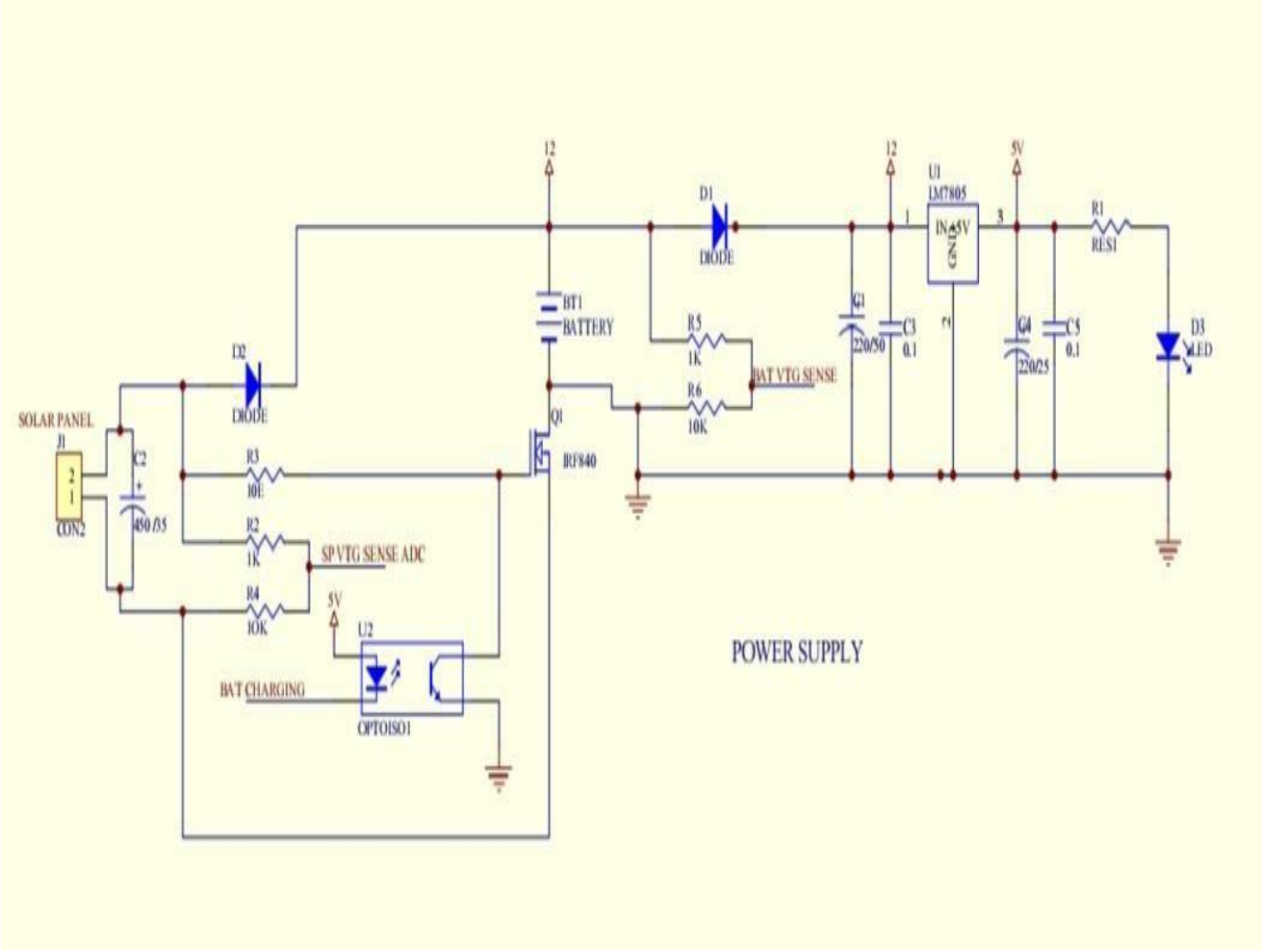


Fig.16: Solar Circuit Diagram of controller

➢ CIRCUIT DIAGRAM OF CONTROLLER

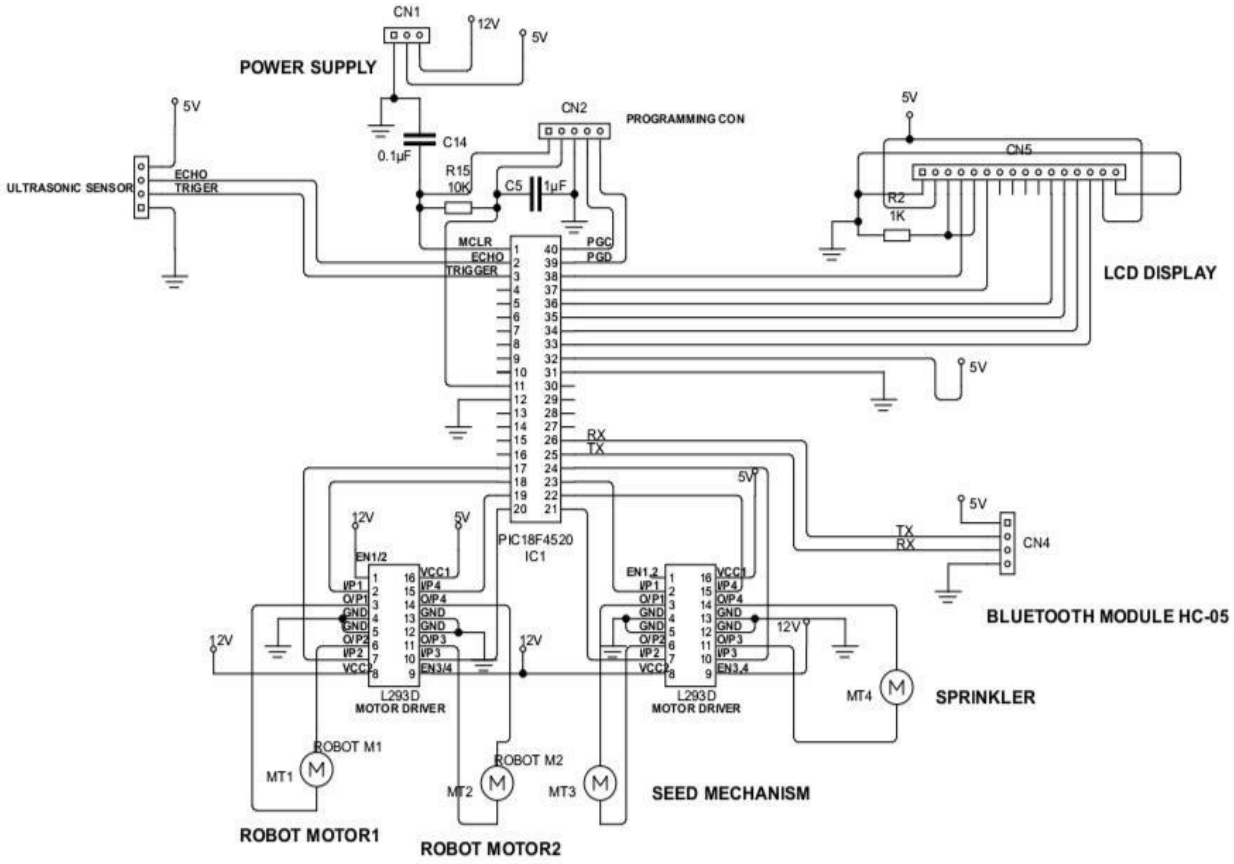


Fig.17: Circuit Diagram of controller

- **CIRCUIT DIGRAM OF REALY**

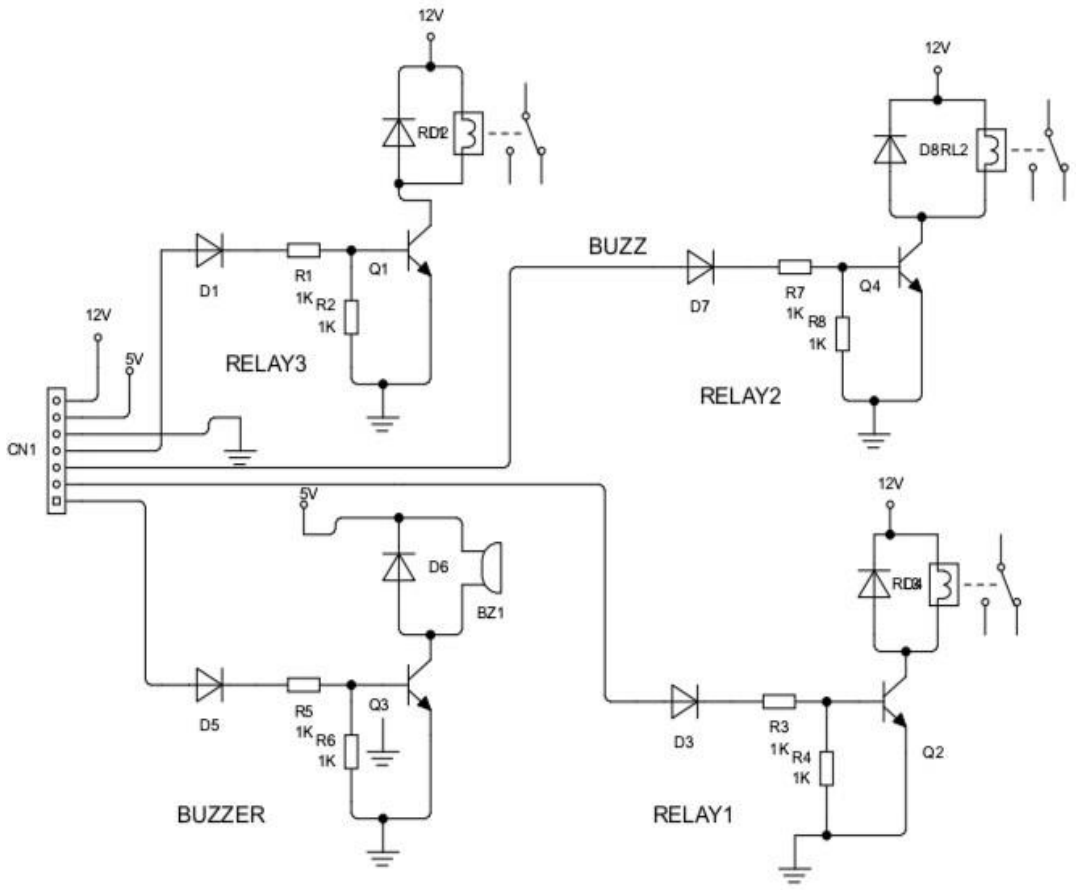


Fig.18: Circuit Diagram of Relay

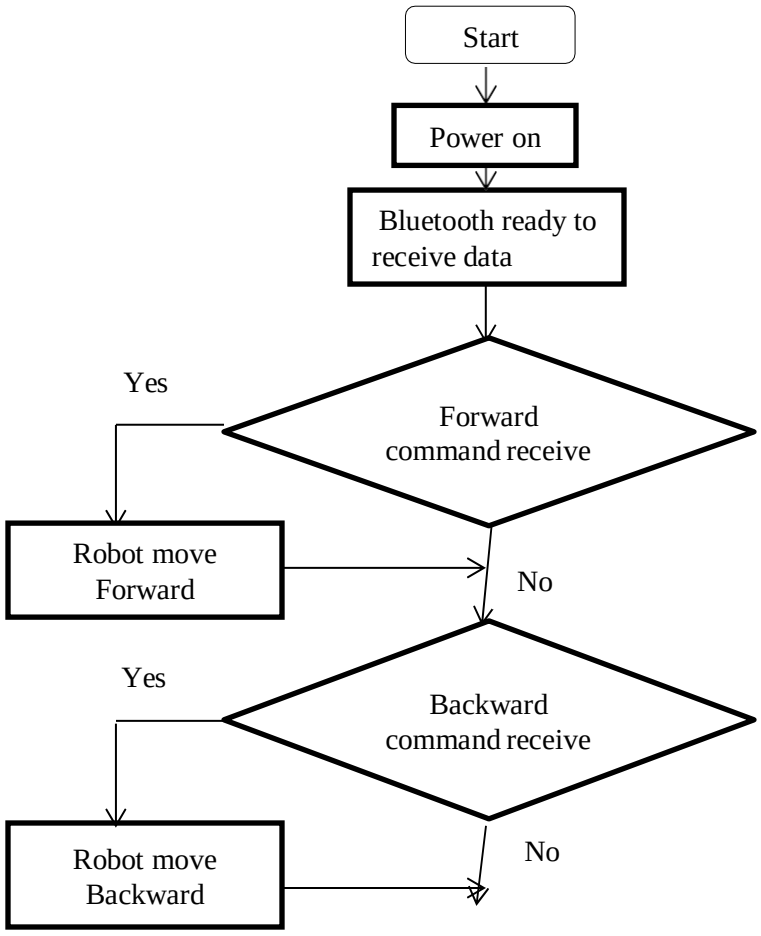
CHAPTER 4
Software Design

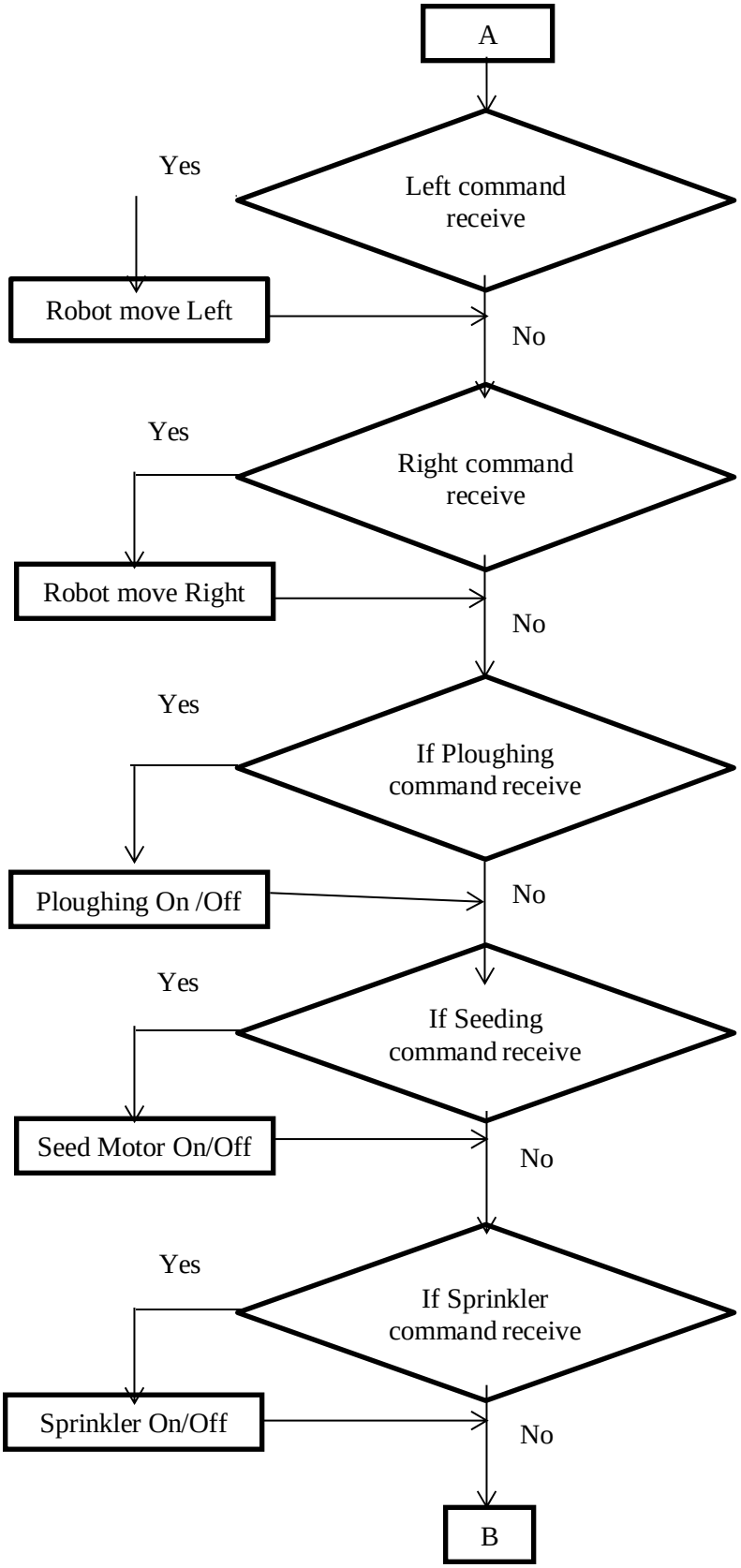
4.1 ALGORITHM

3.1.1 Algorithm of Parameter Measurement System

Step 1: Start.
Step 2: power on.
Step 3: Bluetooth ready.
Step 4: forward command received-robot move forward.
Step 5: backward command received-robot move backward.
Step 6: left command received-robot move left.
Step 7: right command received-robot move right.
Step 8: ploughing command received-robot ploughing on.
Step 9: seed command received-seed motor on.
Step 10: sprinkler command received- sprinkler on.
Step 11: grass cutter command received- grass cutter on.
Step 12: obstacle detected-robot stop and all function stop.
Step 13: stop.

4.2 FLOWCHART




A
Left command receive
Yes
Robot move Left
No
Right command receive
Yes
Robot move Right
No
If Ploughing command receive
Yes
Ploughing On /Off
No
If Seeding command receive
Yes
Seed Motor On/Off
No
If Sprinkler command receive
Yes
Sprinkler On/Off
No
B

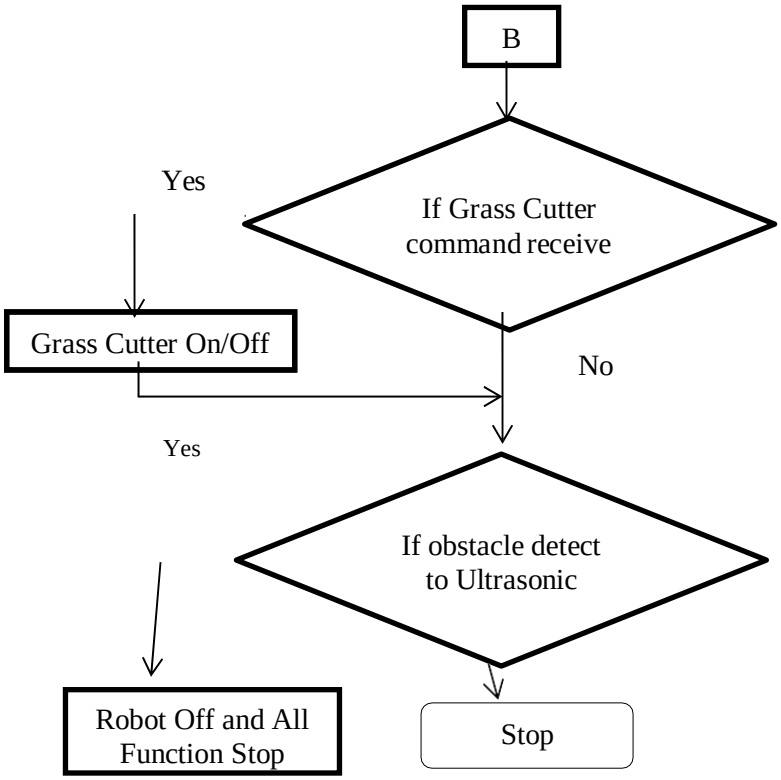
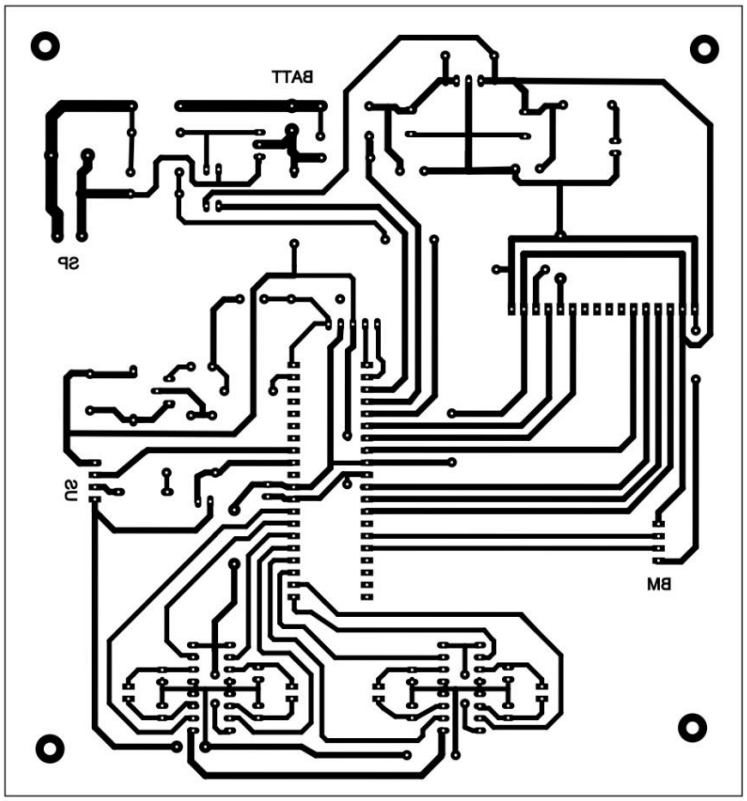


Chart.1: Flowchart of System

CHAPTER 5

SYSTEM PCB DESIGN



LAYOUT.pcb

PCB FABRICATION:

In initial stage of PCB fabrication is to study the circuit diagram. Study of diagram means to check out the components required and examine them and also note their size, dimensions etc. To note the dimensions is necessary to us in the next stage where after preparing the schematic we have give the footprints of respective components before preparation of the layout.

Second stage is an important stage in PCB fabrication. Here we prepare the soft copy of the layout manually or with the help of any software. In case of our project we have used software named “PROTEL99SE” for the preparation of PCB layout.

We first prepare the schematic and give each component label and footprint. A footprint defines the size and shape of the particular component.After preparation of the schematic we create new PCB file, then define

the size of PCB. Then we load net list and place the components at proper places and route to get the final PCB layout.

Now we have the layout ready with us. This layout is first checked for errors. If there are no errors then we go for preparation of negative of the layout. A photo is taken by Vertical Photographic Camera and a negative is taken which gets developed on the special paper of camera roll. This negative is then washed with clean water so as to remove the glueyness of the paper. The film is then developed in A-developer for 1minute where layout is gets appeared. Now to make the tracks transparent the film is passed through B-developer. Then Wash the film with clean water and is then kept for baking in hot air oven and at last the film is cut in appropriate dimensions.

The copper clad on which the film is to be kept and the layout is to be printed is cleaned with steel wool. This cleaning is necessary to remove the
carbon and dust layer that gets formed on the clad.

After cleaning the clad a photo-resist layer is applied. This photo-resist is a liquid and needed to be dried. For this purpose the clad coated with photo-resist layer is kept for baking in hot air oven.

When the clad is baked in the hot air oven it is ready for printing of the layout on the clad. Hence for the same purpose the film prepared is now placed on the clad properly and this composition is kept in U.V. ray machine. The U.V. light passes only through the transparent part of the film and only tracks on the film are transparent as a result the U.V. light and photo-resist solution forms a chemical bond.

The PCB is developed in LPR developer and diablo ink is sprayed on whole PCB. The ink gets applied only on the chemical bond formed in the U.V. ray machine.

Now inspection is done and whenever the ink is faint by using marker we make it dark so that the copper doesn’t come out. After inspection drilling with appropriate drill bit is done.

At last after drilling etching is performed. Here for etching FeCl3 solution is used. Because of this solution CuCl3 bond is formed copper gets removed whenever the ink is not applied. The PCB is washed with water and ink is removed with ready PCB.

CHAPTER 6

SYSTEM PROGRAMMING

```
#include <18f4520.h>
#DEVICE ADC=10

#fuses INTRC_IO,PROTECT,BROWNOUT,NOMCLR,NOCPD,NOWDT,NOPUT,FCMEN

#use delay(clock=8000000)//,restart_wdt)
#use rs232(baud=9600, xmit=PIN_C6, rcv=PIN_C7)

int8 ucROBOTF = 0;
int16 uibill_1 = 0;
int8 uccursrposition = 0;
int16 uiread_otp = 0;
int16  uiotp = 0;
int8 uc_obstacle_f = 0;
int8 ucVotrID = 0;
int8 ucseed = 0;
int8 uccuter = 0;
int8 ucsprinkr = 0;
//int8 ucVtDonIDArr[6] = {0,0,0,0,0,0};
//int8 ucTempIDindx = 0;
int16 uibat_vltgADC = 0;
int16 uibat_vltg = 0;
int16 uiTemp = 0;
int8 ucfiref = 0;
int8  ucactionflg = 0;
int16 uiright_ir = 0;
int16 uisolar_adc = 0;
int16 uisolar_vltg = 0;
int8 ucDecimal_Array[18] = {0,0,0,0,0,0,0,0,0,0,0,0};
int8 ucASCII_Array[18] = {0,0,0,0,0,0,0,0,0,0,0,0};
int16 uiDely1 = 0;
int16 uidispen_time =0;
int16 ucPositionPrev1 = 0;
int16 ucPositionPrev = 0;
int16 ucDiff = 0;
int16 uiDely = 0;
//BYTE CONST TABLE [17]=       "  ENTER ID      ";
BYTE CONST ucArray1[17]     = {"                "};
BYTE CONST ucArray2[17]     = {"ROBOT BASED SYSTM"};//2
BYTE CONST ucArray3[17]     = {"PRICISION FARMING"};//3
BYTE CONST ucArray4[17]     = {"SV:     BV:     "};//4
BYTE CONST ucArray5[17]     = {"                "};//5
```

```
void main(void)
{

   SETUP_ADC(ADC_OFF);               //disable ADC i/p
   SETUP_ADC_PORTS(NO_ANALOGS);      //disable analog i/p
      setup_comparator(NC_NC_NC_NC);
      SETUP_CCP1(CCP_OFF);


   SET_TRIS_A(0x07);//0100 0111
   SET_TRIS_B(0x18);//0001 0110
   SET_TRIS_C(0x80);//1000 1110
   SET_TRIS_D(0x00);//0000 0011
   SET_TRIS_E(0x02);//0000 0000
//
   adfm=true;
//
SETUP_ADC_PORTS(sAN6);//|sAN4|sAN7);//sAN0|sAN1);//|sAN9|sAN10|sAN11|sAN12|sAN13);//sAN0);


   SETUP_TIMER_1(T1_INTERNAL|T1_DIV_BY_8);   //enables timer1
   SET_TIMER1(40536); // timer of 200ms   (64286);//10msec
   enable_interrupts(INT_RDA);
   ENABLE_INTERRUPTS(INT_TIMER1);
//   setup_wdt(WDT_2304MS);
//   RLY_OFF;
//   RLY_OFF_T;
   RLY1_LO;
   RLY2_LO;
   RLY3_LO;
   RLY4_LO;
   RLY5_LO;
   RLY6_LO;
   RLY7_LO;
   RLY8_LO;
      RLY9_LO;
   RLY10_LO;
   RLY11_LO;
RLY12_LO;
   INIT_LCD();
   ENABLE_INTERRUPTS(GLOBAL);
      LCD_WRITE_Const_ARRAY(1,0,2,16);//Blank
      LCD_WRITE_Const_ARRAY(2,0,3,16);//Put

     ucPositionPrev = ucPosition = 1;
     ucPositionPrev1 = ucPosition1 = 1;
      RLY9_HI;
```

```
   RLY10_HI;
   RLY11_HI;
RLY12_HI;
   BUZZ_ON;
   delay_ms(350);
   BUZZ_OFF;
   RLY1_LO;
   RLY2_LO;

      RLY9_LO;
   RLY10_LO;
   RLY11_LO;
RLY12_LO;
   delay_ms(50);
   sel_LO;

//   putc('a');

  printf("HELLO\r\n");
   delay_ms(2000);
ui10SecCNT = 100;

   index = 0;



        RLY2_LO;
        RLY3_LO;
        RLY4_LO;
        RLY5_LO;
        RLY6_LO;
        RLY7_LO;
        RLY8_LO;
   RLY9_LO;
        RLY10_LO;
        sel_HI;

   LCD_WRITE_Const_ARRAY(1,0,4,16);//Put
   LCD_WRITE_Const_ARRAY(2,0,5,16);//Put
   uiLcd10Sec = 30;

   ui1SecCNT = 0;
ui2SecCNT = 10;
   ucStat = 0;//change it as per requirement 0
   Send_Sms_Flag = 0;

   uiread_otp = read_EEPROM(50);
```

```
//uiread_otp = 111;
while(1)
{
  //Show_Float_No_ONLine_At_Offset_IntDig_FltDig(2,9,uiright_ir,4,0);

       //   Show_Float_No_ONLine_At_Offset_IntDig_FltDig(2,9,uiquantity,2,0);
//Show_Float_No_ONLine_At_Offset_IntDig_FltDig(2,12,(ufLitt+1),2,0);
  enable_interrupts(INT_RDA);
        TRIG_HI;
       delay_us(10);
       TRIG_LO;
       delay_ms(7);
   //  POWRON_F = 1;
       ADC_CALL(6);//Lamp Current
       delay_ms(5);
       uiright_ir = current_adc_val;

       if(uiright_ir < 50)
       {
          uc_obstacle_f = 1;
         BUZZ_ON;

       delay_ms(350);
       BUZZ_OFF;
       }
       else
       {
         uc_obstacle_f = 0;

       }
    if(uc_obstacle_f == 1)
    {
       BUZZ_ON;
        RLY1_LO;
      RLY2_LO;
      RLY3_LO;
      RLY4_LO;

      RLY7_LO;
      RLY8_LO;
      RLY9_LO;

      ucactionflg = 0;
    }
   else
    {
```

```
      BUZZ_OFF;

}

if(ui2SecCNT == 1)
   {
      ui2SecCNT = 13;//


   ADC_CALL(1);//
//   ucLDRadc2 = (current_adc_val);
   ucLDRadc2 = (1024 - current_adc_val);

   delay_ms(1);
   ADC_CALL(0);//
   ucLDRadc = (1024 - current_adc_val);

   delay_ms(1);
   ADC_CALL(2);//
   ucLDRadc3 = (1024 - current_adc_val);

   ADC_CALL(11);//batteryvltg
   uibat_vltg = (current_adc_val);
   uibat_vltgADC = (uibat_vltg/53);

   ADC_CALL(9);//solarvltg
   uisolar_vltg = (current_adc_val);
   uisolar_adc = uisolar_vltg/44;


    Show_Float_No_ONLine_At_Offset_IntDig_FltDig(1,11,uibat_vltgADC,2,1);
   Show_Float_No_ONLine_At_Offset_IntDig_FltDig(1,3,uisolar_adc,2,1);
}

if(ui10SecCNT == 1)
{
   ui10SecCNT = 300;
   //putc('1');
      BUZZ_ON;
      delay_ms(500);
      BUZZ_OFF;
   uisolar_adc = uisolar_adc*10;
   uibat_vltgADC = uibat_vltgADC*10;
    printf("Battery Vltg:");
    putc(((uibat_vltgADC/100)%10)+0x30);
    putc(((uibat_vltgADC/10)%10)+0x30);
   putc('.');
```

```
      putc(((uibat_vltgADC/1)%10)+0x30);
     putc('V');
     putc('\r');
     putc('\n');
      printf("Solar Vltg:");
      putc(((uisolar_adc/100)%10)+0x30);
      putc(((uisolar_adc/10)%10)+0x30);
     putc('.');
      putc(((uisolar_adc/1)%10)+0x30);
     putc('V');
     putc('\r');
     putc('\n');
     putc('\r');
     putc('\n');

  }

if(ucRxTimOut == 1)
  {
    ucRxTimOut = 0;

    if((ucRx_Array[0] == '4'))
   {
    RLY1_LO;
    RLY2_LO;
    RLY3_LO;
    RLY4_LO;
    BUZZ_ON;
    delay_ms(350);
    BUZZ_OFF;

    delay_ms(350);
     ucactionflg = 1;
   }
  else if((ucRx_Array[0] == '3'))
   {
    RLY1_LO;
    RLY2_LO;
    RLY3_LO;
    RLY4_LO;
    BUZZ_ON;
    delay_ms(350);
    BUZZ_OFF;

    delay_ms(350);
     ucactionflg = 2;
   }
```

```
else if((ucRx_Array[0] == '2'))
 {
   RLY1_LO;
   RLY2_LO;
   RLY3_LO;
   RLY4_LO;
   BUZZ_ON;
   delay_ms(350);
   BUZZ_OFF;

   delay_ms(350);
    ucactionflg = 3;
 }
else if((ucRx_Array[0] == '1'))
 {
   RLY1_LO;
   RLY2_LO;
   RLY3_LO;
   RLY4_LO;
   BUZZ_ON;
   delay_ms(350);
   BUZZ_OFF;

   delay_ms(350);
    ucactionflg = 4;
 }

else if((ucRx_Array[0] == '5'))
 {
   BUZZ_ON;
   delay_ms(350);
   BUZZ_OFF;
   ucROBOTF = 1;
    ucactionflg = 5;
 }
else if((ucRx_Array[0] == '6'))
 {
   BUZZ_ON;
   delay_ms(350);
   BUZZ_OFF;
   ucROBOTF = 2;
    ucactionflg = 6;
 }
else if((ucRx_Array[0] == '7'))
 {
   BUZZ_ON;
   delay_ms(350);
```

```
   BUZZ_OFF;
uccuter = 1;
    ucactionflg = 7;
 }
else if((ucRx_Array[0] == '8'))
 {
   BUZZ_ON;
   delay_ms(350);
   BUZZ_OFF;
   uccuter = 2;
    ucactionflg = 8;
 }
else if((ucRx_Array[0] == 'b'))
 {
   BUZZ_ON;
   delay_ms(350);
   BUZZ_OFF;
   ucseed = 1;
    ucactionflg = 10;
 }
else if((ucRx_Array[0] == 'a'))
 {
   BUZZ_ON;
   delay_ms(350);
   BUZZ_OFF;
   ucseed = 2;
    ucactionflg = 11;
 }
else if((ucRx_Array[0] == 'c'))
 {
   BUZZ_ON;
   delay_ms(350);
   BUZZ_OFF;
//   ucseed = 1;
    ucactionflg = 12;
 }
else if((ucRx_Array[0] == 'd'))
 {
   BUZZ_ON;
   delay_ms(350);
   BUZZ_OFF;
//   ucseed = 2;
    ucactionflg = 13;
 }
else if((ucRx_Array[0] == '0'))
 {
   BUZZ_ON;
```

```
      delay_ms(350);
      BUZZ_OFF;
       ucactionflg = 9;
    }
   for(ucRxIndex = 0;ucRxIndex < 20;ucRxIndex++)
      {
        ucRx_Array[ucRxIndex] = 0;
      }
      ucRxIndex = 0;
   }

if((ucactionflg == 1))//||())
   {
      RLY1_LO;
      RLY2_HI;
      RLY3_HI;
      RLY4_LO;


   }
   else if(ucactionflg == 2)
   {
      RLY2_LO;
      RLY1_HI;
      RLY3_LO;
      RLY4_HI;

   }
   else if(ucactionflg == 3)
   {
      RLY2_LO;
      RLY1_HI;
      RLY3_HI;
      RLY4_LO;
   }
   else if(ucactionflg == 4)
   {
      RLY1_LO;
      RLY2_HI;
      RLY3_LO;
      RLY4_HI;
   }
   else if(ucactionflg == 5)
   {
      RLY5_LO;
      RLY6_HI;
   }
```

```
else if(ucactionflg == 6)
{
  RLY6_LO;
  RLY5_LO;
}
else if(ucactionflg == 7)
{
  RLY7_HI;
  RLY8_LO;
  delay_ms(300);
  RLY8_LO;
  RLY7_LO;
  ucactionflg = 0;
}
else if(ucactionflg == 8)
{

  RLY8_HI;
  RLY7_LO;
  delay_ms(300);
  RLY8_LO;
  RLY7_LO;
  ucactionflg = 0;
}

else if(ucactionflg == 10)
{
  RLY10_LO;
//  RLY9_LO;
}
else if(ucactionflg == 11)
{
  RLY10_HI;
//  RLY9_HI;
}
else if(ucactionflg == 12)
{
  RLY9_HI;
}
else if(ucactionflg == 13)
{
  RLY9_LO;
}
else if(ucactionflg == 9)
{
  RLY1_LO;
  RLY2_LO;
```

```
      RLY3_LO;
      RLY4_LO;
    //  RLY5_LO;
    //  RLY6_LO;
      RLY7_LO;
      RLY8_LO;
      RLY9_LO;
      RLY10_LO;
    }

}


}
```

CHAPTER 7

SYSTEM OVERVIEW

5.1 ADVANTAGES

- To reduce Farmer efforts.
- No wastage of water.
- Less time consumption.
- Row to row spacing can be adjusted.

5.2 LIMITATIONS:

- This robot has to provide external power supply in rainy season because solar plate is used for power generation.
- This system works only initial process of planting of any crop.

5.3APPLICATIONS:

- Agricultural field

5.4 FUTURE SCOPE

- Many sensors may be added as an expansion to this basic prototype in order to detect impediments, measure temperature, and measure moisture content. It is possible to add sensors to measure the depth of the soil so that seeds may be sown properly.
- The Agriculture Robot may be equipped with a camera, and the software can be altered to show a 360-degree image of the field as the robot moves.
- With the use of modern technologies like WiFi, WI-FI Smart, and Zigbee, a wide variety of connectivity may be achieved. illness prediction software. An alternative design to the standard wheel for the robot is a chain roller.
- Numerous impacts in agriculture may be achieved by robots, including spreading seeds, plantations, soaking retail spaces, removing weeds, dispersing diseases and insecticides.

CHAPTER 8

6.1 CONCLUSION:

This robot is designed basically for the agricultural field and lawn purpose. This will help farmers for cutting unwanted grass, water sprinkler, sowing seeds, which reduce the human efforts and work is done simultaneously as per the requirement. This is the low-cost machine, which is easy to handle. By using solar energy, battery is charged and work can be done as per the command. It also reduces the labour cost. By the use of machineries in this field save time, increase efficiency and indirectly increase the production in farms.

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