CHAPTER 1

INTRODUCTION

Seed sowing machine is a technology which provides the direction for sowing seeds in the required position. Therefore overall time, as well as money, can be saved. The target of this operation is to put seeds in rows at a specific depth and to maintain space between two corresponding seeds. This project provides totally different aspects of seed sowing machine which can be useful for the agriculture demands. The agricultural industry provides 50% of employment of the total population. The population increases continuously, the demand also increases respectively. Hence, there is a lot of demand for multiple cropping in an exceedingly same farm and this requires more efficiency and capacity. Mechanization of the Agricultural industry in India is still in traditional due to the lack of knowledge of updated inventions. In ancient ways, seed sowing is finished by broadcasting manually, gap furrows by a plough and dropping seeds by hand. This can be replaced by using automated techniques. Agricultural implement and machinery program of the government has been one of selective mechanization with a view to optimize the use of human, animal and other sources of power. In order to meet the requirements, steps were taken to increase the availability of implements, irrigation pumps, tractors, power tillers, combine harvesters and other power operated machines and also to increase the production and availability of improved animal-drawn implements. Special emphasis was laid on the later as more than 70% of the farmers fall in small and, marginal category. It is generally said that mechanization of small farms is difficult. But Japan having average land holding even smaller than ours, with proper mechanization has led agriculture to great heights. In order to minimize the drudgery of small farmers, to increase efficiency and save farmer's time for taking up additional or supplementary generating activities, the use of modern time-saving machines implements of appropriate size needed to be suitably promoted. In this project the discusses different aspects of seed sowing machine which will be helpful for the agriculture industry to move towards mechanization. The agricultural industry has always been the backbone of India’s sustained growth. As the population of India continues to grow, the demand for produce grows as well. Hence, there is a greater need for multiple cropping on the farms and this in turn requires efficient and high-capacity machines. Mechanization of the Agricultural industry in India is still in a stage of infancy due to the lack of knowledge and the unavailability of advanced tools and machinery. In traditional methods seed sowing

is done by broadcasting manually, opening furrows by a plough anddropping seeds by hand. This project is about moving a solar panel along with the direction of sunlight, it uses a stepper motor to control the position of the solar panel, which obtains its data from a microcontroller. The automated solar tracking system is design in order to optimize the efficiency of overall solar energy output. Light dependent resistor (LDR) is used for each degree of freedom. LDRs are basically photocells that are sensitive to light. Several applications of solar energy ranging from simple solar water heating to complex megawatt power generation systems are under extensive investigation. The function of the solar collector is to collect the radiation incident from the sun.

1.1 Objective of the Project

This project aims to build a method of solar powered seed sowing machine and spray pump.

- To develop an agriculture Robot this can be controlled by Bluetooth commands from farmers using a Bluetooth controller.
- To implement IoT based control system, which can be used to give commands from anywhere in the world using internet.
- It is helpful for small scale farmers
- To reduce more time for sowing process and also it reduces a lot of labor cost
- To make the system solar powered so that it is green, eco-friendly and cost free for farmers to operate.

1.2 Necessary of project

This machine maintains seed to seed spacing and row to row spacing. It also decreases the cost of sowing the seed and requirement of labor. Solar powered seed sprayers can be used in precision agriculture to efficiently and accurately plant seeds in desired locations. This technology enables farmers to optimize seed placement, leading to improved crop yields and reduced resource wastage. Its automated seeding mechanisms increase planting accuracy and speed, optimizing crop yield and reducing labor requirements. Equipped with smart sensors and controls, the machine ensures precise seed placement and minimizes seed wastage. Furthermore, its modular design allows for easy customization and scalability to suit various farm sizes and crop types. Overall, the solar-powered seed sowing machine presents a promising opportunity to enhance agricultural productivity while promoting environmental sustainability

CHAPTER 2

LITERATURE SURVEY

[1] Ayesha Akhtar et al., studied the information about different types of innovations done in seed sowing machine. This machine is the main equipment of the agriculture field. The aim of sowing technique is to put the seeds in rows at specific depth and space between seeds.

[2]Ibukun B. Ikechukwu et al., focused on the planning and fabrication of an operated by hand single row maize planter capable of delivering seeds exactly in an exceedingly line with uniform depth within the furrow and with uniform spacing between the seeds.

[3] Roshan V Marode et al., in the traditional method, the rate of seed sowing is more but the total operating time is more and the labor cost is much more. Today's aim is to go towards the rising of all sectors as well as the agricultural sector. New techniques have to be implemented to achieve future demands by the famers, which will not affect the soil but crop production will be increased.

2.1 PROBLEM STATEMENT

At present many countries have shortage of skilled labor in agriculture sector, which affects the growth rate of the developing countries including India which hugely depends on agriculture sector. As the population of India is rising, demand of food is also escalating which leads to higher crop production per hectare. So, to fix these problems farmers should use latest technological advancements for the various agricultural practices like digging, sowing, irrigation etc., which are more efficient and less time consuming. The main work of sowing operation is to sow seeds at required depth with specific spacing between the two sowed seeds. This can be achieved with the help of seed sowing machine which willdig the furrow and sow the seeds. After the seeds being placed in the furrow land, it willcover the sowed seeds with soil and sprinkle water. Seed sowing machine saves time and labor requirement, thus saving a lot of money along with the assurance of proper seed broadcasting.

CHAPTER-3

METHODOLOGY

3.1 Block diagram

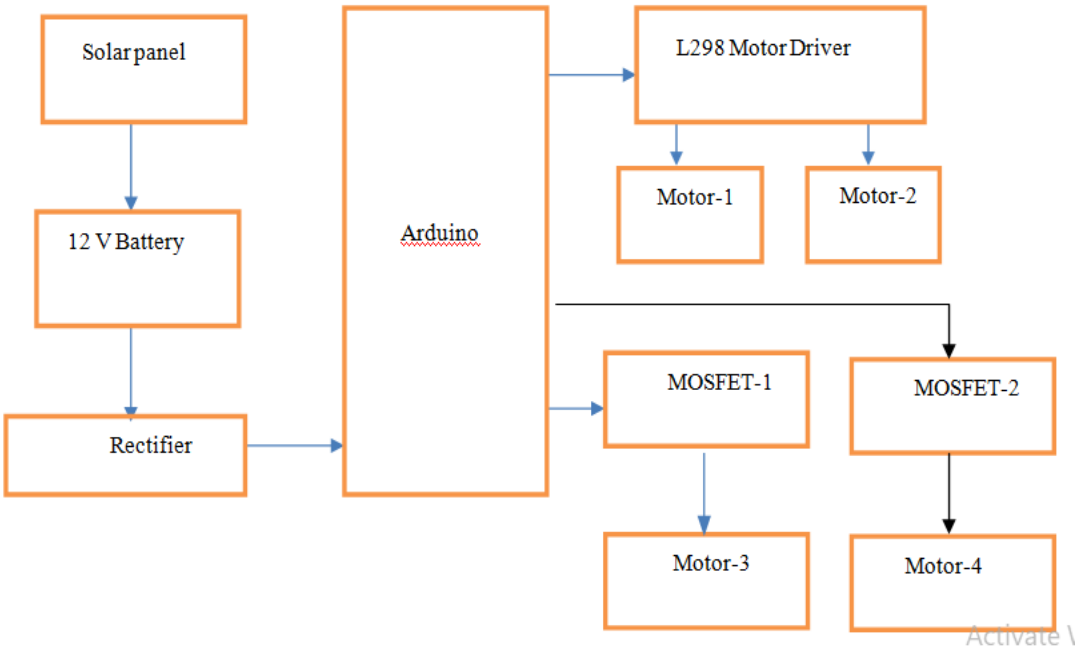


Figure 3.1 Block diagram of solar power seed sowing Machine and spraying pump.

The above figure 3.1 shows the block diagram of solar powered seed sowing machine with spraying pump , here the solar panel is used to convert the solar energy into electrical energy, Then the electrical energy converted from the solar panel is then stored in a lead acid battery. The stored energy is then supplied to all electrical components through rectifier .The arduino that is the microcontroller gets the supply of 5volt dc from the rectifier .The motor driver and two MOSFETS are connected to the arduino .There are 4 motors ,motor 1 and motor 2 are supplied through L298Motor Driver the motor driver is a high power motor drive which is used to drive DC motors or stepper motors. Then the motor 3 is connected to the MOSFIT 1 and the motor 3 is connected to MOSFIT 2 .The MOSFIT's are actually used for controlling the dc motors .

3.2 Circuit Diagram

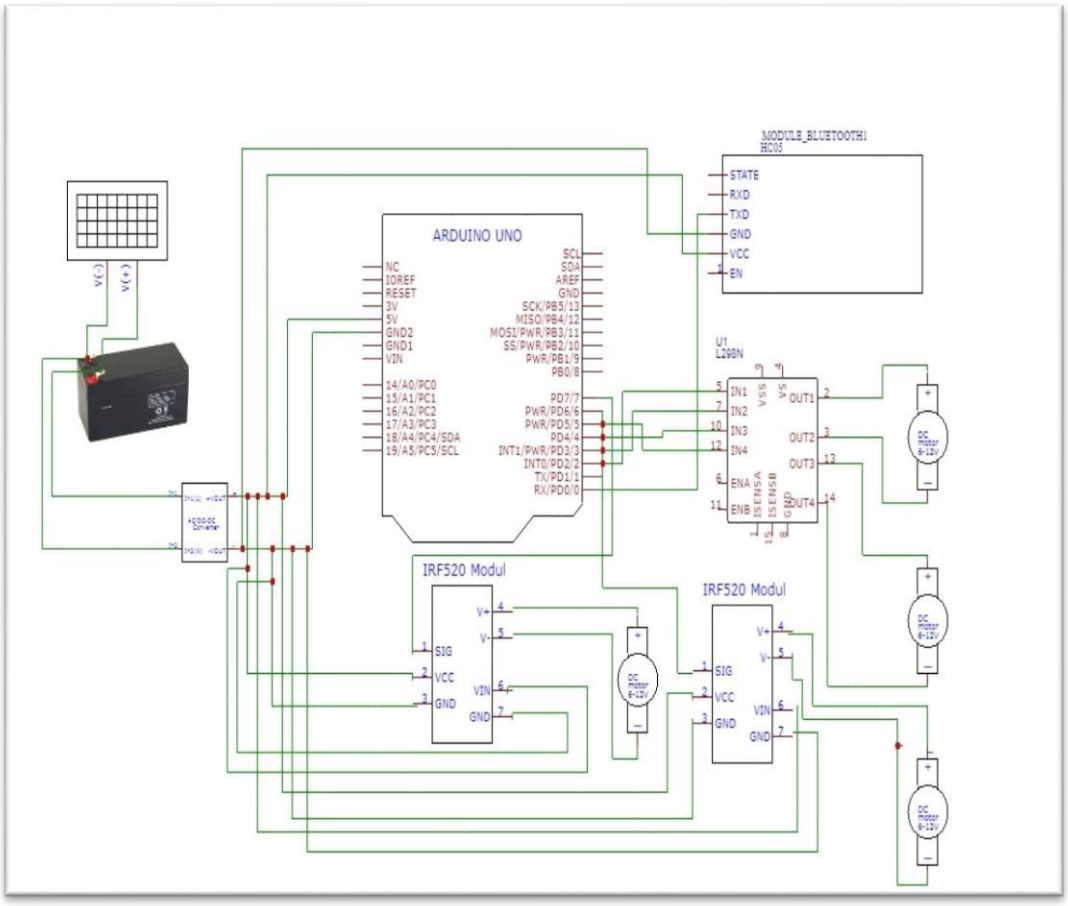


Fig 3.2 Circuit diagram of Solar Powered Seed Sowing machine with Spray Pump

HARDWARE AND SOFTWARE REQUIREMENT

HARDWARE REQUIREMENT

3.3.1 Solar Panel

Figure 3.3 solar panel

A solar panel, or photo-voltaic (PV) module, is an assembly of photo-voltaic cells mountedin a framework for installation. Solar panels use sunlight as a source of energy to generate direct current electricity. A collection of PV modules is called a PV panel, and a system of panels is an array. Arrays of a photovoltaic system supply solar electricity to electrical equipment. Solar panels collect clean renewable energy in the form of sunlight and convert that light into electricity which can then be used to provide power for electrical loads. Solar panels are comprised of several individual solar cells which are themselves composed of layers of silicon, phosphorous (which provides the negative charge), and boron (which provides the positive charge). Solar panels absorb the photons and in doing so initiate an electric current.The resulting energy generated from photons striking the surface of the solar panel allowselectrons to be knocked out of their atomic orbits and released into the electric field generated by the solar cells which then pull these free electrons into a directional current. This entire process is known as the Photovoltaic Effect. An average home has more than enough roof area for the necessary number of solar panels to produce enough solar electricity to supply all of its power needs excess electricity generated goes onto the main power grid, paying off in electricity use at night.

Components of Solar Panels:

- **Photovoltaic Cells:** These cells are the building blocks of solar panels, typically

made of silicon semiconductors.

- **Encapsulation:** Photovoltaic cells are encapsulated between protective layers, usually made of tempered glass, to withstand environmental factors.
- **Frame:** A sturdy frame surrounds the panel, providing structural support and protection.
- **Back sheet:** This layer shields the backside of the panel from moisture and mechanical damage.
- **Electrical Contacts:** Conductive materials facilitate the flow of electricity generated by the photovoltaic cells.

The technical specifications of the solar panel are as shown below.

Table 3.1 Technical specification of the solar panel

Electrical Characters	
Cells	Multi crystal silicon
No. of Cells & Connections	36 Cells in series
Open Circuit Voltage-Voc	21.6 V
Maximum power Voltage-Vmp	17.2 V
Short Circuit Current-Isc	0.64 A
Maximize power Current-Imp	0.58 A
Mechanical Characteristics	
Weight	1.5 kg
Dimensions	310 *368*18 mm
Power	10 watts

3.3.2 Battery

Figure 3.4 12V Battery

Batteries come in different shapes, sizes and differ in their uses. The 12V battery is one of such common batteries. However, A 12-volt battery is a kind of battery that is often used for various electrical gadgets and appliances. The 12-volt battery is distinct and different in its use, as it comes in different shapes and sizes. In some instances, they might be large and heavy or small and light. They may be cylindrical or square batteries. Furthermore, they are also used for transportation purposes in vehicles, boats and other gadgets. 12-volt battery sizes are often influenced by their uses and the amount of amp- hour they are built to produce. Therefore, a 12 V battery implies that a voltage of 12V is supplied within the nominal load by a battery. The battery or power supply unit provides the required power to the entire system. The battery chosen for this project was 12 V 2 AH battery. This can continuously supply a current of 2 Amp for one hour. The following calculations show the power supplied by the battery and other calculations:

Battery voltage: 12V

Battery current: 2AH

Therefore, power output of the battery is given

P=V*I

P=12 x 2

P-24Watt

We use 12 V ,1 Amp adapter for charging the system. Therefore, time required for chargingis given by the calculations given below:

Power of adapter= 12 Watt

Therefore, time required for charging the battery is given by:

24/12

1=2 Hours

3.3.3 Rectifiers

Figure 3.5 Rectifier

The electricity supply that reaches our homes from power grids is alternating current, but the electric appliances commonly used in our homes require direct current. The process of conversion of alternating current to direct current is called rectification. Conversion of AC current to DC is preceded by a further process that involves filtering the current and DC toDC conversion. One of the commonest parts of an electric power supply is a bridge rectifier. A lot of electronic circuits are dependent on the DC power supply for the functioning of basic components of electronic devices. This DC is rectified from the available main supply of alternating current. A rectifier circuit converts currents instead of voltages. A rectifier is an electronic device used for converting alternating current to direct current with the help of one or more p-n junction diodes. This process by which a diode acts as a rectifier is called rectification. A rectifier can exist in several physical shapes like diodes in the solid state, diodes of the type vacuum tube, valves of mercury-arc, rectifiers that are silicon- controlled, and various other semiconductor switches that are silicon-based.

3.3.4 Arduino

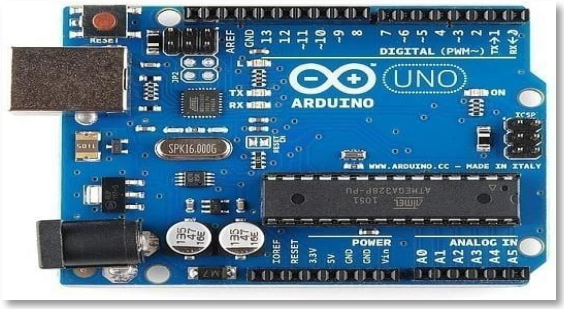


Figure 3.6 Arduino

Arduino is a software as well as hardware platform that helps in making electronic projects.It is an open-source platform and has a variety of controllers and microprocessors. There are various types of Arduino boards used for various purposes.The Arduino is a single circuit board, which consists of different interfaces or parts. The board consists of the set of digital and analog pins that are used to connect various devices and components, which we want to use for the functioning of the electronic devices.Most of the Arduino consists of 14 digital I/O pins.The analog pins in Arduino are mostly useful for fine-grained control. The pins in the Arduino board are arranged in a specific pattern. The other devices on the Arduino board are USB port, small components (voltage regulator or oscillator), microcontroller, power connector, etc.

Features:

- Arduino programming is a simplified version of C++, which makes the learning process easy.
- The Arduino IDE is used to control the functions of boards. It further sends the setof specifications to the microcontroller.
- Arduino does not need an extra board or piece to load new code.
- Arduino can read analog and digital input signals.
- The hardware and software platform is easy to use and implement.

3.3.5 DC Motor

Figure 3.7 100 rpm gear Motor

DC Motor – 100RPM – 12Volts geared motors are generally a simple DC motor with a gearbox attached to it. This can be used in all-terrain robots and variety of robotic applications. These motors have a 3 mm threaded drill hole in the middle of the shaft thus making it simple to connect it to the wheels or any other mechanical assembly.100 RPM

12V DC geared motors widely used for robotics applications. Very easy to use and available in standard size. Also, you don't have to spend a lot of money to control motors with an Arduino or compatible board. The most popular L298N H-bridge module motors with an Arduino or compatible board. The most popular L298N H-bridge module with onboard voltage regulator motor driver can be used with this motor that has a voltage of between 5 and 35V DC or you can choose the most precise motor diver module from the wide range available in our Motor divers' category as per your specific requirements DC Geared motors with robust metal gearbox for heavy-duty applications, available in the wide RPM range and ideally suited for robotics and industrial applications.

Table 3.2 Technical specification of the Motor

SI.NO	Parameter	Value
1	Voltage	12V
2	Current	800 mA
3	Shaft size	6 mm
4	Gear Type	Heavy duty metal
5	Weight	300 gms
6	Speed	100 Rpm

This project uses 30 RPM high power DC geared motors for the purpose of navigation. The technical specifications of the motors are as shown above.

3.3.6 MOSFET Module

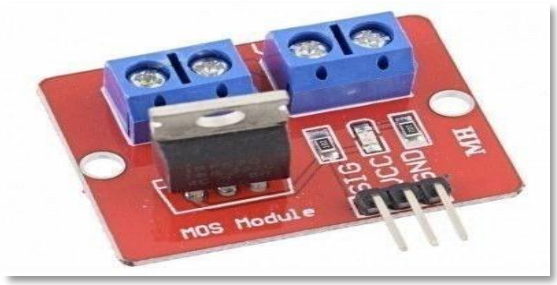


Figure 3.8 MOSFET Module

The metal–oxide–semiconductor field-effect transistor (MOSFET, MOS-FET, or MOS FET) is a type of field-effect transistor (FET), most commonly fabricated by the controlled oxidation of silicon. It has an insulated gate, the voltage of which determines the conductivity of the device. This ability to change conductivity with the amount of applied voltage can be used for amplifying or switching electronic signals. The term metal–insulator–semiconductor field-effect transistor (MISFET) is almost synonymous with MOSFET. Another near-synonym is insulated-gate field-effect transistor (IGFET).The basic principle of the field-effect transistor was first patented by Julius Edgar Lilienfeld in 1925.
The main advantage of a MOSFET is that it requires almost no input current to control the load current, when compared with bipolar transistors (bipolar junction transistors/BJTs). In an enhancement mode MOSFET, voltage applied to the gate terminal increases the conductivity of the device. In depletion mode transistors, voltage applied at the gate reduces the conductivity.

3.3.7 L298N Motor Driver

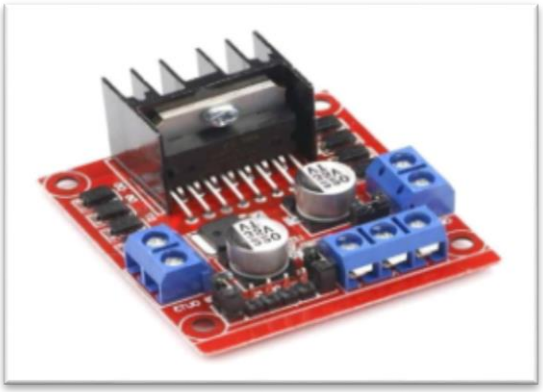


Figure 3.9 L298N Motor Driver

This L298N Motor Driver Module is a high-power motor driver module for driving DC and Stepper Motors. This module consists of an L298 motor driver IC and a 78M05 5V regulator. L298N Module can control up to 4 DC motors, or 2 DC motors with directional and speed control.

Table 3.3 L298N Module pinout configuration

Pin Name	Description
IN1 & IN2	Motor A input pins. Used to control spinning direction of Motor A
IN3 & IN4	Motor B input pins. Used to control spinning direction of Motor B
ENA	Enables PWM signal for Motor A
ENB	Enables PWM signal for Motor B
OUT1 & OUT2	Output pins of Motor A
OUT3 & OUT4	Output pins of Motor B
12V	12V input from DC power Source
5V	Supplies power for the switching logic circuitry inside L298N IC
GND	Ground pin

Features & Specifications

Driver Model: L298N 2A

Driver Chip: Double H Bridge L298N

Motor Supply Voltage (Max):46V

Motor Supply Current (Max):2A

Logic Voltage: 5V

Driver Voltage: 5-35V

Driver Current: 2A

LogicalCurrent:0.36mA

Maximum Power (W): 25W

Current Sense for each motor

Heat sink for better

performance Power-On LED

indicator

3.4 SOFTWARE REQUIREMENT

3.4.1 Arduino ATMega328P:

A microcontroller is a self-contained system with peripherals, memory and a processor that can be used as an embedded system for processing signals. Most programmable microcontrollers that are used today are embedded in other consumer products or machinery including phones, peripherals, automobiles and household appliances for computer systems. Due to that, another name for a microcontroller is "embedded controller." Some embedded systems are more sophisticated, while others have minimal requirements for memory and programming length and a low software complexity. Input and output devices include solenoids, LCD displays, relays, switches and sensors for data like humidity, temperature or light level, amongst others.

A microcontroller (sometimes abbreviated µC, (uC or MCU) is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Program memory in the form of Ferroelectric RAM. NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used m personal computers or other general-purpose applications).

The high-performance, low-power Atmel 8-bit AVR RISC-based microcontroller combines 256KB ISP flash memory, 8KB SRAM, 4KB EEPROM, 86 general purpose 1/0 lines, 32 general purpose working registers, real time counter, six flexible timers/counters with compare modes, PWM, 4 USARTs, byte oriented 2-wire serial interface, 16-channel IO-bit AID converter, and a JTAG interface for on-chip debugging. The device achieves a throughput of 16 MIPS at 16 MHz and operates between 4.5-5.5 volts. By executing powerful instructions in a single clock cycle, the device achieves a throughput approaching 1 MIPS per MHz, balancing power consumption and processing speed.

Features:

High Performance: Low Power AVR 8-Bit Microcontroller

Advanced RISC Architecture:

- 135 Powerful Instructions Most Single Clock Cycle Execution
- 32 x 8 General Purpose Working Registers

- Fully Static Operation
- Up to 16 MIPS Throughput at 16 MHz
- On-Chip 2-cycle Multiplier

High Endurance Non-volatile Memory Segments:

- 64K/128K/256K Bytes of In-System Self-Programmable Flash
- 4K Bytes EEPROM
- SK Bytes Internal SRAM
- Write/Erase Cycles: 10,000 Flash 100,000 EEPROM
- Data retention: 20 years at 85°C/100 years at 25°C
- Optional Boot Code Section with Independent Lock Bits

Peripheral Features:

- Two 8-bit Timer/Counters with Separate Prescaler and Compare Mode
- Four 16-bit Timer/Counter with Separate Prescaler, Compare- and Capture Mode
- Real Time Counter with Separate Oscillator
- Four 8-bit PWM Channels
- Six/Twelve PWM Channels with Programmable Resolution from 2 to 16 Bits
- (ATmega1281/2561, ATmega640/1280/2560)
- Output Compare Modulator
- 8/16-channel,10-bit ADC (ATmega1281/2561, ATmega640/1280/2560)
- Two/Four Programmable Serial USART (ATmega1281/2561, ATmega640/1280/2560
- Master Slave SPI Serial Interface
- Byte Oriented 2-wire Serial Interface
- Programmable Watchdog Timer with Separate
- On-chip Oscillator

3.4.2 SOFTWARE USED:

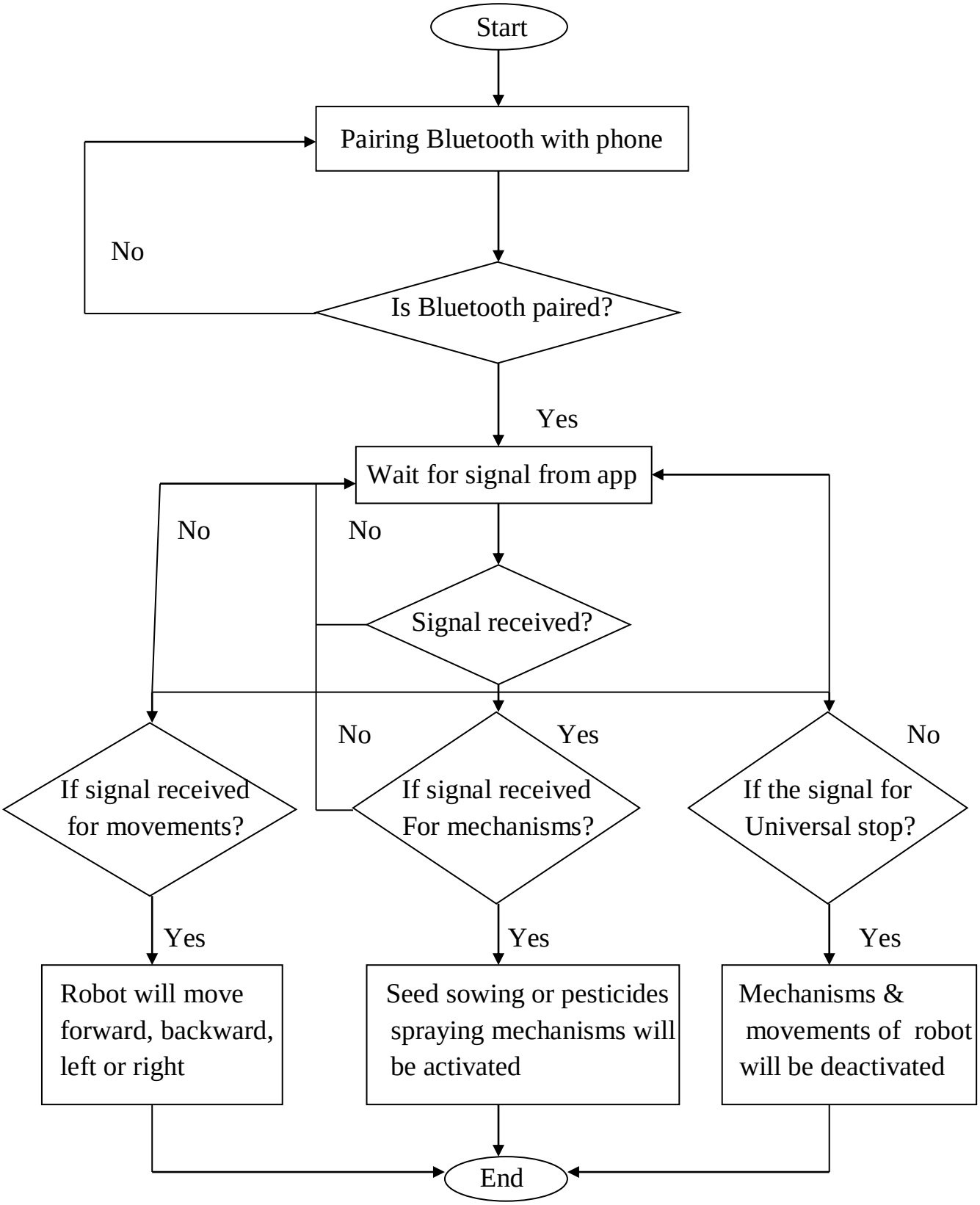
Arduino IDE

The Arduino Ide is the software which we will be using to compile and upload the programs to the Arduino board.

Procedure:

1. Connect the Arduino board to your PC.
2. Go to control panel-> device manager-> and note the com port to which it is connected.
3. Open Arduino IDE.
4. The code Verify and compile it using the verify button as shown in the figure above
5. Verify and compile it using the verify button as shown in the figure above.
6. Go to tools select the proper board and com port
7. Click upload to burn the program to the microcontroller.

FLOWCHART:


Start
Pairing Bluetooth with phone
No
Is Bluetooth paired?
Yes
Wait for signal from app
No
No
Signal received?
No
Yes
No
If signal received for movements?
If signal received For mechanisms?
If the signal for Universal stop?
Yes
Yes
Yes
Robot will move forward, backward, left or right
Seed sowing or pesticides spraying mechanisms will be activated
Mechanisms & movements of robot will be deactivated
End

CHAPTER 4

4.1 RESULTS AND DISCUSSION

Solar-powered seed sowing machines are designed to automate the process of sowing seeds, reducing manual labor and increasing efficiency in agriculture. And the experimental results would likely vary depending on factors such as the design of the machine, the type of seeds being sown soil conditions and environmental factors.

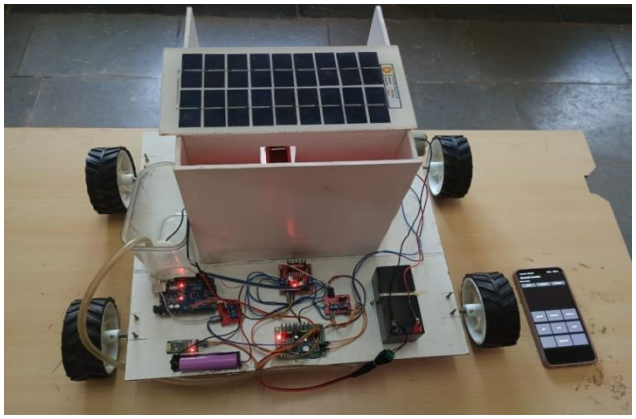


Figure 4.1 Experimental Setup

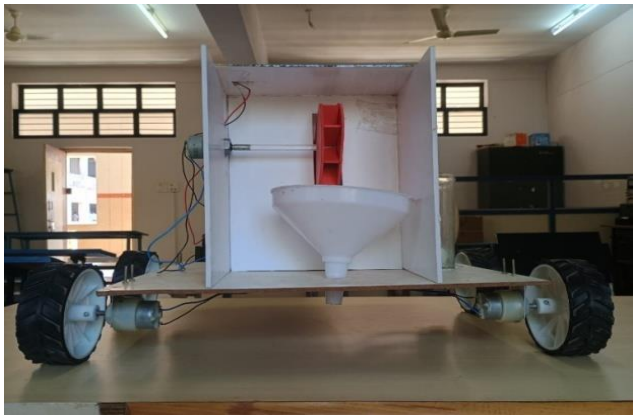


Figure 4.2 Snapshots of seed sowing machine and spray pump

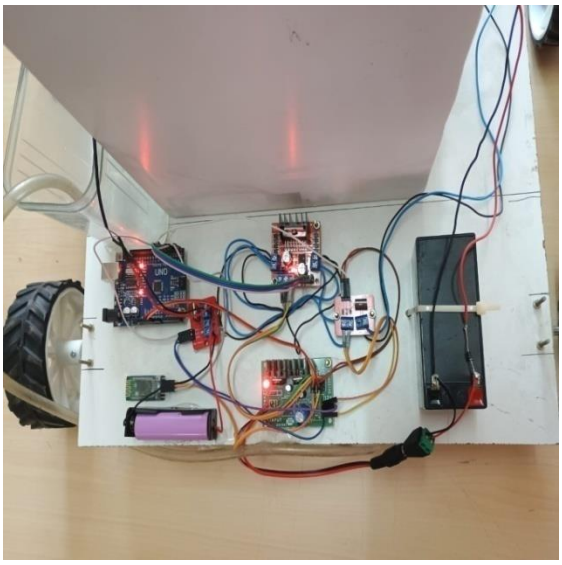


Figure 4.3 Controlling setup of solar powered seed sowing machine

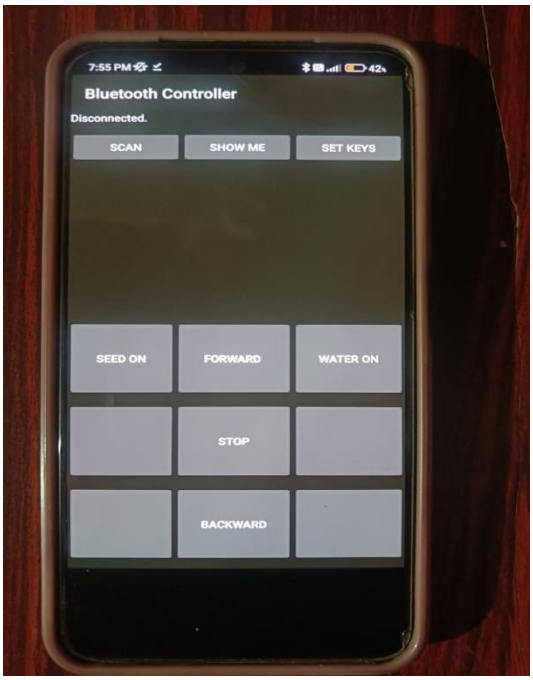


Figure 4.4 Controlling of the module using Bluetooth controller

The above figure shows the experimental result which includes following steps,

- Step 1- At this step we need to connect the connector from Bluetooth to battery.
- Step 2- At this step the Bluetooth module starts blinking once it is connected to the device the blinking stops.

- Step 3- After connecting to the module we should give the required commands like forward, backward, left or right this commands will make the module to move accordingly.
- Step 4- If we give the seed sowing command the seed will sow, similarly if we give spraying command the pesticides will spray.
- Step 5- After all the procedures we shoul give stop command to stop the working and should disconnect the Bluetooth and it should be connected when in use

ADVANTAGES, DISADVANTAGES AND APPLICATION

4.2 Advantages

- No conventional grid electricity required
- Long operating life
- Highly reliable and durable
- Easy to operate and maintain
- Eco-friendly
- The space between the two seeds is maintained properly.
- Required depth can be maintained.
- One or more seeds can be sown by a single machine.
- Mixed cropping can be done.
- Overall Cost of seed sowing machine is reduced by using this technique.

4.3 Disadvantages

- Limited seed capacity, may require frequent refilling.
- Initial cost is high
- Dependency on sunlight

4.4 Applications

- **Industrial purpose**

- It can be used in industry for light duty material handling
- It can be used for spraying paint

- **Agricultural purpose**

- It is used for spraying chemicals on the plant.
- It is used for seed sowing
- It can be used for watering the gardens and plants

CHAPTER-5

CONCLUSION AND FUTURE SCOPE

5.1 CONCLUSION

The proposed project is mainly based to solve the problems faced by farmers by providing them with an IOT based bluetooth control system to automate majority of the tasks in the field. It can independently perform different operations such as seed sowing, spraying, and cutting etc. in the field by receiving commands from farmer from any corner of the world. This will not only help the farmers to effectively use the technology for agriculture related tasks but also help them to independently and remotely perform the operations in the field. Thus, the proposed project is expected not only help farmers, in current pandemic times when the whole world is in critical situation even then farmers will be able to keep their work in progress without any hindrance to perform agricultural operations remotely over IOT but also provide them with cost effective and free to operate solution as the system is solar powered.

5.2 FUTURE SCOPE

The project deals with the development of **Google Kisan**. The proposed project has wide scope for future modifications. The project used Bluetooth commands to command the robotic vehicle remotely and autonomously using IOT. In future deep learning algorithms can be implemented in the project to perform multiple operations remotely and autonomously. Computer vision techniques can be used for selective spraying using deep learning. The project can also be implemented with sensor-based monitoring system over IT so that farmers can remotely visualize the data over IOT application.

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APPENDIX-A

```
Int
out1=
2;   int
out2=
3;   int
out3=
4;   int
out4=
5;

 int MOSFET=7;

int
val;
void
setup()

{

  Serial.begin(9600);

  pinMode(out1,OUTPUT);
  pinMode(out2,OUTPUT);
  pinMode(out3,OUTPUT);
  pinMode(out4,OUTPUT);
  pinMode(MOSFET,OUTPUT)
  ;

   digitalWrite(out1,LOW);
   digitalWrite(out2,LOW);
   digitalWrite(out3,LOW);
   digitalWrite(out4,LOW);
   digitalWrite(MOSFET,LOW
   );
```

```
}

void loop()

{

 if (Serial.available())

{

val =
Serial.read();if
(val == 'F')

  {

    fwd();

  }

 else if (val == 'B')

  {

    bwk();

  }

  else if (val == 'L')

  {

    lft();

  }

  else if (val == 'R')

  {

    rgt();

  }
```

```
    else if (val == 'S')
    {
        stp();
    }
  else if(val=='M')
  {
    if(digitalRead(MOSFET)==LOW
     )digitalWrite(MOSFET,HIGH);
     else
     digitalWrite(MOSFET,LOW);
  }
   else
   {
     stp();
   }
    }
   }
  void fwd()
  {
digitalWrite(out1,HIGH);
digitalWrite(out2,LOW);
digitalWrite(out3,HIGH);
digitalWrite(out4,LOW);
  }
  void bwk()
```

```
    {   digitalWrite(out1,LOW);
        digitalWrite(out2,HIGH
        );
        digitalWrite(out3,LOW)
        ;
        digitalWrite(out4,HIGH
        );

     }

    void lft()

    {   digitalWrite(out1,LOW);
        digitalWrite(out2,LOW)
        ;
        digitalWrite(out3,HIGH
        );
        digitalWrite(out4,LOW)
        ;

    }

    void rgt()

{

    digitalWrite(out1,HIGH);

    }

    digitalWrite(out2,LOW);

     digitalWrite(out3,LOW);

     digitalWrite(out4,LOW);

     }

    void stp()

    {

 digitalWrite(out1,LOW);
digitalWrite(out2,LOW);
digitalWrite(out3,LOW);
digitalWrite(out4,LOW);

     }
```