

# Remote Control Solar Seed Sowing Machine

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## Abstract:

Every area of society, including agriculture, is advancing at breakneck speed nowadays. Farmers must adopt innovative practises that don't alter soil's structure yet enhance crop yields in order to fulfil future food demand. Solar-powered seed sowing machines are goal of this project. Agriculture relies heavily on seed sowing machine. In India, farmers utilise manual, ox, tractor-operated methods to plant seeds and apply fertiliser. This method is labor-intensive and results in limited output. Using fossil fuels, tractor releases tonnes of pollutants per second, including carbon dioxide. Because of this, there is a genuine possibility that we may face a serious energy crisis over next few years, which would have a negative impact on our farmers and environment. Seed sowing machines that are more efficient as well as environmentally friendly are now being developed as part of this initiative. Shunt-wound DC motor is powered by 12V battery, which is charged by a solar panel. DC motor drives wheels with this energy. Additionally, IR sensors are employed to control robot's movements in field. Robots travel from one line to next based on information from four post sensors that delineate region. Sowing and digging robots travel over varied ground contours, performing digging, seeding then watering land after closure.

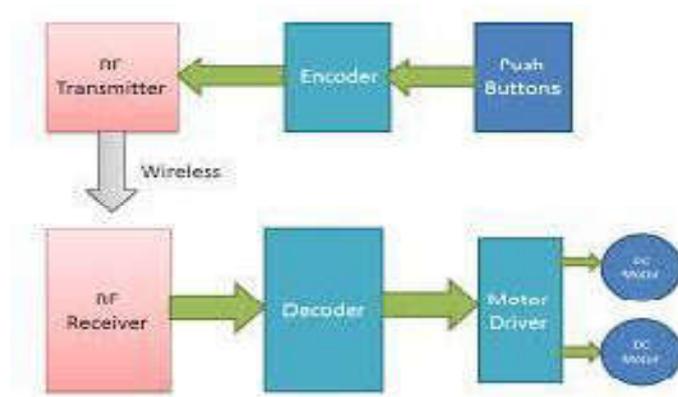
**Keywords:** Solar Seed Sowing Machine, D.C motor, Solar sheet, Battery.

## I. INTRODUCTION

Indian economy has always relied heavily on agriculture, it will remain to do so for a good while longer. With an ever-increasing population, India's need for food will only continue to rise. Because of this, farmers are need more efficient engine machinery for crop rotation on their fields. In India, agricultural mechanisation is still in its infancy because of a lack of information and a scarcity of cutting-edge equipment. A plough is used to open furrows and seeds are dropped by hand in traditional ways. In this project, a stepper motor is used to regulate position of a solar panel, which receives its information from a microcontroller. As a result, automated tracking system is designed to maximise amount of solar energy generated.

RF it is process of seed planting in locations like agriculture may be greatly simplified with use of a remote-controlled solar seed sowing equipment. There are four wheels and a cover plate on this 4-wheel drive system, which has a seed-sowing mechanism. Electrical motors operate frame chassis and seed sowing mechanism, both of which are powered by high-performance, high-efficiency motors. Using a chain and sprocket system, electrical motors power wheels. PCB is powered by a microcontroller, which drives system. Another PCB has directional push buttons that are used to communicate Rf directives. Receiver circuit gets these instructions, which are then processed by PCB and used to operate mechanism motor.

Using a Rf Frequency based remote control, these electrical motors may be remotely operated. Mechanism for planting seeds in agriculture. As an added bonus, robot comes with a wire mesh for separating soil from row and digging seeds.



**Fig 1: Block diagram of RF controller**

While Bluetooth's range is limited, radio-frequency signals may go through walls, giving radio-frequency remotes a significant edge in terms of distance. Because of this, IR/Rf remotes for home theatre components have been introduced. Use RF-to-IR adapters to expand range of IR remotes.

## II. LITERATURE SURVEY

Mahesh R. Pundkar Agriculture relies heavily on a seed-sowing machinery. High-precision pneumatic planters have been designed for a broad variety of crops including seed sizes, resulting in consistent seed distribution throughout travel route or in seed spacing.

M.A. Asoodar Different seeding techniques and machinery, as well as varying rates of oilseed rape application, were studied by another agricultural researcher to examine their impacts on seeding emerge plant development but also ultimate grain production.

P.P. Shelke As number of experienced sowers continues to dwindle, bullock-drawn planters are becoming more necessary for sowing. Maximizing agricultural yields requires careful consideration of variables such as planting spacing and plant density.

Singh A seed drill for wheat crop increased yield by 13.025 percent as compared to traditional approach, as well as a 69.96 percent reduction in man hours and 55.17 percent reduction in huloock hours, when compared with usual way.

Umed Ali Soomro et al. Drilling technique of sowing at seed rate 125 kg/ha at a four replicated RCBD method in Pakistan was shown to be best way for wheat grain yield and quality, as method and seed rate disperse seed evenly and at necessary depth for seed germination and crop development.

M.A. Asoodar, an agricultural researcher, studied impact of various seeding methods or machineries, as well as varying rates of oilseed rape application, on seeding emergence and ultimate grain production.

## III. OBJECTIVES OF PROJECT

- 1) To understand basic principle of solar seed sowing machine
- 2) Describe the constructing and the working of various parts of the project.
- 3) To make this machine solar power-driven so that farmer do not need concern about charging.
- 4) To popularize the technologies.
- 5) To build up the capacity of growth in agricultural.
- 6) Build an intelligent gadget affordable and easy to use for Indian farmers.

#### IV. AIM OF THE PROJECT

- 1) For designing and fabrication of solar seed sowing machine
- 2) It reduces the pollution and consumes large power that can be decreasing with the system
- 3) This robot is controlled by the microcontroller which means it is programmed in it and the most of the countries tractors are used for performing sowing operation in agricultural field.

#### V. MACHINE OPERATION METHODOLOGY

Solar panel on this machine collects solar energy, which is then turned into electrical energy for charging a 12V battery and starting a DC motor. A motor's electric power is sent to its rear wheels through chain drives after it begins to revolve. By processing external task with help of this electric power.

Agricultural seed sowing operations aim to spread seeds at a depth equal to seed-to-seed spacing in rows. After that, use a cover plate to cover seeds with dirt. Provide proper fertilizer in rows.

Solar power generally describes technologies that convert solar energy into electricity energy. Battery that will store the solar energy will be first charged with solar energy before it can be utilised to generate electricity. One or more electrochemical cells are used for storing and converting chemical energy into electrical energy in a battery. DC motor is powered by battery's stored solar energy. DC motors use direct current (DC) to create mechanical motion. With help of a spur gear and sprockets, power is transmitted to wheels for movement. A microcontroller-powered circuit PCB drives system. Another PCB has directional push buttons that are used to communicate Rf directives. These instructions are received by receiver circuit and processed by PCB to move motor.

#### VI. COMPONENTS OF SEED METERING DEVICE

Equipment's many major and secondary components include following:

- 1) Frame: Hopper, disc, and shaft are all fixed on a C. I. angle bar that measures 50mm x 65mm x 10mm
- 2) Hopper: Hopper is made by cyclone plastic type which contains Seed. Hopper is mounted on frame



**Fig 2: Hopper**

- 3) Shaft: A C.I. disc with four gear sprockets are attached to it. Power from ground wheel is transferred to a disc by means of this device.



**Fig 3: Shaft**

4) Disc: It is constructed from a brand-new, circular cyclone type. D isc has a curved groove cut into it, with intake on one side as well as outflow on other. It takes up seed through one side then drops it at a predefined distance on opposite side of seed tray.



**Fig 4: Disc**

5) Chain: In order to ensure stability, chain is made up of several stiff links that are hinged together at pin joints. Wrapping around driving and powered wheels requires a degree of flexibility. To fit into correct chain links, these wheels feature protruding teeth with a unique profile.



**Fig 5: Chain**

6) Four gear sprocket: Number of teeth on each step is used to regulate vehicle's speed.



**Fig 6: Four gear sprocket**

7) Plough: Before planting, it is utilised to cultivate soil using a rectangular C.I. material.



**Fig 7: Plough**

8) Wheel: C.I. Strip with spikes of certain measures on surface of circular plate are used to mount a circular-shaped wheel on bush.



**Fig 8: Wheel**

9) Battery:-An electric battery is a device that converts chemical energy into electrical energy by using one or more electrochemical cells. Each cell has anode and cathode connections. Because electrolytes allow ions to flow across electrodes & battery terminals, batteries are capable for doing work. Battery: 12 volt 7.5 amp hour closed lead acid battery.



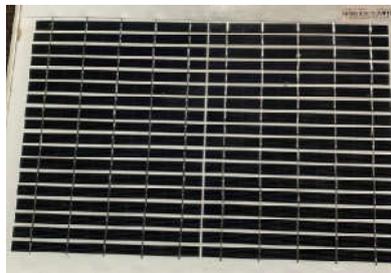
**Fig 9: Battery**

10) Electric Motor:-The electric motor is used to convert electrical energy to mechanical energy. Modern life would be impossible without electric motors. It is Ampere's law that serves as foundation for all motors. This rule indicates that an electric current creates a magnetic field surrounding wire it is travelling along.



**Fig 10: Electric motor**

11) Solar panel: There are a number of smaller components known as "solar cells" that make up solar panels. There are many numerous kind of solar panels: solar cell panels, photovoltaic cell modules, solar panels, and so on. Solar panel that converts sunlight into electricity energy and in some cases thermal or mechanical power.



**Fig 11: Solar panel**

**SPECIFICATION OF COMPONENT:-**

**Table 1 Specification Of Component**

SL.NO	COMPONENT	SPECIFICATION
1	Length	38inch
2	Width	20inch
3	Height	25inch
4	No of rows	One
5	Capacity of hopper box	9 x 8 x 8 (In inch)
6	Functioningmsm	Vertical disc through slot
7	No of slots	One
8	Form of slot	Curved
9	Power Transmission	Ground Wheel to tube
10	Machine weight	45kg
11	Labour requirement(Man-hrs)	2-10
12	Operating speed (Km/hrs)	2.0-2.5
13	Efficiency (%)	It may 70%
14	Power source	Pair of solar energy
15	Battery	7.5Amp hour 12 volts
16	Solar panel	12volts

VII. WORKING OF SOLAR SEED SOWING MACHINE

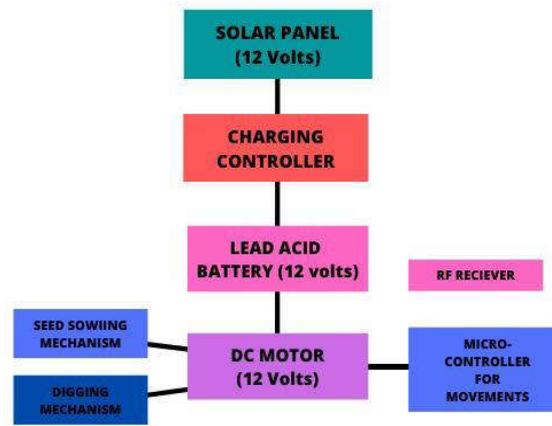


Fig 12 Block IllustrationOf Seed Sowing Machine

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VIII. DESIGN AND CALCULATION

1) **Motor calculation:** Category: Dc Motor

$$\text{Power} = V \times I$$

Where,

Voltage =12V, Current =7.6amp

$$\text{Power} = 12 \times 7.6$$

$$\text{Power} = 85 \text{ watts}$$

2) **Gear ration:**  $N1/N2 = T2/T1$

Where,

$N1$  = speed of pinion,  $N2$  = speed of gear

$T2$  = teeth of gear,  $T1$  = teeth on pinion

No of teeth on gear/Pinion

$$= Zg / \cos\theta g$$

$$= 20 / \cos 45$$

$$= 29$$

3) **Torque**

$$\text{Power} = 2\pi NT / 60$$

$$T = 85 \times 60 / 2 \times 180 \times 30$$

$$T = 27.05 \text{ Nm}$$

4) The battery's ability to store energy =12V, 7A

5) **Solar panel** =12V, 11A

6) Use Dc motor forward reverse

## IX. MACHINING PROCESS

- 1 Metal cutting operation
- 2 Welding
- 3 Drilling

### *1) Metal cutting operation:*

#### 1. Blanking:

It's possible to cut metal into a flat form by using "blanking" technique. An object punched out is known as a "blank," hole and metal left behind are thrown away as waste products of procedure.

#### 2. Punching or Piercing:

It is a slicing technique that creates holes in sheet metal in a variety of shapes. However, punching differs from blanking in that hole that is punched is final output. Waste material is what is left behind after hole has been punched.

#### 3. Notching:

In this cutting procedure, metal bits are removed from sheet's edge. Strip or leave it blank.

#### 4. Perforating:

Small and close-packed holes are drilled in a flat sheet of metal using this method.

#### 5. Trimming:

During this procedure, a previously produced component's outside perimeter is trimmed to remove extra material.

### *2) Welding:*

Welding is a method of uniting two metal components by use of heat. Welding is least costly method and frequently utilised already a days in fabrication. Welding joins dissimilar metals with assistance of a variety of procedures in which heat is delivered directly electrically or by use of a gas torch.

### *3) Drilling:*

A drill bit is used to make a circular crosshole in solid materials during drilling process. A drill bit is often a multipoint rotary cutting instrument. Hundreds to thousands of revolutions per minute are achieved by rotating bit as it is pushed on workpiece. Using this method, cutting edge is pushed against work piece, resulting in removal of chips from hole.

Despite fact that bit is often turned during rock drilling, a random cutting motion is seldom used to create hole. Instead, hole is often formed by slamming a drill bit into hole with a series of short, rapid strokes. Depending on how hammer is used, it may be done from outside or inside of hole. Drifter drills are used for horizontal drilling.

**X. COST ESTIMATION****1. MATERIAL COST:**

SL.N O	Name of parts	Quantity	Amount
1	Frame	1	1000
2	Bearing	2	700
3	Battery	1	800
4	Wheel	4	1200
5	DC motor	1	1000
6	Solar Panel	1	900
7	Four gear sprocket	2	700
8	Hopper	1	800

Total=7100

**2. LABOUR COST:**

LATHE, DRILLING, WELDING, GRINDING, POWER HACKSAW, GAS CUTTING,  
Cost = 2000

**3. OVERHEAD CHARGES** = 20% of the manufacturing price  
= 1050

**4. TOTAL COST:**

**TOTAL COST**= Material Cost+Labour cost+ Overhead charges  
=7100+2000+1050

Amount of money spent on this project = 10150Rs

## XI. RESULTS

The time required for one pass of seed sowing varies for different type of seeds depend on the pitch and number of steps entered by the user.

SEEDS	PROBLEMS	SOLUTION	TIME
Maize seed	Many seed drop in once time	Set the servo angle at initial value	5.8 Sec /2ft
Sun flower	Many seed drop in once time	Set the servo angle at initial value	4.6sec/2ft
Ground nut	Seeds may get stuck in the hopper	Automatic drops the stuck seed by vibrator of machine at the movement	5.8sec/2ft

## XII. CONCLUSION

Agriculture has benefited greatly from new seed-sowing technology. We can save a significant amount of time and money on sowing process by using this new seed-sowing equipment design. It's a lifesaver for smaller mould makers. After weighing benefits of this solar-powered seed sowing equipment against drawbacks of current model, it was determined that

- Controls seed rate while maintaining row spacing.
- More efficient use of seeds may be achieved with less waste by controlling seed depth.

We're pleased of ourselves for getting job done in allotted time. Remote Controlled Solar seed sowing machine components are performing as expected. Understanding difficulty of maintaining tolerances and quality is something we can appreciate.

We have used all of available resources to best of our abilities and competence. Following are some final thoughts about our endeavour. A "Components for Remote Controlled Solar Seed Sowing Machine" has thus been created. It is possible to improve upon these strategies by combining a variety of them.

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