

# Solar Precision Planter

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*Abstract— Manpower is undoubtedly the most important demand in agriculture, as it is in any business. Therefore, our project's primary goal is to lessen the demand for human labour. In the agriculture industry, workers need not only be in large numbers but also possess the necessary skill set to carry out farming operations. The process of sowing seeds can be automated to meet the labour need. One of farmers' most significant and regular jobs is "seed plantation." The conventional approach has a number of issues. Our project's primary goals are to raise the precision of the seed planting method while lowering the amount of time and human labor needed.*

## I. INTRODUCTION

Global warming affects the entire world in the twenty-first century. Worldwide, there is a shortage of rain due to ongoing environmental changes, with monsoon-prone regions like India experiencing annual floods and insufficient rainfall. The greenhouse is a creative solution to address environmental issues. Vegetables and flowers are grown in greenhouses. The ability of a productive greenhouse to regulate temperature allows for productivity for the most of the year. However, a greenhouse's negative is that it can occasionally be expensive. The greenhouse requires a significant number of workers to operate. We designed and built the multipurpose seed planter equipment to get over this problem of too much manpower. In the greenhouse, the manual seed planting method is utilized, which involves manual seed planting approach has a number of drawbacks. The trend for physical labor is continuing to decline. One of the main issues that every farmer faces on a daily basis is electricity shortages. The cost of the plantation should go up because of the labor shortage. Therefore, not all farmers will benefit financially from it. There are proximity sensors, timers, relays, and DC in the seed planter. Motor, revolving wheel, seed feeder, etc. A revolving wheel on the motorized farm vehicle is used to gauge how far the vehicle has travelled . A proximity sensor will detect the distance. The

particular pulses are produced. The timer and proximity sensor work together to control the rotary drum's spinning. The relay board is then linked to this timer.

## II. REVIEW OF LITERATURE

[1] Bawaskar Mayur: The majority of countries currently lack enough skilled labor, particularly in the agricultural sector, which has an impact on the growth of developing nations. Thus, it presents a chance to automate the division in order to resolve this problem. The backbone and cornerstone of the Indian economy is agriculture. Approximately 50% of the nation's population has chosen to work mostly in agribusinesses. States like Kerala, Assam, Punjab, Maharashtra are heavily dependent on agriculture.

[2] Abdulrahman This essay illustrates contemporary methods such as the creation of tube wells, the use of tractors to plough fields, and the manufacturing of pesticides. Given that water is the most important resource in this situation, methods for watering the seeds.

Sahana: In this study, a robotic platform-based advanced agriculture system is presented, allowing for production based on defined areas of various land dimensions. The robotic system cultivates the farm based on dicotyledon crops (beans, peas, and groundnuts, among others), taking into account specified rows and columns. A single robotic platform may do multiple tasks, including watering, fertilizing with liquid, planting seeds, and ploughing. Obstacles in the path are detected by the infrared sensors. The machine moves according to a predetermined plan; the power supply serves as a backup and the solar panels are utilized to charge the battery. The micro controller is programmed in the embedded C language.

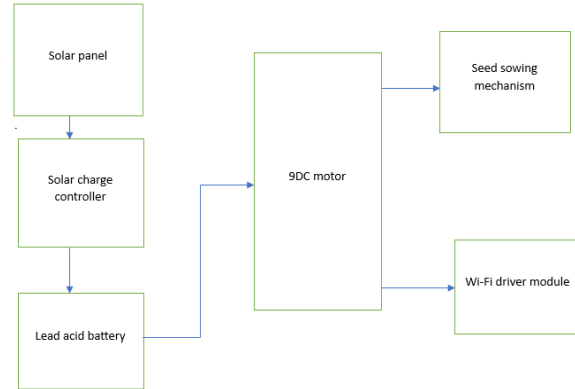
Trupti A: The agricultural sector is the backbone of the Indian economy, according to this survey research. Approximately 50% of the people in our country choose to work mostly in agriculture. States like Kerala, Assam, Punjab, and Maharashtra are strongly linked to agriculture. Everything started as a result of the “Green Revolution” and the techniques that led farmers to consider the many approaches involved in cultivation and its main points. As hundreds of years went by, scientific advancements led to the conception of some innovative agricultural methods. These innovative techniques included the use of tractors to clear fields, the production of insecticides, the construction of tube wells, and more. Water is the primary requirement in this case.

Swati D. Sambare: Approximately 70% of people in India are dependent on agriculture.

To be advanced in order to lessen farmers’ labor. In the sector of agriculture, a variety of tasks are carried out, including planting seeds, pulling weeds, pruning, applying pesticides, and more. Seed sowing is an extremely important and crucial action. That being said, Whatever the case, there are issues with the current seed-planting techniques. The kinds of equipment used in seed sowing are quite difficult to use and uncomfortable. Thus, it is necessary to develop machinery that will lessen farmers’ labor demands. This framework offers a control system that arranges for the sowing of seeds at predetermined positions with lines and spaces between the seeds.

Kiran AS and Baban Parisa Dathwade : The physically labor-intensive process of planting seeds encounters problems with rodents eating the seeds Snails and avian animals. Therefore, mechanizing the process of seed sowing is required. This section and a dynamic development prove to be essential in elevating the demand for agricultural products and their quality. In order to address these concerns, a micro For correct digging, seeding, and covering of seed, a controller guides the rover. The robot is powered by a DC engine with a high torque and an accessible turning shaft. The use of pesticides is what propels the Indian farming industry forward.

### III. BLOCK DIAGRAM

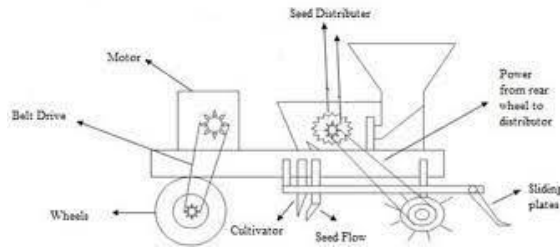


### IV. ADVANCED SEED PLANTATION MACHINE COMPONENTS

1. Frame: each of the three frames has a bar height measured from the bottom of the frame and is constructed with M.S. angle 25x1 mm weighing 10 kg. Every square frame measures 610 mm by 610 mm in increments. Which other parts are mounted, such as the hopper, disk, shaft, etc..
2. Hopper: The Hopper is constructed from M.S. sheets that include seed. Three hoppers are positioned in the center and upper parts. This five kilogram frame uses a total of six hoppers.
3. Shaft: As seen in the 3D diagram, the shaft is arranged between the upper and middle frames. The length of shaft is 615mm with gear head motor.
4. A rotating drum. It is composed of circular-shaped fibre plastic material. Three rotating drums are installed on a shaft, 160 mm apart from one another. Every revolving drum has a diameter of 70.5 mm. The rotary drum is sliced with a tiny slot. With the aid of, it removes the seed from the upper frame hopper side of the hopper and drops it to another side hopper at a specific distance.
5. Farrow: This multifunctional tool is used to both excavate soil and plant seeds in it. It is constructed with a circular hollow that has been carved at an angle and connected to a bottom side frame at a 45-degree angle. It is filled with C.I. material, which is used to cultivate the soil by releasing seeds. The seed was dropped at an angle designed to stop excess seed in one spot.

6. Wheel: Depending on the state of the soil, the three-fiber wheel is attached to the frame. There are 90.5 diameters on each wheel.

7. Electric Motor: The seed plantation equipment is equipped with two DC electric motors. Each motor requires 12 volts to work and has a power of 1/2 HP with a gear head that rotates at 30 rpm.



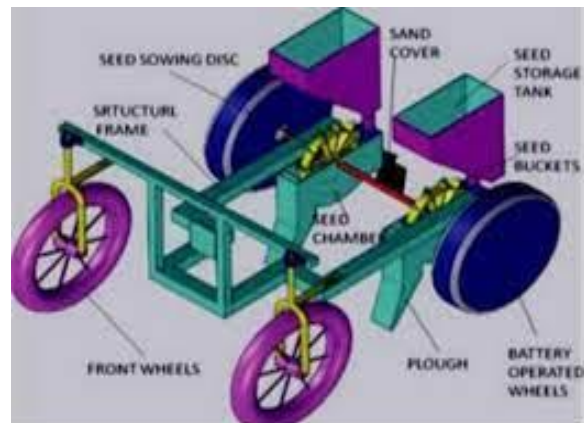
Working principle:

- The planting apparatus consists of rotating drums arranged in hoppers. Seeds are stored in hoppers, which are placed beneath a rotating drum for storage. It is completely perforated.
- When the hole in the drum completely rotates beneath the hopper's exit, a seed is permitted to travel downward and land on the ground. The seed is then covered with soil to ensure that it fully penetrates the soil. With the aid of a projected, a proper digging line is also produced prior to the seed being dropped.
- We lower With geared DC motors, it is an autonomous barrier. Motors are supplied with the DC voltage. Two of the three wheels have motor drives, one is automatically driven, and a third dc motor is used to turn the rotating drum. A proximity sensor is located next to the wheel.
- One logic pulse is produced by the proximity sensor during a tire rotation. The switching circuit and micro controller receive this logic pulse. After receiving one pulse, it is anticipated that the rotor will cycle once. The procedure is then repeated after dropping one seed.

## V. MODEL DIAGRAMS



## VI. EXPERIMENTAL SETUP



CATIA drawing of the project

## VII. CALCULATIONS OF DESIGN

The motor needs torque to operate.

Motor power transmission

$$P = \frac{2}{60} \times 0.3677 \times 103 = 2 \times 30 \times 60 = 117.04 \times 103$$

$$T = 117.04 \times 103 \text{ Torque}$$

The ground wheel's design

Wheel diameter  $D = 0.095\text{m}$

Ground wave circumference  $= \pi \times D = \pi \times 0.095$

Ground whirlwind circumference  $= 0.29\text{m}$ .

Area covered by one rotation of the ground wheel's circumference times the width of the seed drill  $l = 0.29 \times 0.5 = 0.145 \text{ m}^2$ .

#### ECONOMIC ASPECTS ACCORDING TO FARMER NEEDS

- We are aware that every project's success rate takes into account both the project's design and its cost-benefit to the end user. We believe that the low-income Indian farmer is the project's or product's final user in this instance.

#### FINAL RECAP:

- This system's automatic seed planting approach is its primary goal. Proper germination of seeds is achieved by sowing the seeds in the correct order. This cutting-edge technique for using a robot to spread seeds lessens the labor-intensive process. The amount of seeds wasted in this approach has also been significantly decreased. This technique is designed to allow seeds to be sown in a predetermined manner. Here, a robot is helping to distribute the seeds in the soil.

#### RESULT

- **Improved Efficiency:** The solar precision planter demonstrated increased efficiency compared to traditional planters, thanks to its ability to harness solar energy for operation.
- **Cost Savings:** Analysis showed that the use of solar power reduced operating costs over time, particularly in terms of fuel savings and lower maintenance requirements.
- **Environmental Benefits:** The adoption of solar-powered technology led to a reduction in carbon emissions and environmental impact, aligning with sustainability goals in agriculture.
- **Reliability:** Field trials indicated that the solar precision planter maintained reliable performance even in varying weather conditions, showcasing its robustness and adaptability.
- **Precision Planting:** The planter consistently achieved accurate planting depth and spacing, contributing to improved crop yields and quality.

#### CONCLUSION

The report concludes that the integration of solar power into precision planting machinery offers a promising solution for sustainable agriculture. By harnessing renewable energy sources, farmers can enhance operational efficiency, reduce environmental footprint, and improve overall productivity. However, the successful implementation of solar precision planters requires careful consideration of factors such as initial investment costs, maintenance requirements, and site-specific conditions. Further research and development in solar technology and precision agriculture practices are recommended to maximize the benefits of this innovative approach in modern farming.

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