

Solar Operated Automatic Seed Sowing Machine

Swetha S.¹ and Shreeharsha G.H.²

¹Department of Aeronautical Engineering, Acharya Institute of Technology, Bangalore, Karnataka, India

²Industrial Automation & Robotics, Department of Mechanical Engineering, Karavali Institution of Technology, Mangalore, Karnataka, India

Correspondence should be addressed to Swetha S., swetha4shree@gmail.com

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Abstract The real power required for machine equipment depends on the resistance to the movement of it. Even now, in our country 98% of the contemporary machines use the power by burning of fossil fuels to run IC engines or external combustion engines. This evident has led to widespread air, water and noise pollution and most importantly has led to a realistic energy crisis in the near future. Now the approach of this project is to develop the machine to minimize the working cost and also to reduce the time for digging and seed sowing operation by utilizing solar energy to run the robotic machine. In this machine solar panel is used to capture solar energy and then it is converted into electrical energy which in turn is used to charge 12V battery, which then gives the necessary power to a shunt wound DC motor. This power is then transmitted to the DC motor to drive the wheels. And to further reduction of labor dependency, IR sensors are used to maneuver robot in the field. Here 4 post sensors are used to define the territory and robot senses the track length and pitch for movement from line to line. Seed sowing and digging robot will move on different ground contours and performs digging, sow the seed and water the ground after closing.

Keywords *Direct Current Motor; Infrared Sensors; Internal Combustion Engines; Special Purpose Vehicle*

1. Introduction

Today the environmental impact of agricultural production is very much in focus and the demands to the industry is increasing. In the present scenario most of the countries do not have sufficient skilled man power in agricultural sector and that affects the growth of developing countries. Therefore farmers have to use upgraded technology for cultivation activity (digging, seed sowing, fertilizing, spraying etc.). So it's a time to automate the sector to overcome this problem. In India there are 70% people dependent on agriculture. So we need to study on improving agricultural equipment. Innovative idea of our project is to automate the process of digging and seed sowing crops such as sunflower, baby corn, groundnut and vegetables like beans, lady's finger, pumpkin and pulses like black gram, green gram etc. and to reduce the human effort. Since we have lack of man power in our

country, it is very difficult to do digging and sowing operation on time, Automation saves a lot of manual work and speed up the cultivation activity. The energy required for this robotic machine is less as compared with other machines like tractors or any agriculture instrument, also this energy is generated from the solar energy which is found abundantly in nature. Pollution is also a big problem which is eliminated by using solar plate.

2. Machine Operation Methodology

In this machine a solar panel is used to capture solar energy and then it is converted into electrical energy which in turn is used to charge 12V battery, which then gives the necessary power to a shunt wound DC motor. This power is then transmitted to the rear wheel through chain drives. Consequently, in this project an attempt is made to make the electric and mechanical systems share their powers in an efficient way.

The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed [1]. The recommended row to row spacing, seed rate, seed to seed spacing and depth of seed placement can vary from crop to crop and for different agro-climatic conditions to achieve optimum yields. Typical application of seed sowing of Cereal's including ground nut, all types of dal's, oil seed crop's etc. [2].

A solar panel is a device that collects and converts solar energy into electricity or heat or mechanical work. Solar energy is first used to charge a storage battery. An electric battery is a device consisting of one or more electrochemical cells that convert stored chemical energy into electrical energy. The solar energy stored in the battery is utilized to operate DC motor. A DC motor is a device that converts direct current (electrical energy) into mechanical energy. By using the bevel gear and Chain drive with sprockets power is transferred to the wheels for their movement. AT89S52 Microcontroller is used to automatically control the machine. IR Sensors are fitted to the machine for automatic turning operation and to sense the obstacle in the moving path. An infrared sensor is an electronic instrument.

2.1. Experimental Setup

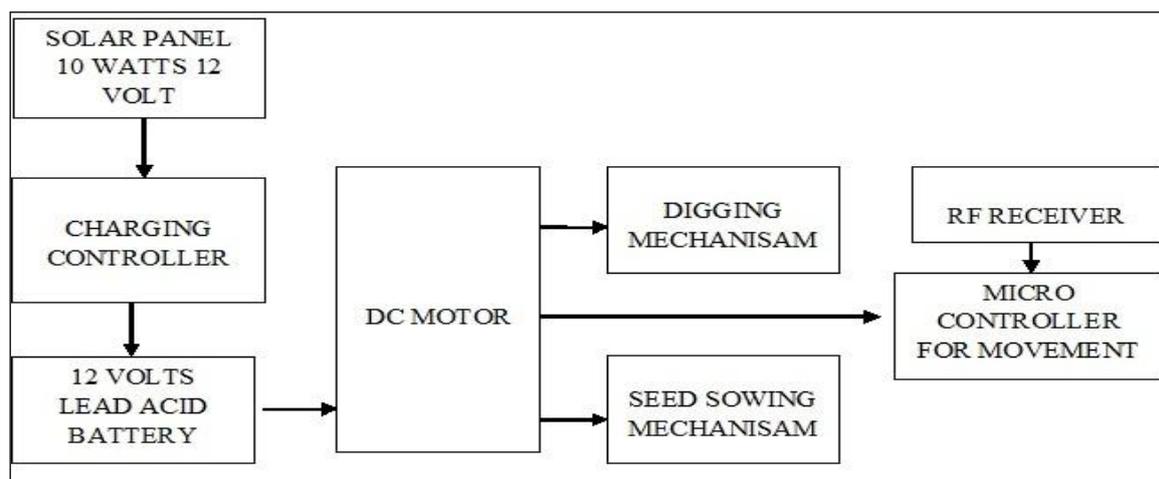


Figure 2.1.1: Experimental Setup

2.2. Line Diagram of the Machine with Dimension

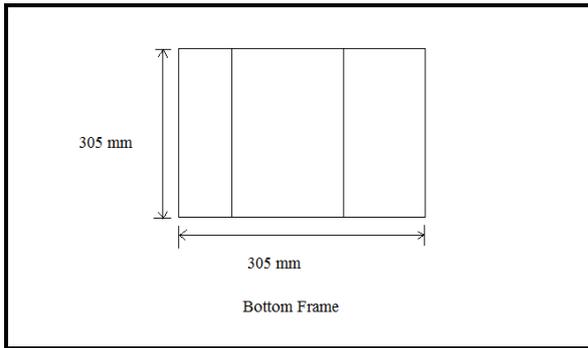


Figure 2.2.1: Bottom Frame

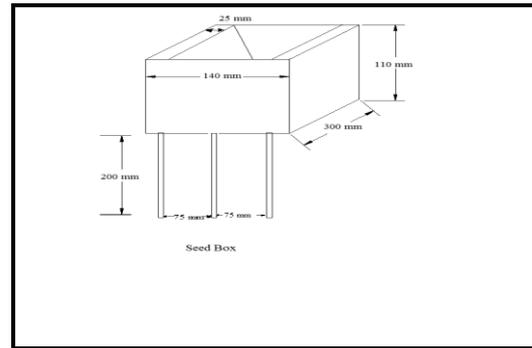


Figure 2.2.2: Seed Box

2.3. 3D Model Pictures of Digging Tool Mechanism with Frame

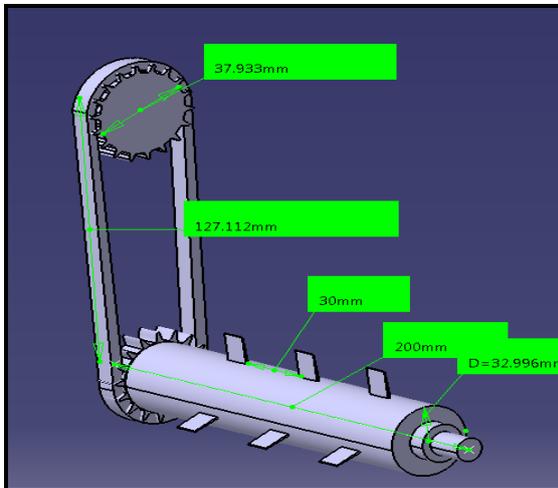


Figure 2.3.1: Chain-Sprocket and Digging Tool Arrangement

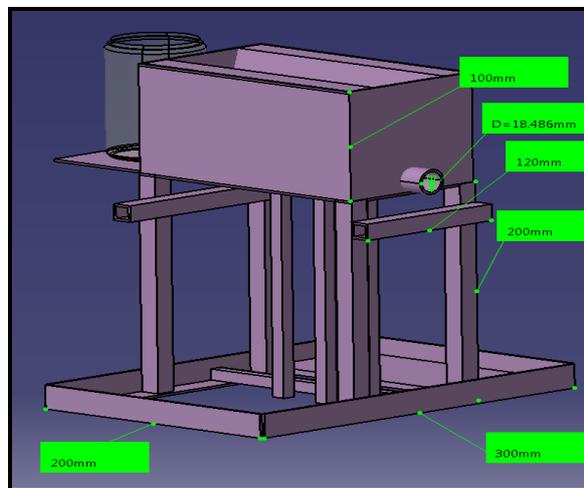


Figure 2.3.2: Base Frame Structure

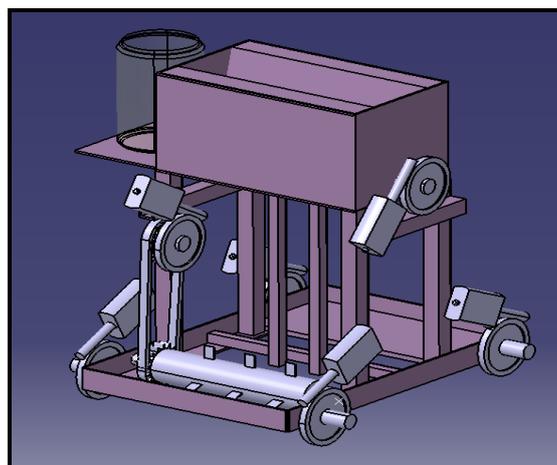


Figure 2.3.3: Assembly of Drive Mechanism

2.4. Photographs of Model



Figure 2.4.1: Solar Panel and Experimental Setup



Figure 2.4.2: Digging Tool Arrangement



Figure 2.4.3: Seed Container and Dropper

3. Performance Characteristics

Prototype of the solar operated automatic seed sowing machine developed has the following Performance characteristics.

- Working speed of the machine depends upon the DC motor and energy stored in the battery.
- Prototype Machine can dig the soil in three rows up to 5 inch by rotating the digging tool by the help of DC motor.
- Digging speed depends on the moisture content in the soil and tool tip.
- At the same instant from the seed dropper seed is placed in all the three rows at a distance of 4 inch.
- No. of seed placing at an instant can be varied by altering the size of holes in the dropper.
- By the help of 4 post sensors, machine will sense the track length of the field and takes an automatic turning at the end of the boundary.
- In the future work this machine can also be further designed to detect obstacle present in the path by using IR sensor.

Conclusion

As we know that in our country about 70% of population lives in villages & their mainly income depend on the agricultural source. Hence my prominent aim of this project Solar operated automatic seed sowing machine is to fulfill the tasks like digging, seed sowing, water pouring and fertilizing by using non-conventional energy sources. Thus solar operated automatic seed sowing machine will help the farmers of those remote areas of country where fuel is not available easily. And also they can perform their regular cultivation activity as well as saves fuel up to larger extent. At the same time by using solar energy environment pollution can also be reduced. Thus aiming to save the revenue of government & also most demanded fossil fuel.

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