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Automated Solar Powered Seed Sowing Machine

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Miss. Yogita Bhavari, Mr. Vishweshwar Udate , Mr. Shantanu Wankhade, Mr. Manoj Goski "Design & Development Of Automatic Seed Sowing Machine By Utilizing Solar Energy".

Abstract: *In this project, we are developing an agricultural-based robot this robot should useful for farmers. In this robot, automatic seed placing and pumping the water to seed(desired location) and we are using pick and place set up to remove the dry plant and sowing the seeds consecutively . We are using the sensor to find the conditions of land. If any obstacle is noticed means the robot will stop at that place and (soil moisture sensor) is using to find the dry or wet condition in the plant if it is dry means the pump motor will start and water will be supplied.*

Agriculture has always been important activity for Indian people which determine the economy. Greater part of urban areas in this country does not have proper skilled labor in farming and that influences the advancement of creating nation. Hence farmers must use advanced methods in agriculture. Seed sowing is performed manually by hands and distance (spacing) between seeds was not accurate, while sowing the seeds. Traditional method of sowing seeds is achieved manually by hand and in some cases two bullocks are used to lift the bulky traditional machine for dropping seed and ploughing the land. Hence automation is almost essential to solve the issues in agriculture by modernizing agricultural machinery. Seed sowing is important task for farmer during the sowing seasons if seeding the land area is greater it requires greater number of workers for sowing the seeds.

Key Word*: Automatic seed placing, Robot, Indian economy, urban areas, Concentrated Solar Power, wet condition, agriculture land, farming techniques.*

I. Introduction

Agriculture has been the backbone of this country's economy and it will continue to be for a long time. It has to support almost 17% of world population from 2.3% of geographical area and 4.2% of water resources of world. The percentage of cropping intensity of 137% has an increase of only 26% since 1950-1951. The total sown area is 142 MH. The main motive of sowing operation is to put the seed in rows at desired depth and spacing, cover the seed with soil and provide proper cover over the seed. The recommended row to row space, seed rate, seed-seed spacing and depth of seed placement vary from crop to crop and for different agricultural and weather conditions to achieve optimum output and an efficient seed-sowing machine must attempt to fulfill these conditions. Plus saving in cost, operation time, labor and a lot of energy are other advantages to be derived from use of improved techniques for such operations. A traditional method of seed sowing has many limitations. This paper is about the different types of methods of seed sowing and fertilizer placement in the soil and constructing a multi-functional seed sowing machine that can perform many operations. In the history, it has been thought that atomic energy would be a answer for the growing energy crisis, but in recent times solar energy has proved to be an efficient and safe way of providing renewable energy. Concepts related to the solar energy have constantly been under intense study, research and development. We introduce a machine which can carry out various farming activities like ploughing, seed-sowing and irrigation etc. This machine is manually operated which is equipped with

a four wheel drive. The seed sowing machine is developed economically. It is easily affordable by rural farmers. It is low maintenance and mainly adjustments can be made with ease for operation

II. System Development

Today many countries have limited skilled labor in agriculture sector, which affects the growth rate of the countries including our country (India) which mainly depends on agriculture sector. As the population of India is growing, basic demand of food is also growing exponentially which leads to higher crop production. So, to fix these issues farmers should use modern technological advancements and machinery for the various agricultural practices like digging, sowing, irrigation etc. Which are more in terms of efficiency and less time wasting? The main work of sowing operation is to sow the seed at prescribed depth with specific distance between the two sown seeds. This is attained with the help of seed sowing machine which digs the furrow and sow the seed. After the seeds being placed in the furrow land, it will cover the sowed seeds with soil and water the area. Automatic seed sowing machine saves time and labor requirement, thus saving a lot of money along with the assurance of proper seed sowing operation.

In this robot(machine), automatically placing seed and pumping the water in the area of sowed seed and we are using pick and place set up to remove the dry plant(residue) and sowing the seeds in that very place. We are using the sensor to find the conditions of land under consideration. If any obstacle is dedicated means the robot will stop that place and soil moisture sensor is using to find the dry condition or wet condition in the land if the land/plant is dry means the pump motor should be on and water will supply to plant.

III. Proposed Methodology

Here we can explain what the various ways to solve our problem are. If project is in the images processing, then write the algorithms and data which are applicable (HAAR, CANNY EDGE, HIS TOGRAM, etc.) If it is based on embedded domain, mention different microcontrollers/microprocessors or sensors, communication protocols by which this issue might be solved. And identify which one will be more suitable. We suggest a machine which can carry out various agricultural activities like digging, sowing and irrigation etc. Fig1 shows the block diagram of our experimental setup. This is a manually operated machine which is equipped with a four-wheel drive. For the fabrication, components and equipments were decided based on the material, factor of safety efficiency and the calculations were done to find out the speed of the machine at output of the motor to be used to match the requirements of the consumer. The design parts were modeled using CATIA software and the assembly was done to finalize the best position of the components. The machine is developed at a low cost . It is cheap and easily affordable and accessible by rural farmers. It is almost maintenance free or requires very low maintenance and various adjustments can be made easily for various operation.

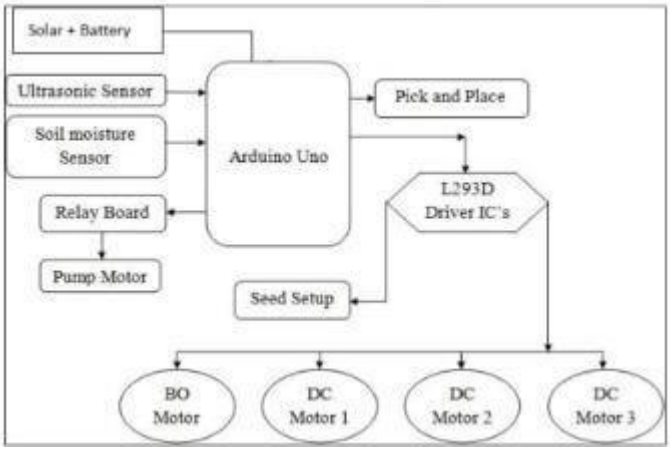


Figure no I Block Diagram

IV. Working Principle

1) Pyranometer

we are using the sensor to find the conditions of agriculture land, and (L293D IC) is using to operate the mobility of robot forward, backward, right and left the ultrasonic sensor is using find an obstacle in way of moving time and soil moisture sensor is using to find the dry condition and wet conditions in land. If we find any dry/residual plant pick and place is help to remove the dry plant from its root and we sow the seed in that place after that supply the water to the land where the seed is sown in this method this all process is controlled by Arduino Uno.

2) Working of a typical Thermopile Pyranometer-

For the of seed sowing, we are using servomotor. Servomotor is a simple (electrical) motor, controlled with the help of well known servomechanism. In this as the shaft of servomotor can be turned at required degree which is attached with the hopper that contains seeds, the mechanism of seed sowing is achieved feasible.

V. Hardware Implementation

Arduino-Uno Board: - Shows Arduino-Uno board which is the controller for the entire assembly. It consists of (Atmega328 microcontroller). It is small, complete, and breadboard friendly. In order to load new code on to the board one can simply use a USB cable to load.

Digital Compassing Digital Compass Sensor: - It is used for finding out the exact 900 rotation of Farmington if we need to rotate in any direction. It includes high resolution series magneto resistive sensors plus an (ASIC) containing amplification, automatic degaussing strap drivers and a 12-bit ADC that enables 1° to 2° compass heading accuracy and reliability.

Solar Panel: - Solar Panel provides renewable and ecofriendly source of energy/power. It is made up from Photovoltaic (PV) cells these cells absorb sunlight. It absorbs sunlight and converts this solar energy into electrical energy. Specifications- Rated Power- 20 W Dimension- 470mm x 350mm x 25mm Cost- INR 400- 700.

Lead-Acid Battery: - It consists electrochemical cells which convert chemical energy into electrical energy instantly. Each cell contains a terminal that is positive and a negative terminal. Electrolyte is used for ions mobility between electrodes and terminals. These ions mobilization allow current (I) to stream out of the battery to perform required task. Specifications- Rated Voltage- 12V Capacity- 6Amp Hour.

Seed Hopper: - The Seed Hopper consists of a seed drum that is made out of two frustums. The small ends of frustums are connected with cylinders maybe of plastic. The large ends of frustums are connected to each other and three holes are made on the larger area of the hopper. Seeds are inserted in the frustums with the help of openings on the face of frustum. Hopper will rotate about its central mid axis. Seed spacing will be made and maintained that way by the holes which are created on the surface with equal distance in length.

Cutter: - A cutting equipment or a cutter is any tool which contains sharp teeth on its body and Due to fast rotation , its teeth will remove material from the surface of the work piece by means of shear speed and sharpness.

Adjuster: - It is used to direct the soil from side to the center of the furrow/hole created by the equipment cutter. Adjustment of soil is to be done after seed is sown by the seed sower. Hence, adjuster needs to perform its function

after the operation of seed hopper. Seeds must be covered by the soil before watering process begins. After covering seeds with the soil, water is to be sprinkled.

Water Tank: - Tap Arrangement- For watering purpose tank tap arrangement is used. Water is to be sprinkled on the land after seeds sowing is done by the Hopper and covered by soil . A thick plastic sheet is mounted on the chassis which is used to support water-tank and solar-panel

Belt Pulley System: - A belt and pulley system contains two pulleys or sometimes more in common to a belt. This allows for mechanical power, torque, and speed to be transmitted across shafts . If the pulleys are of different diameters then a mechanical advantage will be made.

VI. Methodology

In this machine a solar panel is used to absorb solar power and this energy is converted into electrical energy. This electrical energy is stored inside a 24Volts battery of capacity 7.5 Amp Hour, which then gives the necessary power required to the DC motor connected. This power is then transmitted to the cutter for cutting through belt-pulley system. Due to the shear deformation created by the cutter's sharp tooth, the farm field will be ploughed and the furrows will be created for the unsown seeds. Seed hopper rotates due to the friction that occurs between ground and surface of the hopper. Ground contact generates the required torque for rotation. Seeds will be dropped/placed on the ground from the holes due to their own weight and the effect of gravity. The basic objective of sowing operation is to put the seeds in furrows at desired depth, to maintain seed to seed sowing distance and to cover the seeds with sand and provide proper cover over the seed.

The recommended row-row spacing, seed rate, seed-seed spacing and depth of seed placement can vary from crop to crop and for different weather conditions to achieve maximum yields. Typical application of seed sowing of Cereal's includes many things of them some are ground nut, all types of dal, oil seed crops and much more. To put the soil back on the seed, an adjuster is used which adjust the soil towards the furrow created by the sharp cutter. After adjusting the soil , irrigation takes place, water is sprayed from the pipe to the desired location. Water Tank-Tap arrangement is used for watering purpose. Tires of the machine are rotated by pulling action of the machine with the help of man-power. Tires need to be rotated for forward movement of the vehicle and rotating the seed-hopper. Various fabrication processes involve cutting and welding of steel, cutting of solid-shaft, cutting and welding used in cutter, clamping of all the ball bearings. Bolting of DC motor, slot making for movement of DC Motor, clamping of batteries used and solar panel, wiring and clamping of seed sowing machine and adjusting.



Figure no II Flow Chart

VII. Result and Discussion

In seed sowing machine, we have used battery powered wheels and dc motor inbuilt in these wheels. When the seeds are empty it detects the level of limitation of seeds and sets off the alarm. When any obstacle comes in the front part of the machine or divert path the seed sowing machine can detect this obstacle effortlessly. In each complete rotation of rotating wheel seeds falls from this seed drum and the seed plantation process can take place neatly and without wastage of seeds. The end of system machine reached and sets off the create alarm. In this work we replace complicated and bulky gear system by Hall Effect sensor for easier seed sowing and also reduce a need and cost of labor. The Hall Effect sensor is a sensor which converts rotation into distance for which seed sowing at particular distance. Also, there is adjustable-system for sowing at various distances. By using this machine, the sowing can be done row-row and distance will be easily maintained. In this machine solar panel is used to absorb the solar energy and then it is converted into electrical energy which in turn is used to charge the 12 Volts, 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 of the machine. And to further decrement of labor dependency, I.R. sensors are used to move the robot in the field. Here 4 post sensors are used to define the land and robot senses the track length/area and pitch for movement from line-line.

VIII. Conclusion

In our country (India) about 70% of the population lives in rural areas and their main source of livelihood is based on agriculture sector. So, it is important to have great focus on agriculture/farming sector of India and to apply modern technologies and methods which are more advanced, practical and efficient. This will initiate better growth of India. Our machine which operates on renewable power when compared to different traditional seed sowing methods which will give us clean energy.

The rate of sowing seeds can be controlled

Spacing between the seeds can be varied and achieved.

Manpower required is less as compared to traditional method.

No pollution is caused as we use green and clean energy.

It is highly economical.

Any type of seeds can be sown.

References

[1] Mahesh R. Punker, “A seed sowing machine: A review” IJESS volume 3, Issue ISSN: 2249-9482, International journal of engineering and social science.

[2] P.P. Shelke, “frontline demonstration on bullock-drawn planter enhances yield of soya bean crop. International journal of farm science 1(2):123-128, 2011.

[3] Sahay (1990), Principals of Agricultural Engineering (2005), Volume 1, Text book published by Jain brothers, New Delhi, India.

[4] Nibal, Akbar, Mali, Mostar, L.Ali.”Effect of seed rate and Row spacing on yield and yield components of Wheat “Journal of Agricultural Research, 48(2).

[5] R. Joshua, V. Vasu and P. Vincent “Solar Sprayer - An Agriculture Implement”, “International Journal of Sustainable Agriculture” 2 (1): 16-19, 2010 ISSN 2079- 2107.