SOLAR POWERED SOIL DIGGING MACHINE

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Abstract: Today's era is marching towards the rapid growth of all sectors including theagricultural sector. To meet the future food demands, the farmers have toimplement the new techniques which will not affect the soil texture but willincrease the overall crop production. The aim of This project is fabrication of Solar Powered Soil Digging Machine which shows capability of drilling in soil .
The various technique used in India for Soil Digging are manual, ox and tractor operator, or engine operated soil digging machine . The manual and ox operator technique are time consuming and productivity is low. engine is running on fossil fuel which emits carbon dioxide and other pollution every second. This evident has led to wide spread air, water and noise pollution and most importantly has led to a realistic energy crisis in the near future, in order to make the development of our farmer as well as nation sustainable and cause less harm to our environment. Now the approach of this project is to develop the Solar Powered Soil Digging Machine which is to minimize the working cost and the time for digging as well as operate on clean energy.

I. INTRODUCTION

The soil digging machine which is used for plantation of smaller saplings. This machine uses the principle of auger drilling machine which is used in pile foundation during construction. The auger drill is made of required size by scaling down its original size as per the requirement. The machine is made automatic by employing a D.C motor which serves as a power source for digging the soil. The motor can be rotated both in clockwise and anti-clockwise direction. This makes the auger to drill hole in the soil and the return back to its original position. There are water tanks which are used to provide continuous supply of water to loosen the soil as well water the saplings after the plantation. The size of the auger is designed as per the sap-ling size. This machine is designed for a preliminary aim of avoiding the use of shovels & levers in plantation of saplings thereby enhancing the plantation process by making it facile.

II. LITERATURE SURVEY

Kyada. A. R et al (2014)proposing for seed to seed spacing and depth of seed placement, using mechanisms such as seed meter mechanism, plunger mechanism, lever fulcrum mechanism, cam shaft and power transmission, pulling mechanism. Joshi S.G et al (2014) presents a high speed solar powered system in cultivation based on robotic platform and artificial agent which is steered by DC motor remote control. The IR sensor is used and the seed block can be detected and solved using water pressure. A. Kannan et al (2014) converted the tractor movement into ground wheel rotation is transmitted to the metering mechanism through the power transmission system depending upon the nature of seeds; we can change the metering mechanism arrangement. The flax blades are used in making holes in the soil. These flax blades serves good in removing the soil and throwing it out so that a hole is made in the zone of plantation so that sapling can be easily planted in the soil. The plantation needs only a 1.5" inch diameter hole so that the auger drill is also made of such specification. This avoids making larger holes more than the requirement. On surveying the field of our project it is found that flax blades along with rotating hand wheel and springs are used which requires again a manual operation. One method which uses driller type machine which makes just hole in the ground and also requires in minimum of two members for handling the machine

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Innovative Seed sowing equipment It has remarkable influence in agriculture. By using this innovative project of seed sowing equipment.we can save more time required for sowing process andalso it reduces lot of laborer cost. It is very helpfulfor small scale formers. After comparing the different method of seed sewing and limitations of the existing machine, it is concluded to this Solar machine canMaintain row spacing and controls seed rate.Control the seed depth and proper utilization of seeds can be done with less loss.Perform the various simultaneous operations and hence saves labour requirement so as labourcost,labour time and also save lots of energy. Henceit is easilyaffordable byfarmers. So we feel that this project serves something good to this world andwe would like to present it before this prosperous world.
International Conference on Systems, Science, Control, Communication, Engineering and Technology 2016 [ICSSCCET 2016] Semi-Automated Soil Digging Machine for Sapling Plantation SaiKrishnan D1, Sakthivignesh K2, Balaji P3, BrailsonMansingh B4
International Journal Of Research In Advent Technology, Vol.5, No.5, May 2017 E-Issn: 2321-9637 Available Online At Www.Ijrat.OrgK.Vengatesvaran1, R.Rathish2, M.Kanagaraj3, M.Sivakumar4, S.Kannan5, G.Vijayakumar6 Solar Powered Drilling Machine
This report details with design and "solar operated drilling machine" .the project carried out by us made an impressing task in the shaping works of inclined work piece .it is very useful for the labors to make a hole for inclined profile component of required length to perform the milling operations to be carried out.

III. PROBLEM STATEMENT& SCOPE

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, here the motor can be rotated both in clockwise andanti-clockwise direction. This makes the auger to drill hole in the soil and the return back to its original position, to overcome the costing problem to farmers to make their work easy.

Scope of project for this project includes literature review from the last project and all the results of the last project, engineering material, designing and development of mechanism.In this project we have Designed Solar Powered Soil Digging Machine, which operates on 12 volt battery & powered by solar to charge the battery. Solar panel can be hanged on the back pack with the help of college bag for better sun rays collection on plate, 1 dc motor to drive the Auger Drill which is the main part to dig into the soil.

IV. OBJECTIVES

To make a portable machine with the use of battery

- Low cost machine as compare to existing engine operated machine
- A Machine with less noise and more efficient
- To Improve and optimize the present procedure.
- To improve simplicity.
- Minimize the time required by using simple mechanical mechanisms.
- Develop machine which will require less labour and which can be operate with unskilled operator.

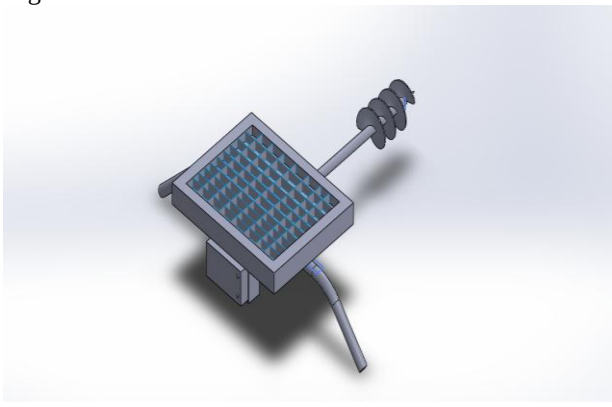
The objectives of the project are to design a system for Solar Powered Soil Digging Machine is:

- Efficient
- User-friendly
- Transportable
- Cost-effective
- Reduce repetitive task
- Functional requirement of proposed system

V. DESIGN AND DEVELOPMENT OF TEST SETUP

Photovoltaics were initially solely used as a source of electricity for small and medium-sized applications, from the calculator powered by a single solar cell to remote homes powered by anoff-grid rooftop PV system. As the cost of solar electricity has fallen, the number of grid-connected solar PV systems has grown into the millions and utility-scale solar power stations with hundreds of megawatts are being built. Solar PV is rapidly becoming an inexpensive, low-carbon technology to harness renewable energy from the Sun.

Design of Model:



When designing our attachment, the following considerations were taken into account:

- The device should be suitable for local manufacturing capabilities.
- The attachment should employ low-cost materials and manufacturing methods.
- It should be accessible and affordable by low-income groups, and should fulfill their basic
- need for mechanical power
- It should be simple to manufacture, operate, maintain and repair.
- It should employ locally available materials and skills. Standard steel pieces such as steel plates, iron rods, angle iron, and flat stock that are locally available should be used. Standard tools used in machine shop such as hack saw, files, punches, taps & dies; medium duty welder; drill press; small lathe and milling machine should be adequate to fabricate the parts needed for the machine.
- Excessive weight should be avoided, as durability is a prime consideration

VI. TEST SECTION

Auger Bit:

VII. EXPERIMENTAL SETUP INSTRUMENTATIONS

DC geared motor:

Selection of this motor done on the basis of Torque Constant

– 8 N.m (80 kg-cm) , high torque motor beneficial for the drilling into the soil, so from online manufactures CatLog we have selected this 24 volt dc motor

Motor Specifications:

- Voltage: 24 Volt DC
- Output: 250 Watt
- RPM (after Reduction) – 300
- Full load current – 13.4A
- No load Current – 2.2A
- Torque Constant – 8 N.m (80 kg-cm)
- Torque stall – 40 N.m (400 kg-cm)
- Sprocket: 9Tooth only fits #410 bicycle chains
- For Chain Size: Pitch 0.5 inch
- Roller Diameter 0.3 inch
- Roller Width 0.16 inch

Advantages

- High strength.
- Good machinability.
- Low Noise operation
- No external fuel required
- Handy in use .

Applications

- Used in agriculture sector
- Used in the Plant Nursery
- It is helpful to the small scale farmers.

VIII. CONCLUSION

After comparing the different method of soil digging and limitations of the existing machine, it is concluded that this solar powered soil digging machine is

- Environment friendly as no fuel is required
- Economically affordable

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