Solar Operated Electronic Seed-drill with Seed Flow Regulator

Pradnya Korde[1], Pradnya Bagde[2], Ajay Motghare[3], Chetan Hedau[4]
[1]*Assistant Professor, Department of Electrical Engineering, NIT Polytechnic Mahurzari, Katol Road Nagpur, Maharashtra, 441501*
[2,3,4] *Diploma Student, Department of Electrical Engineering, NIT Polytechnic Mahurzari, Katol Road Nagpur, Maharashtra, 441501*

Abstract **- Today's era is shifting towards the rapid growth in all sectors including the agricultural sector. In India main problem with agricultural sector is that farmers are farming the land with traditional methods. In future, for better quality of food farmers have to implement the new techniques which will not affect the quality of soil and increases the crop production. The aim of our project is to design and develop a solar operated electronic seed-drill with seed flow regulator machine. In our country 98% of contemporary machines operated on burning fossil fuels to run IC engines or external combustion engines. In rural areas, for seed sowing and fertilizer placement are manual, using bull or using tractors. These techniques are time consuming and productivity is low. And also tractor emits carbon dioxide and other harmful pollutants in the environment. This causes air pollution and noise pollution and this will lead to a realistic energy crisis in future. Now the perspective of this project is to reduce the time and minimize the working cost. it reduces the time for digging and seed sowing operation by using solar energy to run the robotic machine. In this machine solar panel is used to catch solar energy and then it is converted into electrical energy to charge 12V battery, which then used to give power to a shunt wound DC motor. This power is then transfer to the DC motor to drive the disc. IR sensors are used to maneuver machine in the field. Here sensors are used to define the area of land and machine senses the route length and pitch for movement from line to line. Seed sowing and digging machine will move on different ground contours and it performs cultivate, sow the seed and water the ground after closing.**

I.INTRODUCTION

Agriculture is a backbone of Indian economy since very long time and it will continue further for very long time. Now the environmental impact of agricultural productions very much in focus and the demands to the industry is increasing. Most of the countries do not have enough skilled man power in agricultural sector and that affects the growth of agricultural sector and developing countries. Therefore, farmers need to shift from traditional farming techniques to modern farming techniques for digging, seed sowing, fertilizing, spraying etc. In India 70% people dependent on agriculture. Now it's time to upgrade the agriculture sector to overcome these problems. So we need to study on new upgraded methods of agricultural equipment. Inventive 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. It is very difficult to do digging and sowing operation on time because of lack of man power Automation speed up the cultivation process and saves time and reduce manual work. As compared with tractors and other agricultural instrument the robotic machine consumes very less energy, also this energy is generated from the solar energy which is found in nature. In India pollution is also a big problem which is eliminated by using solar plate. This paper discusses the future technology used in agriculture.

II.LITRATURE REVIEW

In recent years, there has been a shortage of agricultural labours and work animals during sowing season Due to non-availability of labours and work animals during sowing seasons, in many places the seed is sown even when the soil is at a low moisture content which affects the productivity of crop. Nowadays farmers are use harmful fertilizers to

increase the crop production but these fertilizers are harmful for soil texture. Therefore, for crop sowing operation under rain fed conditions, a suitable seed drill is necessary as it places the seed in the pitch of sufficient moisture and at desired depth. The seed drill machine gives proper seed rate, uniform distribution and correct placement of seed. Its gives more production of crop and reduces man power

III.METHODOLOGY

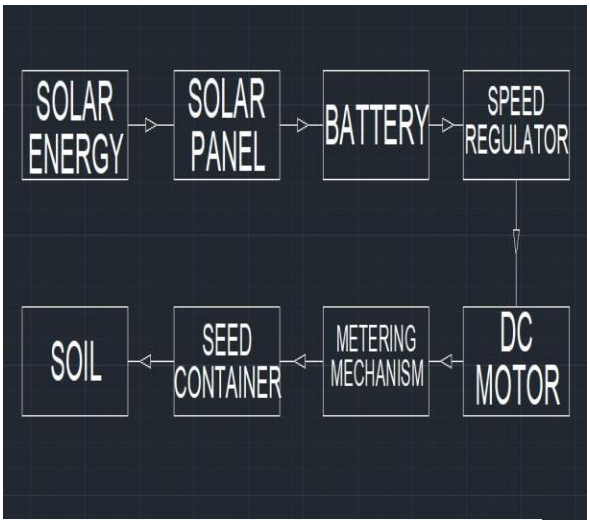


Fig1. Block Diagram

First a seed drill is prepared for accurate metered seed sowing. For this, we have used materials such as GI sheets, MS bars etc. A hopper is made out of GI sheet for collection and storage of seeds. The bottom end of hopper is cut for a slot for attachment of metering mechanism. The metering mechanism, which consists of a toothed gear for seed distribution is then mounted on a shaft and constrained by bushes which are attached to MS bars for constraining any other movement. The shaft is used to transfer the rotary motion to the mechanism, it also allows the mechanism to perform some adjustment in order to compensate with the diameter of the seed.

Now, one end of shaft is connected to sprocket, while as other end is kept free for rotation. Pins are mounted on shaft to limit the linear motion of the mechanism and allowing to only rotate around its axis. A chain drive is given to the sprocket, where one end is connected to the mechanism shaft while the other end is attached to the power unit. The power unit comprises of a geared DC motor (Specifications described below), which is connected to a smaller sprocket via Arbor. A battery connection is provided to the motor, and the battery is then charged with a solar panel. The motor and battery are attached in series whereas the solar panel is jump charged onto the battery. A speed/flow regulatory circuit is connected between the battery and motor, (also connected in series) for regulation of motor according to the need of user. At the bottom of the seed drill, a wheel base is provided for movement and balancing, along with a seed sowing system, where seed is penetrated into the soil for plantation.

IV.WORKING

To harvest the solar energy, we have installed a solar panel which converts the heat energy into electrical energy and supplies it to the battery, the battery charges by the electrical energy produced by solar panel. The electrical energy/power is then transferred to the motor via speed regulator, for operation of metered seed sowing system. The motor shaft runs the smaller sprocket which transfers motion to larger sprocket via chain drive. This results in rotation of the drive mechanism shaft, which runs the seed sowing mechanism and regulates the flow of seeds. The sowing is regulated by controlling speed at which the drive shaft rotates. Higher speed will result in faster rotation, which will then result in less spacing between two seeds sown, slower speeds means longer distances between the two seeds sown. The whole mechanism can be shut down and regulated by operating buttons on the handle for precise control of sowing by farmer/operator. The tilling mechanism at the bottom ensures that the seed is sown at desired dept and then soil is covered on it as the machine passes through.

V.HARDWARE

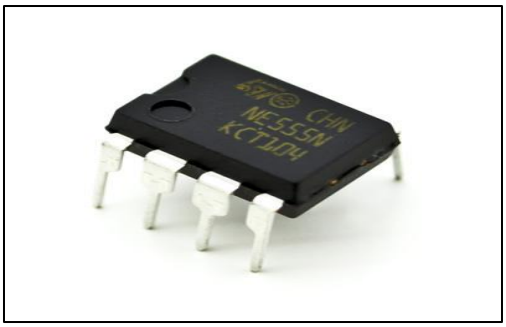


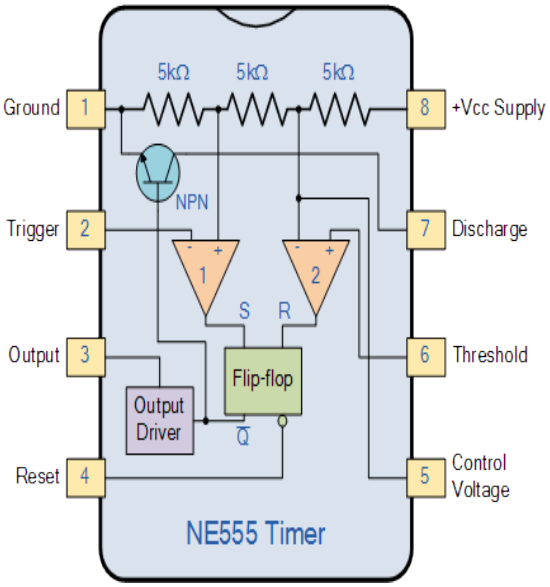
Fig. 555 Timer IC

555 Timer oscillator is commonly called as "555 Timer". The basic 555 Timer IC have internally connected three 5KΩ resistors which it uses to generate to comparators reference voltages.

The cost of 555 IC is very low. It is popular and useful precision timing device. It can be act as a simple timer to generate single pulse or long time delays, or as relaxation oscillator producing a starting of stabilized a waveform of varying duty cycle from 50 to 100%

The 555 timer IC is stable 8-pin device. it is either operated as a very accurate Monostable, Bistable or Astable multivibrator.

Pin diagram of 555 Timer IC is shown below:



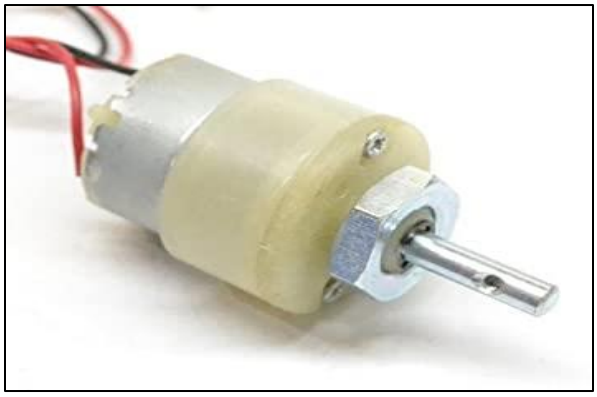


Fig. DC Motor

The above figure shows the DC motor, which is operated at 12volt - 24volt. The current passing through the motor is 3.6 amphare and base of this DC motor is 3600 RPM. The gear box to the motor is 10 – 12 RPM. It is depending upon load output RPM. The shaft dia of the motor is 6mm.

Fig. Battery

A 12V – 24V heavy duty battery is used in the system to store the energy and power supply to the machine. It is a rechargeable battery. The initial current is less than 0.39A

Fig. Solar Panel

A 10 W heavy duty aluminum framed solar panel is using for charging the 12V battery. The size of solar panel is 285*350*22 mm.

VI.CONCLUSION

We have studied about the project, solar operated electronic seed-drill with seed flow regulator machine. The main target of this system is sowing the seeds automatically using the machine. The seeds are sowed in a correct way. For proper germination of seeds, the agricultural and climatic conditions play a very important role. Using this method of sowing seeds labour requirement reduces and also it reduces the wastage of seeds. This machine will help the farmers to do farming more easily and effectively. This project can also be implemented for other kind of crops like fruits, paddy, sugarcane etc. In this paper we tried to solve the problems of farmers in their day to day work in the agricultural fields. The conventional method of

farming need more man power and still the efficiency is less. So with the help of this machine we can increase the efficiency and reduce the man power and save money.

REFERENCE

[1] SAHAY (1990), Principals of Agricultural Engineering (2005), Volume 1, Text book published by Jainbrothers, New Delhi, India.
[2] Senthilnathan N, Shivangi Gupta, Keshav Pureha and Shreya Verma "Fabrication and Automation of Seed Sowing Machine Using Iot'' International Journal of Mechanical Engineering and Technology. Volume 9, Issue 4, April 2018, ISSN Print: 0976-6340 and ISSN Online: 0976-6359.
[3] Pradip S. Gunavant, Sarfraj J. Mulani, Vishal N. Gandhe, Gurunath Shinde and Vinayak D Yadav "Farm Mechanization by using Seed Planting Machine'' International Advanced Research Journal in Science, Engineering and Technology, Volume 4, Special Issue 1, January 2017.
[4] Dr. HAJILAL M.S Department of Farm Power Machinery and Energy (FPME) Kelappaji college of Agricultural Engineering & Technology, Thavannur.
[5] Dr. JAYAN P.R, Associate Professor. Kelappaji collegeof Agricultural Engineering & Technology, Thavannur.
[6] Dr. SASIKALA D, Associate Professor Head of the Department of Irrigation and Drainage Engineering (IDE). Kelappaji college of Agricultural Engineering &Technology, Thavannur.
[7] Dr. P K SURESHKUMAR Associate Professor Dept.of Ag.Engg College of Horticulture, KAU Vellanikkara,Thrissur.
[8] International Journal of Emerging Technology &Research Volume 1, Issue3,Mar-Apr, 2014(www.ijetr.org) ISSN (E): 2347-5900 ISSN(P): 2347-6079 "Automatic Seed Planter Punching Type"