RF Controlled Solar Seed Sowing Machine

Thenmozhi Devaraj 1*, Sakthiya Ram Shankar Raja 2, Madhumitha Janarthanan 3

1 Under Graduate Scholar, Department of EIE, Bannari Amman Institute of Technology, Sathyamangalam.
2 Assistant Professor, Department of EIE, Bannari Amman Institute of Technology, Sathyamangalam.
3 Post Graduate Scholar, Department of EIE, Bannari Amman Institute of Technology, Sathyamangalam.

Corresponding author’s email address: thenmozhi.ei17@bitsathy.ac.in

Abstract. Radio Frequency based solar controller is designed for seed sowing machine. Recently, farmers facing many economical issues, so they move in search of some other jobs. This reduces skilled labours in agriculture field. But agriculture is the back bone of our country, so we need to introduce some efficient methods to improve farming. In this Seed sowing machine, based on the instruction given the machine will operate in three modes like slow, medium and speed. Arduino is used to control the machine. Sowing, Spreading and Ploughing mechanisms can be done by using this machine. Using solar panels can improve the efficiency. The controller is designed to make the machine to drive in slant surface of 45 degree and also sense obstacles situated front and back of the machine. The distance between the two seeds will be adjusted using the motor in the machine. This type of machine will be more useful in agriculture field. Further improvements like watering based on the soil moisture will be made in future.

1. Introduction

In today’s scenario, modern agriculture uses many modern types of machinery. Mostly the modern machinery is highly suspension based drives. Mostly the modern machines run with IC engines, but this seed sowing machine runs with the help of batteries and motors. Recently, the use of fuels powered vehicles are being reduced due to increase in price of fuels. And it is sure that the future world depends on electric vehicles. The main advantage in solar seed sowing machine is it is operated in electricity. Electric vehicles are evolving recently, but they are not much capable of the mechanical powered machines. Our main objective is to make an electric machine with the little greater efficiency than the mechanical powered machines. Self-charging facility is also added with this machine. The main drawback of the agriculture is unavailability of labours. Man power is reduced by using this type of machine. It can be operated by using RF control. The machine spreads and sows the seed as per our choice. Hence the labours for seeding the seeds can be reduced. The installation cost of this machine can be little high, but the cost of maintenance is low. It is efficient than the other modern machinery used in agriculture. This machine can act as a sowing machine as well as tractor. It is suitable of any type of agricultural lands.

Kyada A R, Patel D B, focused on the very simple requirements for the small scale cropping machines; they should be flexible for use in unique farm operations that are suitable for small farms, simple in layout technology [1]. A manually operated row planter, evolved to enhance the planting
efficiency. It also decreases the hard work that concerned in guide of planting technique. Seed planting is likewise feasible for specific length of seed at variable intensity and space between two seed.

D. Ramesh, H.P. Girishkumar, targeted at the primary goal of sowing operation is to sow the seed and the fertilizer in preferred rows at required intensity. It also involves the seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed [2]. This enhanced spacing between rows, spacing between seeds and intensity of seed placement range between crops. Additionally it includes unique agri-climatic situations to reap most appropriate yields. The Seed sowing machine is one of the important device that plays a wide use in agriculture discipline.

A. A. Wankhede et. al, focused on the seed sowing mechanism and fertilizer placement that are the very primary activity in the farming. They also added the numerous new techniques of sowing seeds and fertilizer placement in India [3]. Here is a comparison between the traditional techniques of sowing seed and newly designed machine which may carry out the simultaneous operations in very small time interval and has various benefits. The right seed metering tool is used to maintain the intensity of seed sowing and distance among seeds. The process of farming by the use of conventional strategies may take extra time and labour work for sowing seed and fertilizer placement.

2. Rocker Bogie Mechanism

This mechanism has two arms with three wheels and connected by a movable joint. Basically it is used in the space rovers to overcome the hard and rough terrain. The main advantage in the system is it brings efficiency of the mechanically powered machines by its architecture. Hence it can run at any type of agricultural lands. This can cross major type of obstacles and run at a slant land of 45 degree easily. Figure 1 shows the Rocker-Bogie System

![Figure 1. Rocker-Bogie System](image)

3. RF Controlled Seed Sowing Machine

The RF transmitter first transmits the signals to the RF receiver. The receiver feeds the output of processing unit. The processing unit first checks whether the commands to the LCD display is given or not. If the commands are given then the commands passes to the control units which controls the machine [4]. According to the commands given, the sowing and driving systems will works. The power supply is given by lithium ion battery which gets its supply from solar panel [5]. The block diagram of RF controller seed sowing machine is shown in Figure 1

![Figure 2. Block diagram of RF controller seed sowing machine](image)
In order to control the machine, we need a micro controller to perform some kind of operation. The operating voltage is 7 to 12 volts. The current limitation for I/O pins is 40mA. In this machine the controller used is Arduino mega 2560. The user interface is simple in this board and hence this board is used in this machine. This controller can be handled easily and data can be burned easily. ATmega2560 IC is used in this board. The memory used in this device is EEPROM (Electrically Erasable Programmable Read Only Memory) which is also called as E2PROM. Instead of Arduino Uno, it has more number of pins to interconnect with the circuit components [6]. The required oscillation is produced by the crystal oscillator (16MHz), to process more number of operations at a time. It has 54 digital I/O pins out of that 14 can produce the PWM (Pulse Width Modulation) and 16 analog input pins. The Circuit diagram of RF controller seed sowing machine is shown in Figure 2.

![Figure 3. Circuit diagram of RF controller seed sowing machine](image)

Driver is mainly used to drive the motors because the operating voltage of the controller is 5 volts but the motor requires 12 volts to drive. The speed of the motor is varied according from usage with the help of the driver using PWM pulse generated by the controller. The operating voltage is 40 volts and high operating current up to 3A. It has two inbuilt H-bridge. Table 1 shows the H-Bridge Pulse Direction

| Enable | Input 1 | Input 2 | Operations   |
|--------|--------|--------|-------------|
| 1      | 0      | 0      | Stop        |
| 1      | 0      | 1      | Anticlockwise|
| 1      | 1      | 0      | Clockwise   |
| 1      | 1      | 1      | Stop        |

A RF module is a device used to transmit or receive radio signals between two electronic devices. It uses an optical communication or through radio-frequency communication to communicate with another electronic devices without the use of wire. Normally, RF communication needs a transmitter and a receiver. The main applications of RF module are smart sensor application, wireless alarm, wireless data transmission, area paging and home automation systems. The 433.92 MHz, 915 MHz and 2500 MHz are commonly called industrial, scientific and medical (ISM) radio bands. The RF module can communicate with defined protocols for communications such as Wi-Fi, z-wave and Proprietary protocols. Radio frequency module mainly consist of a printed circuit board, antenna, transmit or receiver circuit and serial interface to host processor.
4. Working of RF Controlled Seed Sowing Machine

In this seed sowing machine the working is controlled by means of Bluetooth. There are two modes take place in this operation known as sowing & spreading. Each operation has 3 modes of speed variations such as slow, medium and fast [7]. We can control the mode of operation using the LCD display. If the control is given to the LCD display, then the machine starts working. If the commands are not selected in LCD display the RF command is not accepted. A tank is kept behind the machine which contains the seeds to be sowed. It is called sowing tank. If sowing operation is selected, the motor at the bottom of the sowing tank runs according to the command given in the LCD display. By varying the speed of the motor the distance between the seeds is varied. A bottle like tank called spreading tank is kept at the back of the machine in which the seeds to be spread is stored. In case of spreading the seeds, the spreading mode is selected in LCD display. In sowing, the speed of the motor below the spreading tank can be varied to vary the distance between the seeds. If the seeds filled in either sowing tank or spreading tank is finished the machine stops working. The machine gets the supply from the solar panel. The strip behind the machine closes the seed after sowing. The strips are provided also for plowing purpose. The when the machine stops working, it is intimated through a buzzer sound which is to be added later. The main concept of this vehicle is to work as efficient as the mechanically powered machines. And the world is facing scarcity in fuels for vehicles. This can be balanced by the electric vehicles [8]. The battery can be recharged many times. As the Rocker-Bogie mechanism is used here the machine can run on any land surfaces easily like a mechanically powered machine. Solar panel is used for self-charging purpose [9] [10].

![Figure 4. RF Controlled Seed Sowing Machine](image)

5. Result and Discussion

The main aim of the Seed sowing machine is to sow the seed within the given distance. The distance between the two seeds will also be given in the data. Based on the given data the machine will sow seed correctly. 15 Iterations were made and there was the difference between the distance given in the program and distance of the seeds sowed by the machine. After fine tuning the program the final results obtained. Table 2 shows the distance between two seeds given and the distance that the machine sowed between two seeds.

| Iteration Number | Distance Given (cm) | Distance obtained (cm) |
|------------------|---------------------|------------------------|
| 1                | 10                  | 9.25                   |
| 2                | 10                  | 9.7                    |
| 3                | 10                  | 10                     |
| 4                | 10                  | 10                     |
| 5                | 15                  | 15                     |
The different values of distance can also be given based on the area and space we required. In some agriculture field space will be given for the water flow. That can also be incorporated in the program, by giving some larger distance after particular rows of seeds.

6. Conclusion
As we know Agriculture is the back bone of India, this machine helps a lot for it. It is also one of the Eco-friendly machines that help farmers to provide better cultivation by reducing the requirement of manpower, time and the cost of cultivation. This would be very helpful for farmers as there is less number of skilled labours. The installation cost of this machine may be high, but the maintenance cost is low. Hence this is worth of money and also efficient. Further improvements can be made by adding watering the land based on the soil moisture in future.

7. Reference

[1] Kyada, A R, Patel D B 2014 5th International & 26th All India Manufacturing Technology Design and Research Conference pp 590 1-7
[2] Ramesh D, Girishkumar H P 2014 International Journal of Science, Engineering and Technology Research 7 pp 1987-92
[3] Wankhede A A et. al 2017 International Journal for Engineering Applications and Technology 3 pp 126-129
[4] Ramesh M V, Vijay Kumar G 2019 International Journal of Innovative Technology and Exploring Engineering 9 pp 4026-31
[5] Anuja Mohalkar et. al 2017 International Journal of Innovations In Engineering Research And Technology pp 61-64
[6] Roshan V Marode et. al 2013 International Journal of Mechanical Engineering And Robotics Research 4 pp 422-429
[7] Swetha S, Shreeharsha G H 2015 International Journal of Advanced Agriculture Sciences and Technology 4 pp. 67-71
[8] Ajit G D, Kulkarni VA 2013 ITSI Transactions on Electrical and Electronics Engineering 3 pp 51-56
[9] Anshuman Kumaar Singh et. al 2019 International Journal of Engineering and Advanced Technology 8 pp 17-22
[10] Adityakawadaskar S S, Chaudhari 2013 International Journal of Pure and Applied Research in Engineering and Technology 5 pp 180-186