

Multipurpose Agricultural Equipment

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Abstract— This research work is aiming to automate the process of digging and seed sowing at proper distance and depth. This advancement in technology will not affect the quality of soil and increase the efficiency of getting crop. Now a days the availability of labor is a major problem faced by farmer. By using this machine the sowing can be done row by row and distance will maintain. So this machine reduces their efforts and reduces the cost of seed sowing process with great efficiency and accuracy with reduction in labor requirement.

Key words: Agriculture, Mechanical Hardware, Battery Operated Wheels, Arduino AVR328Ic

I. INTRODUCTION

Farmers today spend a lot of money on machines that help them decrease labour work and increase yield of crops. There are various machines that are available for ploughing, however these machines have to be manually operated to perform the required operations and moreover separate machines are used for every functions. The yield and profit returns from employing this equipment are very less as compared to the investment. Another issue is the growing demands of the world's population. Automation is the ideal solution to overcome all the above mentioned shortcomings by creating machines that perform more than one operation and automating those operations to increase yield on a large scale. All kinds of agricultural robots have been researched and developed to implement a number of agricultural productions in many countries, such as harvesting, planting, grafting, agricultural classification etc. And they gradually appear advantages in agricultural production to increase productivity. Autonomous agricultural robots are an alternative to the tractors found on fields today. Cultivation tasks like seeding, spraying, fertilizing and harvesting may be performed by autonomous agricultural robots in the future. To reach a full utilization the agricultural robot needs to be a vehicle with some basic capabilities and the possibility to support multiple applications. In the current generation, man power shortage is a major problem specifically in agricultural sector and it affects the growth of developing countries. In India at most 70% of people are dependent on agriculture. The revolutionary invention in agriculture system is becoming an important task because of rising demand on quality of agriculture products and lack of labour availability in rural farming areas. Today agricultural robots can be classified into several groups: harvesting or picking, planting, pest control, or maintenance. It is unlike the robots that used in factories for building cars. Robots that are used in factories don't have to deal with uneven environmental conditions or changing in environmental conditions. Commonly digging operation on the field is done by using bull or by tractor and the method of sowing the seeds are by hand. Later, the seeds are sowed through

holes in bamboo attached to a plough. For example, sowing seeds in small areas they employ dibbling method i.e., making holes or slits by a stick or tool and dropping seeds by hand is practiced. Later, the multi row traditional seeding devices with manual metering of seeds are quite popular with experienced farmers. It is a large time consuming approach. Agricultural robots are an alternative to the tractors found on fields today Agriculture is humankind's oldest and still important economic activity, providing the food, feeder, fibre and fuel necessary for our survival. The current trend in agricultural robot development is to build more smart efficient machines that reduce the expense of the farmer while still providing one more services and higher quality which is precisely what we have done in this paper. Development of a robot that can perform automated ploughing and seeding operation can be manually navigated by the farmer and stabilizes the humidity in the environment. Robotics and automation can play a significant role in enhancing agricultural production needs. We can also implement with the advancement in sensors and control systems that allow for optimal resource and integrated disease and pest management.

A. Component Details:

- 1) Motor
- 2) Battery
- 3) LCD
- 4) Wheels
- 5) Arduino AVR328Ic

1) Motor:

A motor is a device that converts direct current (electrical energy) into mechanical energy. Two dc motors are used for driving the wheels connected to the robot.

2) Wheels:

The wheels of the machine is made with the material C45. Four wheels are been in used out of which the front two wheels are universal wheels of 100 mm diameter which are free to direction and the rear wheels consist of diameter 330 mm.

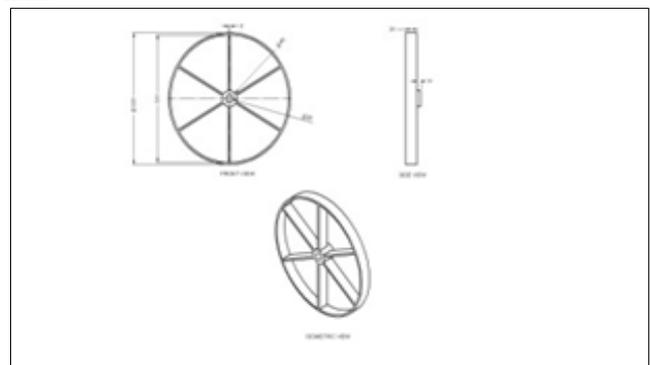


Fig. 1: wheels

3) **Battery:**

A 12v dc battery is being used for our autonomous robot used for driving the dc motors. 5 volt supply is being used by the controller, LCD and for driving the relays.



Fig. 2: Battery

4) **LCD:**

The LCD receives the control signal from the microcontroller, it decodes the control signal and performs the corresponding actions on the LCD.

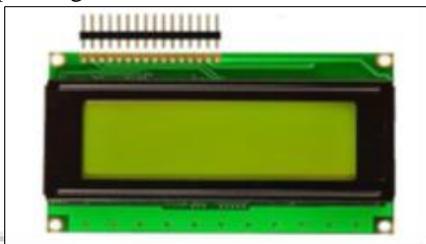


Fig. 3: LCD

B. **Objectives:**

- 1) The main objective of this project is to design and fabricate smart seed sowing machine which can automatically sow seeds in the field based on variable pitch which is given as input by the farmers using the keypad present on the machine.
- 2) Make this smart machine economical and user friendly for Indian farmers to operate.
- 3) To implement functionality of adding the number of seeds to be sowed using keypad.
- 4) To make this vehicle solar powered so that the farmer need not worry about charging.

II. WORKING

The machine consist of battery which powers the rear wheels through chain mechanism. The shaft is connected to the wheels and the hopper which stores the seeds within it, the seeds drops after some time interval depending upon the rpm of the machine. Solar panels has been used which charges the battery and the obtained power is used for the machine to perform work. Each panel produce power of 9 watt hence total of 18watt of power is transferred to the machine. The plougher has been placed at the front side of machine which helps to dig the land and seeds are sown. The plougher has given the adjustment so that it can move upward and downward when it is not in use. The Arduino AVR328Ic is used to connect the Bluetooth device to run the machine.

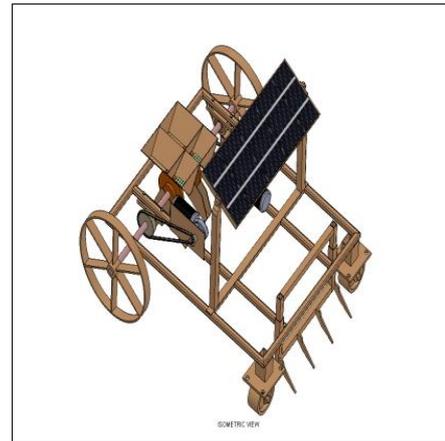


Fig. 4:

SR.NO	PARAMETER	MANUAL	TRACTOR	SEED PLANTER MACHINE
1	Pollution	No	More	No
2	Time Required	More	Less	Less
3	Wastage of seed	Moderate	More	Less
4	Required energy	High	Very high	Less
5	Man power	More	Moderate	No
6	Sowing Technique	Manually	Manually	Automatic
7	Distance between seed	Not fixed	Not fixed	Fixed

A. **Measurements:**

- Frame Dimension - 800*600 mm
- Solar Panel Dimension - 480*200 mm
- Pitch – 3.65 mm
- Shaft Diameter – 20mm
- Bearing used – P20
- Teeth – 33*12
- Front Wheel Diameter – 150 mm
- Rear Wheel Diameter – 330 mm
- Height of Solar Panel from Frame – 200 mm
- Digger nails – 360/4 mm
- Hopper Dimension – 115*135 mm

III. FUTURE SCOPE

The developed robotic vehicle can be a full-fledged example of agricultural automation. However since the field of agriculture is very large, further improvements can be done in this projects to make it smarter and multipurpose.

This vehicle can be added with other sensors such as soil pH sensors and temperature and humidity sensors which are other factors in farming. The vehicle can be added with mechanism to remove the weeds, thus the single vehicle can be used for sowing as well as preparing the soil.

Also addition of rainfall sensors can be used to detect and calculate the amount of irrigation to the crops in

addition to the moisture sensor. Thus this platform which we have fabricated in our project can be used to expand the flexibility of the project by adding more application to the vehicle and also leaves the space for future research.

IV. ADVANTAGES

- 1) This mechanism reduces effort of person to avoiding the blockage of seed.
- 2) This mechanism can be easily implemented on various types of seed drilling machine.
- 3) The empty space produce due to uneven seed feeding is minimize by this mechanism.
- 4) The seed placement is uniform over the entire period of time.
- 5) Increases the productivity of farm.

V. DISADVANTAGES

- 1) Due to greater soil moisture and density, then difficulties occurs in mechanism.
- 2) More Maintenance is required.

VI. CONCLUSION

Hence after comparing the different method of seed sowing and limitations of the existing machine, it is concluded that the multi-purpose seed sowing machine can perform the various simultaneous operations and hence saves labor requirement, labor cost, labor time, total cost of saving and can be affordable for the farmers.

- 1) Productivity of seed is increases.
- 2) Problem of blockage is solved by the mechanism
- 3) Empty space produced due to uneven seed feeding is minimize by the mechanism.
- 4) If the uneven seed is then again we have to done sowing this have take so much time and efficiency due to this mechanism this problem is minimizes.

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