

Review paper on smart automated multipurpose agriculture robot

^{#1}Namrata Lakshman Govekar, ^{#2}Akshay Anil Bhosale,
^{#3}Vipul Annappa Pote, ^{#4}Rupesh Ramesh kankekar



¹govekarnamrata123@gmail.com

²bhosaleakshay013@gmail.com

³vipulpote007@gmail.com

⁴rupeshkankekar633@gmail.com

^{#1234}Mechanical department, Shivaji university

SGMCOE Mahagaon, Tal- Gadhingaj, Dist- Kolhapur, India

ABSTRACT

India is the country of villages. This being said the major occupation of majority of villages in India is farming. There also have been changes in agricultural technology and practices with recent advancements in engineering and technology. But people still follows the old practices due to the lack of money as well as high cost of advanced agricultural equipment's.

According to a study made by ISAE, it is found that pangs, axes, hoes, and shovels are the main farm tools used by the farmers for agricultural operation. These tools are conventional, time immemorial and no improvement in agricultural practice is adopted.

Seed sowing is the basic operations needed to get better revenue from agriculture. Manual sowing should not give adequate spacing between row to row. Manual sowing is very time consuming process and costly. Hence, it is a necessary for appropriate seed drill for sowing. Indian farmer perform agriculture mostly with manual operation. The pain involved in doing each and every manual operation related to agriculture. Thus this project deals with design and fabrication of a smart Automated Robotic vehicle for Indian farmers.

Keywords— seed, sow, furrow, micro-controller, display, humidity sensor etc

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I. INTRODUCTION

The invention in agriculture system is a major task. Income per capita of India is low. As the rising of demand on quality of agriculture products and declining availability of labour in rural farming areas. The designed system is automated seed sowing, insecticide sprinkler, humidity detector agriculture robot using microcontroller.

Agriculture development does not have sufficient labour to trade off latest technology. To give an elucidation to these problems, a sensor guided robot for digging, precise seed positioning and sowing has been proposed to minimize the efforts of human and also to increase the yield from agricultural field.

II. TRADITIONAL METHODS OF SEED SOWING

Farmers in India perform agriculture mostly with manual operation. The pain involved in doing each and every operation has to be reduced by the way of introducing simple technology which is not only user friendly to farmers

but also is economical for farmers to adopt. Thus this project deals with design and fabrication of a smart Automated Robotic vehicle for Indian farmers.

The following are the three different types of seed sowing:

A. Broadcasting

A farm field is initially prepared with a plough to a series of cuts which known as furrows. The farm field is then seeded by throwing the seeds over it, that method known as manual broadcasting. The result was a field planted roughly in rows i.e. not with proper dimension, but having a large number of plants. When the seeds are scattered randomly by human on the soil, the method is called broadcasting.

B. Dribbling



Fig. 1

Drill, sowing and dribbling (making small holes in the ground for seeds) are better method of sowing than broadcasting. Once the seeds are put in the holes, they are then covered with the soil. This saves time and labor and prevents the damage of seeds by birds.

C. Another method of sowing the seeds

This method is done by using a simple device consists of bamboo tube with a funnel on it attached to a plough. As the plough moves over the field the tube attached to it leaves the seeds kept in the funnel at proper dimensions i.e. spacing and depth. The plough keeps making furrows in the soil in which the seeds are dropped by the seed drill. The above sowing methods have the some disadvantages.

D. Multipurpose seeding equipment



Fig. 2

The working principle of this machine is very simple and requires only one man to operate. This equipment consists of container with cylindrical shape in which the seeds can be stored. The container is mounted on the four wheeled carrier assembly. The wheels made up with polymer material, container having a metering plate with easily fissionable with Allen keys, metering plate rotate in container, bottom of the container having a two hole and metering plate has number of holes depend on size of seed. The plate will rotate in container when the bottom holes of container and meter plate hole coincide seeds will flow through pipe to soil. Here the metering plate gets rotating motion by bevel gear assembly and the bevel gears get the motion by rear wheels with the help chain and sprocket assembly.. It is a double row-seeding device suitable for sowing different crops. Seeding is accomplished by just pushing the device in a pre-established furrow. The sowing operation is to put the seed in desired depth and seed to seed spacing, when the machine is pushed, with the help of metering plate the seeds are feed in to the ground at correct rate and distance. Here the metering plate rotates in anticlockwise direction and which get a rotating motion with the help of rear wheels connected through chain sprocket, chain and bevel gear assembly. The arrangement made in such a way that we can control the depth of sowing. With the help of this machine the formers can save lot of labor cost.

E. Mechanical factors which affect the seeds

1. Seed damage during metering.
2. Uniformity of depth of placement of seed.
3. Uniformity of distribution of seed along rows.
4. Transverse displacement of the seed from the row.
5. Prevention of loose soil getting under the seed.
6. Degree of soil compaction above the seed.

F. Disadvantages of traditional methods

1. No control over the depth of seed placement.
2. No uniformity in the distribution of seed placement.
3. Loss of seeds.
4. No proper germination of seeds.
5. During khariff sowing, Placement of seeds at uneven depth may result in poor emergence because subsequent rains bring additional soil cover over the seed and affect plant emergence.
6. More labor requirement.
7. Time required for sowing is more.

III.REVIEW

Agriculture is the backbone of the Indian economy and it will continue to remain so for a long time. It has to support almost 17 percent of world population from 2.3 percent of world geographical area and 4.2 percent of world's water resources.

S. Chandika^[1] reviewed that lack of man power has resulted in spending a lot of money in seed sowing, which is not only time consuming but also not accurate.

Kawadaskar^[2] The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and spacing, cover the seeds with soil and provide proper compaction over the seed. The recommended row to row spacing, seed rate, seed to seed spacing and depth of seed placement vary from crop to crop and for different agricultural and climatic conditions to achieve optimum yields and an efficient sowing machine should attempt to fulfill these requirements.

Mahesh R. Pundkar^[3] stated that the seed sowing machine is a key component of agriculture field. high precision pneumatic planters have been developed for many varieties of crops, for a wide range of seed sizes, resulting to uniform seeds distribution along the travel path, in seed spacing.

Singh (1971)^[4] revealed that by using a seed drill for wheat crop there was an increase in yield by 13.025 percent when compared with the conventional method, it also revealed that by using a seed drill for wheat crop, a saving of 69.96 per cent in man-hours and 55.17 percent in hillock hours was achieved when compared, with the conventional method.

Umed Ali Soomro^[5] in Pakistan has evaluated three sowing methods and seed rate in a four replicated RCBD method and concluded that drilling method of sowing at seed rate 125 kg/ha is optimal for yield and quality of wheat grains, because the said sowing method and seed rate distribute seed uniformly and desired depth which provide appropriate depth for seed germination and crop establishment.

Thus considering the research made in the field of seed sowing this project aims at taking the research to further level by development of solar powered automated robotic vehicle for Indian Farmers.

IV. RECENTLY PROPOSED SYSTEM

Proposed system is based on mechatronics. It is automated multipurpose robot. The invented system is eco-friendly because it works on solar energy. Features of these robot are seed sowing, insecticide sprinkler, and humidity detector. It consumes less time than other as well as light weighted. It is more efficient than other systems.

It can be also used fertilizer sowing instead of seed. Insecticide sprinkler can be used as water sprinkler. By using motion sensors bird scared application can be implement. Machine can be control by remote. Adjustable hopper.

Automated Robotic Vehicle. The farmer initially inputs the pitch at which the robot is expected to sow the seed by using a numerical keypad which is provided on the robot and initiates the seed sowing sequence. The data input is given to the microcontroller mounted in the robot which processes the input data. Depending on the pitch the robot moves through the distance which is specified in the pitch. The rotary encoders is used to calculate the distance. When the robot covers the respective distance the robot stops to sow the seed. When the robot stops the microcontroller signals the seed sowing mechanism to sow the seed at required pitch.

Also this smart vehicle is used in different modes, as and when required thus making a complete smart system for Indian farmers. This vehicle has an insecticide spraying mechanism, which can spray the insecticides when required. When activated, the insecticide spraying system sprays the insecticides from the tank provided on the robot.

This vehicle is made smarter by incorporating the humidity monitoring system. There is probe to determine the soil moisture content, which can be inserted when required to determine the moisture of the soil and can be displayed onto the display provided on the robot.

We also can plan to incorporate the bird scared system to scare away the birds and other animals which come to eat seeds and crops in the absence of the farmers. This system continuously monitors the field for birds, and scares away the birds, thus protecting the crops and seeds.

V. OBJECTIVES

- 1 The main objective of this project is to design and fabricate a smart **seed sowing robotic** vehicle 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 robot.
- 2 To make this vehicle **Solar powered** so that it can be charges using the solar energy.
- 3 To incorporate the **Insecticide spraying feature** in the robotic vehicle which permits it to be used to spray insecticides.
- 4 To add **Soil moisture monitoring** system which displays the soil moisture content to the farmer using the display provided on the robot.

VI. CONCLUSION

Innovative Seed sowing equipment has remarkable influence in agriculture. By using innovative seed sowing equipment we can save more time required for seeding process. And also it reduces lot of laborer cost. It is very helpful for small scale formers.

A. Advantages

1. Reduces the effort on farmers by implementing seed sowing automation.
2. Smart pitch is maintained thought the field which can be varied using keypad.
3. Gives humidity and temperature output, which can be used to decide seeds to sow
4. User friendly and can be easily operated by Indian farmers
5. Solar powered, hence doesn't require charging
6. Safe

B. Disadvantages

1. Needs water proofing to operate in rains.
2. Some initial investment.

C. Applications

1. For seed sowing in farm.
2. Insecticide sprinkling purpose.
3. Measurement of humidity.

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