Seed Sowing Using Robotics Technology

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Abstract—In India, near about 70% people are dependent upon agriculture. So the agricultural system in India should be advanced to reduce the efforts of farmers. Various number of operations are performed in the agriculture field like seed sowing, weeding, cutting, pesticide spraying etc. Very basic and significant operation is seed sowing. But the present methods of seed sowing are problematic. The equipments used for seed sowing are very difficult and inconvenient to handle. So there is a need to develop equipment which will reduce the efforts of farmers. This system introduces a control mechanism which aims to drop seeds at particular position with specified distance between two seeds and lines while sowing. The drawbacks of the existing sowing machine will be removed successfully in this automatic machine.

Keywords:-Agricultural Operations, Agricultural Machinery, Agricultural Equipment, Seed Sowing Techniques, Seed Sowing Mechanism,Farming System, Robotics Technology

I. INTRODUCTION

Our whole economy is based on agriculture. Agricultural field involves the effective production of food, feed, fiber, and other goods for humans and animals [7].Also agriculture includes operations like production of cut flowers, timber, fertilizers, animal hides, leather, and industrial chemicals [7].Heavy material handling is required in the farming operations. For example,in vegetable cropping, handling of heavy vegetables in organic farming, handling of heavy compost bags. As compared to other fields, globalization and development in agriculture field is less. So, it is necessary tomake some advancement in this field. Today's agricultural field demands to find new ways of agricultural operation to improve performance efficiency. In the field of agriculture various problems are faced by the farmers in the operations like seed sowing, pesticide spraying,weeding.Also the equipments used to perform the operations are very heavy. Due to migration of humans in the cities the labour problem occurs.

Nowadays robotics technology plays a paramount role in all sections like medical field, industries and various organizations. In other countries robots are used to perform different operations in the agricultural field.We can make the use of available technologies and the robotics technology in the farming system to reduce the efforts of farmers and also to reduce time, energy and required cost.

II. THEORY OF SEED SOWING:

In addition with seed sowing, multipurpose operations such as Leveling & Plugging are also needed. But many problems are faced by farmers during seed sowing operation, like proper adjustment of distance between two crops, distance between two rows.Seed sowing is very basic and paramount operation in the agricultural field. Nowadays seed sowing is done either manually or by tractors. Manual method includes broadcasting the seeds by hand. Sometimes method of dibbling i.e. making holes and dropping seeds by hand is used. Also a pair of bullocks is used to carry the heavy equipment of leveling and seed dropping. Another method of seed sowing is to use tractor in farms. The heavy equipments of seed storage and dropping mechanism are attached to the tractor to drop the seeds. A ground wheel is attached at the base of the seed sowing machine[3]. The power transmission system is used to transmit the motion of the rotation to the metering mechanism. The metering mechanism contains number of scoops to drop out the seeds from the hopper [3]. The seeds are then transmitted in the seed distributor pipes. Flexible and compatible pipes can be used to distribute seeds.With the help of tiller we can make the land smooth for sowing the seeds. The metering mechanism arrangement can be changed depending upon the nature and the type of seed. Thus we can perform sowing of the different kind of seeds.But these methods of seed sowing require more time & the man power.Using the present techniques problems of misalignment of distance between seeds and the rows of the seeds occurs.

Problems faced by the farmers during seed sowing:

- Low germination percentage leading to wastage of seeds.
- Creation of gap due to non-germination of seeds.
- Declination of total yield.
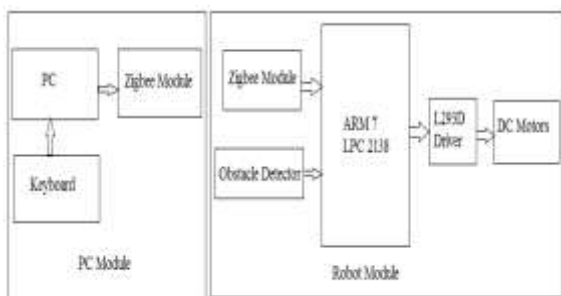- Scarcity of labour, demanding high wages

III. BLOCK DIAGRAM:

Figure 1. Block Diagram

IV. BLOCK DIAGRAM DESCRIPTION:

A) ELECTRONIC ASSEMBLY DESIGN:

The system includes two modules:
1. PC module
2. Robot Module

1. PC MODULE:

In PC module keyboard is used to provide the user input for the movement of the robot in the particular direction. Various instructions can be given from the PC to move the robot in forward, reverse, left and right direction. Zigbee module is used for the wireless communication between the PC module & the Robot module.

2. ROBOT MODULE:

Zigbee is used to receive the signal form the PC module & send the commands to the ARM. According to the instructions given by the user the robot move inforward, reverse, left and right direction to drop the seeds at a particular position. Four wheels are connected at the base for the flexible movement of robot. Two DC motors are used to drive the wheels connected to the robot. L293D is used to drive the DC motors. Obstacle detector sensor is used to detect different obstacle in the path of the robot. If any obstacle is detected in the path of the robot the information of the obstacle is sent to the user through wireless connection between zigbee and PC.
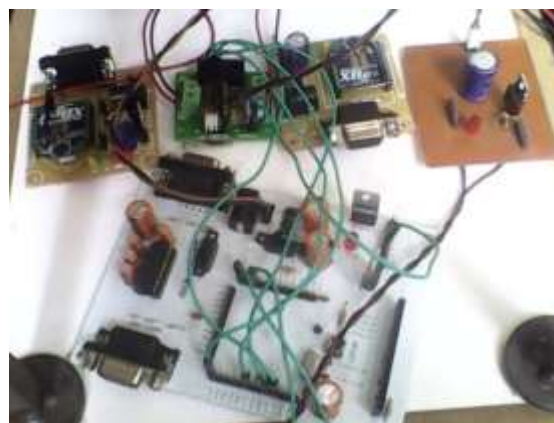

Figure 2. Electronic Assembly

B) MECHANICAL ASSEMBLY DESIGN:

It is the important part of the system. Main objective of the mechanical part is to design low cost seed storage and dropping mechanism which will drop the seed at a particular position.
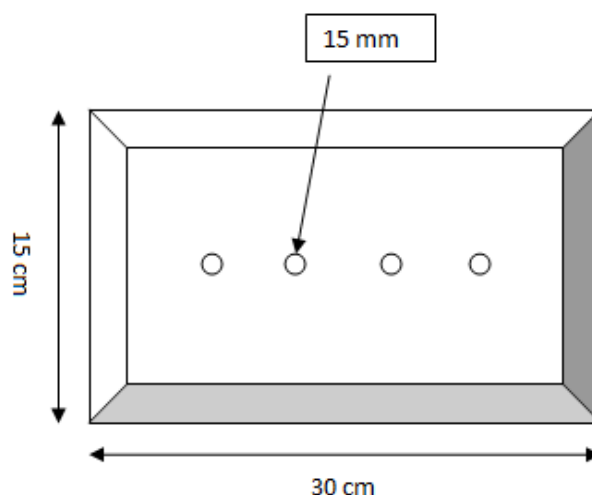

Figure 3.Mechanical Assembly Dimensions

For the mechanical assembly a tray type structure is designed. Dimension for the tray structure is 30×15 cm. For seed dropping four holes of 15 mm diameter are made. We can make the holes as per the requirement of the system. Four wheels arekept on the holes to block the seed so that seed dropping can be done at a specified time. A DC motor is connected to the wheel line to control the motion of the wheels as per the requirement. Four flexible pipes are connected to the wheels to drop the seeds at particular location. We can use additional pipes for large amount of seed sowing operation. Also we can make partition of the holes depending upon the types of seeds. Thus we can also drop different kinds of seeds as per the requirement.

Figure 4. Mechanical Assembly

Figure 6. Seed Sowing Robot

V. RESULTS:

Flash magic window based application is used to give instructions for the movement of the robot system with the help of keyboard.1,2,3,4 and5 are the instructions used for forward, reverse, left, right and stop movement of the robot respectively. 6,7 and 8 are the instructions used for clockwise, anticlockwise and stop movement of the motor attached to the top tray of mechanical assembly structure.

Figure 5. PC Module Results

VI. OTHER ALTERNATIVES FOR TECHNOLOGY

We can use camera for video interaction which will detect the obstacles during seed sowing. Smart robots can be used which will work automatically for sowing the seeds without use of human interaction. We can use various sensing technologies to advance the process of seed sowing. Various feedback sensors, motion sensors can be added for the excellent working of the robot.

VII. CONCLUSION

The system is beneficial to the farmers for the basic seed sowing operation. The mode of operation of this machine is very simple even to the lay man.. Low germination percentage leading to wastage of seeds can be reduced by the use of this system. Creation of gap due to non-germination of seeds can be avoided. Total yield percentage can be increased effectively. Labour problem can be reduced. As compared to the manual and tractor based sowing time,energy required for this robot machine is less.Also wastage of seed is less. So this system will be a better option for the farmers who want to perform the seed sowing operation in a well-organized manner.

VIII. REFERENCES

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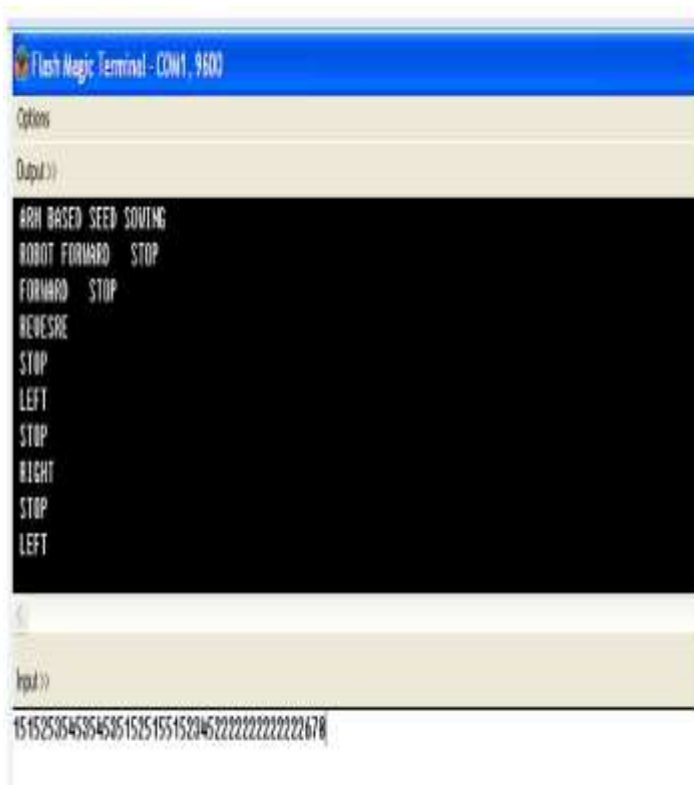
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