Seeding And Fertilizering agricultural robot

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Abstract- *One of the oldest forms of occupation isAgriculture. By using tools in the agricultural process it reduces the human effort. Important factors are that affect agriculture includes less holding area, shortage of seeds, fertilizers and labor and uncertainty of rain. The mechanism of agriculture refers to the use of tools or machines in the agricultural process that effectively reduces the human effort. Human interaction is also required to reduce the human efforts in agricultural process. The automation and robotics application in the branch of agriculture is at the booming stage. But researches have been done in this field to automate the process. In the present paper an effort is made for the design and developed the robot that can perform seeding and fertilizing process without any human interaction. The robot developed is capable of making a hole in the soil up to certain depth, placing the seed accurately and closing the soil. The process is controlled by a Arduino Board. The robot is developed to overcome the disadvantages in the traditional way of seeding. In which includes wastage of seeds, high payment of labor, minimum use of land etc. By using this agricultural robot in the field of agriculture it is possible to increase the overall efficiency of the farming process, avoid effects of labor shortage and reduced wastage of seeds.*

Keywords- Agriculture Robot, Seeding, Displacer, Seed Container, Arduino, solar panel.

I. INTRODUCTION

Farmers are the backbone for food production. Farmer plays a very important role in India's economy. The need of the automation in the field of agricultural sector is mainly due to the increased need of agricultural products, increased population and shortage of labor. In India, about 65% people are dependent upon agriculture to earn livelihood as shown in the figure (Fig. 1). But automation in agriculture is lesser as compared to other field. Farming has been done by the human efforts with the help of pair of bullocks and after that by tractors. Now due to increasing population the demands are also increasing, so to minimize the use of resources and to maximize the output farmers should involve technology (to reduce the wastage of seeds, shortage of labor, and fertilizers, etc.) in field of agriculture.

Agricultural Robot is one such machine with the capabilities to perform efficient work which is possible with the help of different computation algorithm. The improved specification helps to design, smartly control, and to make agriculture safe and suitable for everyone. In this paper the author suggested that robot will start automatic seeding and fertilizer.
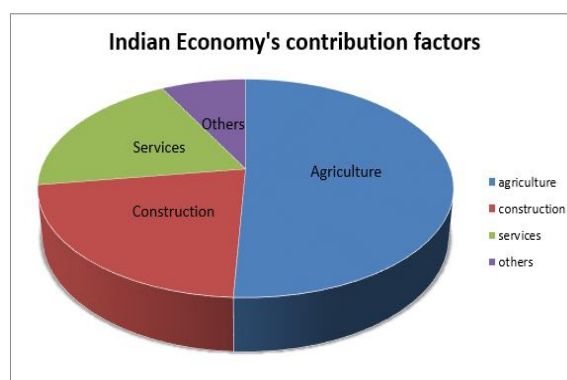

Fig. 1. Percentage of contribution to Indian economy.

The aim of this project is to design, minimize the labor of farmers in addition to increasing the speed of the work as well as increase the income from agriculture.

Due to the heavy weight of the tractors the soil will be compacted, the compacted soil will lose porosity and it becomes difficult for the seeds to germinate. Thus the use of agriculture seeding robot is more effective than tractor. The human effort and increase the income. The plantation of seeds is automatically done by using DC motor. The distance between the two seeds are controlled and varied by using Arduino programming. When the Robot reaches the end of the field it can change the direction without any help. The whole process is controlled by Arduino. Seed plantation is our day to day life is done by tractor in farms but have a more fuel power also it is used for large scale area agriculture. The conventional method for seeding is the manual one and it requires more time & the man power shortage is faced continuously. But in case of Agriculture seeding and fertilizering robot, it is also used for small scale area and it has a low cost, efficient for farmer and it has a no man power.

II. SYSTEM DEVELOPMENT

The agriculture robot is capable of performing the seeding operation. The process involved in the working of the robot can be divided into two types; first one is the seed feeding process along with the soil closing and second is fertilization.
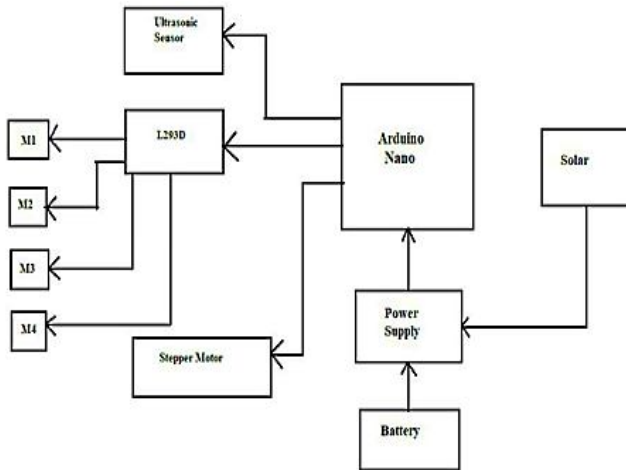

Fig. 2. Block Diagram of our system.

A. Arduino Board

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.
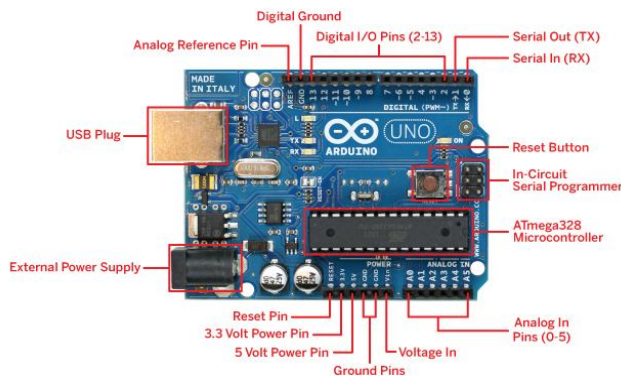

Fig. 3. Arduino Uno Board

B. Ultrasonic Sensor

An ultrasonic sensor transmits ultrasonic waves into the air and detects reflected waves from an object. There are many applications for ultrasonic sensors, such as in intrusion alarm systems, automatic door openers and backup sensors for automobiles.

C. L293D (Motor Driver)

The L293 and L293D devices are quadruple high current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, DC and bipolar stepping motors, as well as other high-current/high-voltage loads in positive supply applications.

D. Stepper Motor

A stepper motor is an electromechanical device which converts electrical pulses into discrete mechanical movements. The shaft or spindle of a stepper motor rotates in discrete step increments when electrical command pulses are applied to it in the proper sequence. The motors rotation has several direct relationships to these applied input pulses. The sequence of the applied pulses is directly related to the direction of motor shafts rotation. The speed of the motor shafts rotation is directly related to the frequency of the input pulses and the length of rotation is directly related to the number of input pulses applied.

E. Solar Panel

Photovoltaic solar panels absorb sunlight as a source of energy to generate electricity. A photovoltaic (PV) module is a packaged; connect assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. Each module is rated by its DC output power under standard test conditions (STC), and typically ranges from 100 to 365 Watts (W)

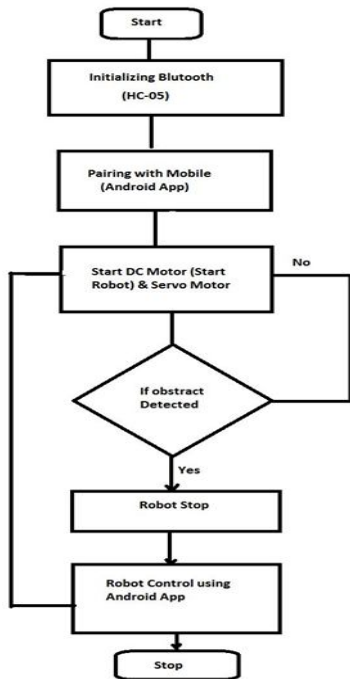Below fig shows the flowchart of our system.

Fig. 3. Flow chart of our system.
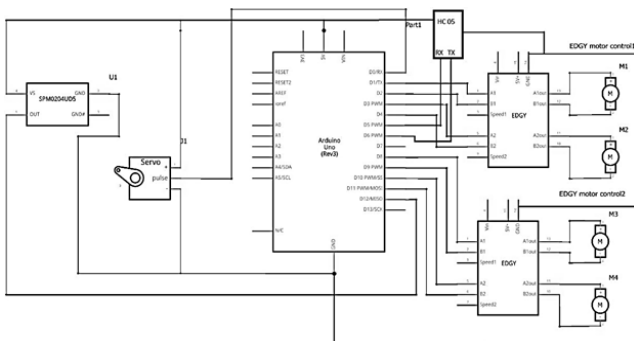
III. CIRCUIT DESCRIPTION

Fig. 4. Circuit diagram of our system.

The robot consists of an on board battery which supplies the required power. The battery is rechargeable type which charged through solar panel. The drilling arrangement consists of a nut, bolt, motor mounting plate and a motor. The nut is fastened to the robot frame. The bolt is placed inverted in the nut. The motor shaft and the bolt is connected each other by a coupler made up of mild steel material. When the motor is actuated the bolt will move along the nut and the hole is created. The depth of hole to be done depends on the type of seed that is being used and the moisture content present in the soil. When the motor shaft is rotated in the clockwise direction, the bolt will move downwards and when the motor shaft is rotated in the anticlockwise direction the bolt will move upwards. A high torque 12V DC geared type of motor is used for this purpose. Once the hole is done in the soil the next process is the seed placement. The seed placement

arrangement consists of a seed container and a motor. The opening of the seed container consists of a hole through which the seed will be dropped. The motor used for the purpose of seeding is low rpm high torque 12V geared DC motor. The seed container is made up of plastic. It can be used to store and feed wide variety of seeds. The main advantage is the seed feeding flexibility in terms of the size of seeds used. The seed container consists of a screw rod which is used for seed feeding. The end of the screw rod consists of threaded portion. This threaded portion is connected to the motor shaft by a coupler. The motor is directly mounted on to the frame. When the motor shaft is rotated the seeds that are accumulated in the container will move towards the opening of the container and will fall from it. The number of seeds that are dropped can be controlled by the number of rotation of the motor shaft. It also depends on the size of the seed that is being used.

IV. ADVANTAGES, APPLICATIONS & FUTURE SCOPE

A. *Advantages:*

1) The cost of the robot system is low.
2) Requirement of power is less.
3) It gives more profit.
4) Automatic seeding and fertilizing.
5) Size should decide by user requirement.
6) Using battery or solar power so eco-friendly system.
7) No human source required, fully automatic.

B. *Applications:*

1) Crop Seeding

Many food plants begin life as seeds in a field. The traditional method for sowing seeds is to scatter them using a "broadcast spreader" attached to a tractor. This throws many seeds around the field while the tractor drives at a steady pace. It is not a very efficient method of planting as it can waste seeds. Thus by using seeding robot we avoid wastage of seeds.

2) Fertilizing

Robots also have an advantage as they are able to access areas where other machines cannot. For example, corn growers face a problem that the plants grow too quickly to reliably fertilize them. Robot aims to solve this problem as it easily drives between the rows of corn and targets fertilizer directly at the base of each plant.

C. *Future scope:*

1) This robot fitted with a camera can be used for surveillance purpose.
2) By modifying the drilling arrangements more depths can be achieved.
3) By making use of GPS mapping can be done.

IV. CONCULSION

This paper is present robot system for agricultural fields, which makes farmer comfort. In previous system there are several limitations was found in seeding arrangement. In that system seeding arrangement is not proper and only one type of seeds size can be used. These limitations are overcome in the current design robot system. In this project an effort robot is design and developed that can perform automatic seeding and fertilizing process without any human interaction. The developed robot system is capable of making a hole in the soil up to certain depth, placing the seeds accurately in the same hole and closing the soil. The process is controlled by Arduino Board. The main purpose of project is minimizing man power and costing of tools. In agricultural field an advantage of this system will reduced the labor cost and time, and also reduces the wastages of seeds. Because of using the robot system productivity of crop also increased. The operation of robot is performed on solar energy. Along with the agricultural process this seeding robot can be also used for mass plantation and reforestation.

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