

SMART SEED SOWING AGRIBOT USING ARDUINO UNO

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Abstract- In our India more than 70% people are dependent upon agriculture sector. Therefore this field requires the advance technologies to reduce the efforts of farmers. There are number of operations are performed in the agriculture field. For examples-seed sowing, weeding, cutting but this problematic. The tools used for seed sowing are very difficult and inconvenient to used. So there is a need to develop tools which will reduce the effort of farmers. In this agribot to develop a system which minimizes the work as well as reduce the seed sowing operations also. Agribot consists of Arduino which is controller for the whole assembly. Solar panel is used to capture solar energy and it is converted into electrical energy which is used to charge battery. Ultrasonic sensor is used for Obstacle detection and Servomotor is used for Seed Sowing. By using bluetooth android application controlled agribot.

Keywords- Agribot, Arduino, Solar Panel, Dc Motors, Servo Motor, Sensors, Bluetooth, Automation, Wheels, Battery.

I. INTRODUCTION

Agriculture plays a important role in india's economy. Developing and under-developed nations agriculture provides employment opportunities for rural people. It is very important source of subsistence. The increase agricultural surplus caused by increasing agricultural production and to improve social welfare in rural areas. The states like Maharashtra, Assam, Punjab, Uttar Pradesh, Madhya Pradesh, Haryana, Kerala are highly involved in agriculture. In our india day by day increase population. So increase the population increase their needs also increases. This need directly or indirectly depends upon agriculture. As compared to other fields development and globalization in agriculture field is less. So, it is necessary to requires the advance technologies in this field. In agriculture many problems are created. So agricultural production minimized and affects the progress of developing country. Therefore farmers have to accept upgraded technology in agriculture like-seed sowing, digging. etc. Few years ago seed sowing machine is developed but there is no smartness of work done by it expects seed sowing. This machin very heavy to handle also need more manpower and maintenance. so it time to automate the sector to overcome this problem. There is a need

to study on upgrading agricultural equipment. In this paper innovative idea is doing the processes of digging, seed sowing and soil automatical covering. So that human efforts will get reduce up to 90% . Eliminate pollution by using solar panel. Also this energy is found abundantly in nature. The energy needed for robot is minimum as compared with other agricultural tool. Android app controlled agribot. Now a days robotics technology plays important role in all sector.

II. LITERATURE SURVEY

There are many seed sowing methods used in agriculture. But some are cost high, wastage of seeds, Needed more man power as well as time consuming methods. Due to this drawbacks we are design fully automatic agribot.

In 2016, Seed Sowing Using Robotics Technology, Swati D. Sambare, S.S. Belsare are explain in system 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 [1].

In 2017, Kunal A. Dhande, Omkar R. Sahu, Megha S. Bawane are invented Design and Development of Automatic Operated Seeds Sowing Machine. In this machine they replace complicated gear system by hall effect sensor for easier and costlier seed sowing and also reduce a need of labor. The Hall Effect sensor convert rotation into distance for which seed sowing at particular distance. Also there is adjustable system for sowing at different distance. 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 [2].

In 2017, Abdulrahman, Mangesh Koli invented Seed Sowing Robot. The main focus of this system is its Automatic way of sowing the seeds. The seeds are been sowed in a proper sequence which results in proper germination of seeds. This automatic way of sowing seeds using a robot reduces the labor requirement [3].

Angel Nimisha Lorain, Ramamalini.P Udhayanithi N,Veeralakshmi.R was invened smart automated agriculture monitoring and controlling system using arduino. Here they developed an autonomous agriculture monitoring module. This autonomous unit was seed sowing, pesticide spraying, fertilizer spraying, water pumping automatically without human intervention.Use arduino for setting the time slot for each process. After completion of this process, it sends the message automatically through gsm to user. This is the main advantage of system. perform agricultural activities and monitor them without going to the agricultural field. It also reduces the capitation cost of agriculture [4].

In[5], the author states that traditional seed sowing methods.In Table I shows Broadcasting is the process of scattering seeds by hand all over area. After broadcasting the seed covered by some other devices like planking. Drilling or line sowing is the dropping of seeds into the soil with the help of tools like as mogha, seed drill. Dibbling is the placing or dibbling of seeds with definite depth at fixed spacing. It is done manually by dibbler. This method is followed in crops like Groundnut, Castor, and Cotton, etc.**Transplanting** is the consist preparing seedlings in nursery. After 3-5 weeks planting these seeding in the prepared field. **Putting seeds behind the plough is very common and traditional method in villages.** Seed dropping behind the plough in the furrow with the help of farmer by hand. This method is followed for crops like wal , gram in some areas for better utilization of soil moisture. This methods is slow and need more manpower[6].

	requirement is less than other method, implement is not required for sowing.	method, require more labour, hence increase the cost of cultivation.
Transplanting	Proper growth in lab.	It is very time consuming method
Putting seed behind the plough	The seeds are covered by successive furrow opened by the plough.some areas for better utilization of soil moisture.	It is very time consuming and traditional method

TABLE I

COMPARISONS BETWEEN SEED SOWING METHODS

Seed sowing methods	Advantages	Disadvantages
Broadcasting	Quickest and cheapest method.skilled labour is not uniform.implement is not required.	Seed requirement is more, crop stand is not uniform.
Drilling or line sowing	Seeds are placed at proper and uniform depths, along the rows, interculturing can done. Uniform row to row spacing is maintained.	Require implement for sowing. Skilled person is requiredfor sowing
Dibbling	Optimum plant population can be maintained, seed	Laborious and time consuming

A. Farmers Faced Problems By During Seed Sowing

- More Creation of gap due to non-germination of seeds.
- Not high germination percentage leading to wastage of Seeds.
- Declination of total yield.
- Deu to Scarcity of labour, demanding high wages.
- Traditional equipments need more maintenance.

III. PRAPOSED ARCHITECTURE

In this system Agribot is a robot designed for agricultural purpose. Doing the processes of digging seed sowing of crops and soil automatical covering.so that human efforts will get reduce. This agribot not only seed sowing but also detect the obstacle and give the message to farmer. Eliminate pollution by using solar panel. Also this energy is found abundantly in nature.The energy needed for robot is minimum as compared with other agricultural tool. Android app controlled agribot.

A.Block Diagram

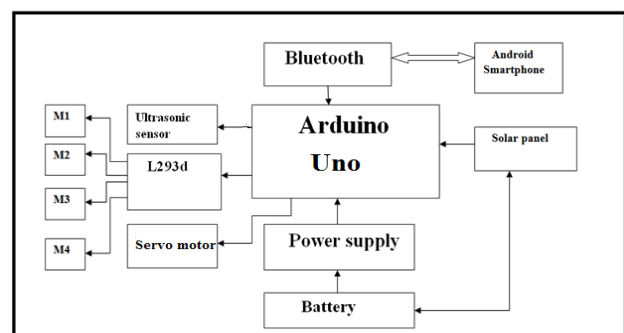


Fig.1 Block Diagram

The block diagram of agribot consist of arduino uno which is controller all over system as show in fig.1. Solar panel connected lead-acid battery for storing energy. It is given to power supply circuitry which is provide 5V to arduino uno board and 12V for driving DC motors using L293d. Ultrasonic sensor is used for obstacle detection. Servomotor is used for Seed Sowing and bluetooth module HC-05 is connected with Arduino board. By using bluetooth android app controlled agribot. Hardware components and their features are explain in below.

B. Arduino Uno

The Arduino UNO is a mostly used microcontroller board based on the [atmega328p](https://www.arduino.cc/en/Main/arduinoBoardUno). The board features 6 Analog input and 14 Digital pins pins. 6 can be used outputs of PWM, a power jack, 16mhz crystal oscillator, an ICSP header, a USB connection and a reset button. The Uno board is the first in a series of USB Arduino boards. It contains everything needed to support the microcontroller and connect it to a pc with a USB cable or power it. The arduino Uno differs from other in that it does not use the FTDI USB - serial driver chip. Instead, it features the Atmega16U2 programmed as a USB - serial converter.

C. Ultrasonic Sensor

There are many applications for ultrasonic sensors, such as automatic door, **Liquid Level Control/Monitoring**, intrusion alarm systems and **Vehicle Detection for Car Washes**. Ultrasonic sensor high frequency, sensitivity, and power make it easy to detect objects. The important task of Agribot is Obstacle Detection. An Ultrasonic sensor can measure the distance to an object by using sound waves. It measures distance by sending a sound wave at a definite frequency and listening for that sound wave to back. Ultrasonic sensors module HC - SR04 provides 2 cm – 400 cm measurement function and the ranging accuracy reach to 3 mm which can be used for obstacle detection.

$$\text{Distance} = \frac{\text{speed of sound} * \text{time taken}}{2} \quad (1)$$

D. DC Motor Driver

A Motor Controller is a device that acts between microcontroller, batteries and motors. A motor controller is important because a microcontroller can provide the current is 0.1 Amps, but most actuators require several Amps. L293D is which allows DC motor to drive on either direction. Single IC L293D is a 16-pin which can control two DC motors. In [7], author demonstrated that as power required to run the motors through Arduino is not enough, L293D driver IC is able to achieve the current rating issues.

E. Bluetooth Module

In this project android smartphone connected agribot through bluetooth module HC-05. The Bluetooth module HC-05 is a MASTER/SLAVE module. By default the factory setting is SLAVE. The slave modules can accept connections but not initiate a connection to another Bluetooth device. Master module can initiate a connection to other devices. Supply Voltage 3.3V to 5V. Arduino and bluetooth connection show in fig.2

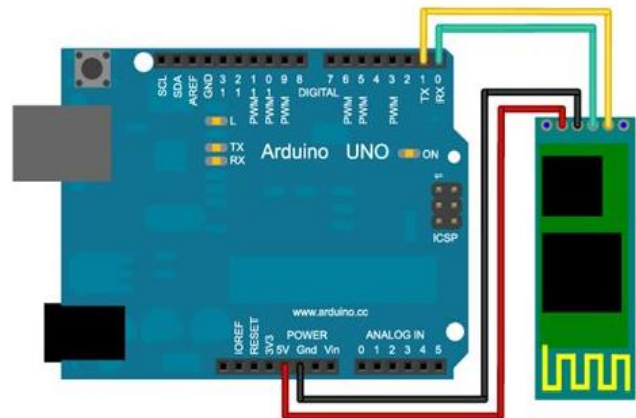


Fig. 2. Arduino And Bluetooth Connectivity

F. Power Supply

The supply is taken from solar panel of 5 watt 12 V Output so as to fulfill the power requirement for the system. Photovoltaic solar panels absorb sunlight as a source of energy to generate electricity. 12V lead-Acid battery is used to stored the energy. It should be noted that the supply voltage should be only to cater an Arduino, 6V dc motor and a 5V Bluetooth module. In solar panels the solar energy is converted into electrical energy directly or indirectly through photovoltaic(PV) and concentrated solar power (CSP).

IV. WORKING PRINCIPAL

The agribot is started through Initialisation Bluetooth module HC-05. Pairing agribot and android application. After pairing this devices robot star moving and various operations starts like dc and servo moter start so digging and seed sowing process also start. Simultaneously supporter at the back side of robot soil is covered the seed. In this process any obstacle is detected by ultrasonic sensor HC-SR04 . It will stop motor and seeding operation. within specific time opstacle is not removed power supply is cut and total process get stop.

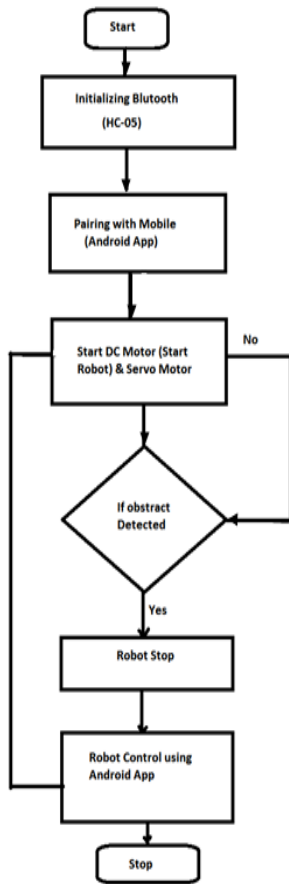


Fig. 3 .flow chart for proposed method

V. RESULTS

This proposed system gives a low cost low power easy to handle robot. Android application controlled whol assembly. Fig.5,6,7 shows agribot and fig.8 shows as chart for advance method.

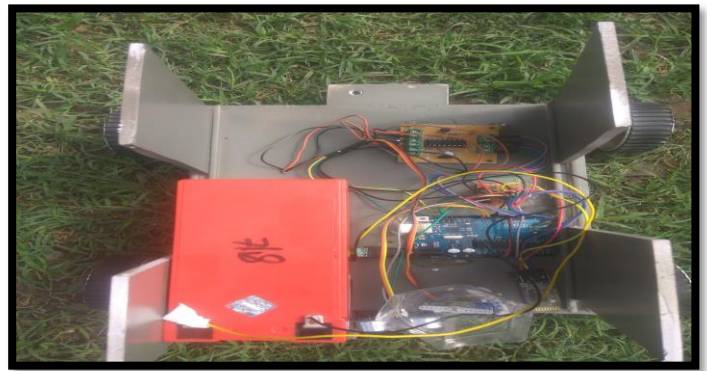


Fig .5. Agribot Hardware



Fig .6. Agribot Left Side View



Fig .7. Agribot Right-Front Side View

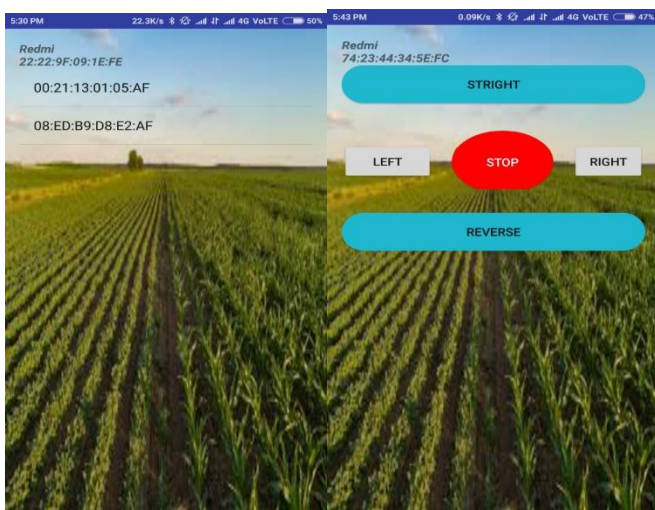


Fig.4 Android application for agribot

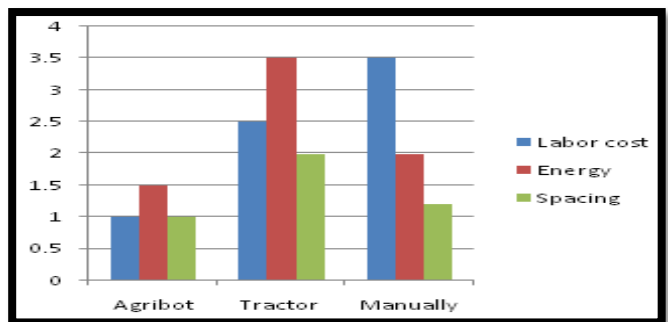


Fig .8. Chart for advance method Agriculture

VI. CONCLUSION

This paper is present agriculture robot in agricultural fields, which makes farmer comfort. In previous system there are lot of limitations. In that system seeding arrangement is not proper, cost issues, labor problem, wastages of seeds..etc after observing these limitations overcome in the current project. In this project robot is design and developed that can perform automatic digging, seeding. The without any human interaction. The developed Agribot system is able to making a hole in the soil up to specific depth, placing the seeds accurately in the same hole and soil automatical covering. The process is controlled by Arduino Uno Board. The main important purpose of project is reduced man power and costing of tools. Using the Agribot productivity of crop also increased. The operation of agribot is performed on solar energy. The agricultural process this seeding agribot can be also used for sport stadium, nursery, reforestation and mass plantation.

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