

A RESEARCH PAPER ON ADVANCE AGRIBOT

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ABSTRACT

In India agriculture as the primary sector occupation, more than 60 percent of the population is involved in it. At present agriculture sector mainly faces the shortage of labour problem. Because now a days, the interest has grown for the development of the autonomous vehicles like robot.

This Advance AGRIBOT project referred as the agriculture robot which is designed for the agriculture purpose. In this project we mainly focus to minimize the labour involvement in the field and by this also increases the speed and accuracy to do work. This Advance AGRIBOT performs major functions i.e. sowing of seeds, spraying of water/pesticides and helps to determine the moisture of soil, quality of water and humidity of environment without harming the fertility of soil. This is beneficial for worker to prevent from the harmful insects in the field. The main aim to design multipurpose autonomous agriculture robot which is controlled through IOT.

KEYWORDS: Robot, Wireless Technology, Smartphone, Seed mapping.

I. Introduction

In our country, agriculture plays a very vital role to enhance Indian economy. Most of the rural population in India depends on agriculture sector. Here, our main aim is to increase crop production and reduce shortage of labour problem. Previously various types of robots were proposed but this advance robot consists of advance features. The need of automation in the agriculture sector is mainly depend on two factors i.e. increasing needs of agriculture products due to the increasing population and due to the lack of labour in this sector.

Here, we use advance methods which may perform basic functions and as well as it consists of advance features like seeds sowing, putting seeds behind the plow, line sowing etc. The first step of this robot is to perform ploughing of soil followed by sowing of seeds and at last it completes the process by spraying of pesticides. In this advance AGRIBOT project we use basic components like DC motors, Johnson motor, relay, Arduino nano, Bluetooth module as the main control system. This Advance AGRIBOT is controlled through Bluetooth.

To perform the ploughing function is equipped with the spiked wheels, which are fixed in the anterior end of the robot, to sow seeds it has a container with seeds, and its bottom consists of hole to drop the seeds, and finally the end of the robot has sprayer which is controlled by relay. Our main aim is to propose a robot which works more than the application of robot technologies to agriculture.

II. Methodology

In this AGRIBOT, there are 6 wheels to 6 arms and the rear wheels are driven by Johnson motor or DC gear motor. The seeds are sowed through drilled hole at the bottom of the container. We use pump sprayer to spray the pesticides. Bluetooth and wi-fi through smart phone is used to control the robot for ploughing, seeding and pesticides. This whole robot is mainly controlled and programmed through microcontroller. This may also known as the heart of the robot.

Through new technology we can instructed it by using web browser or Bluetooth android application. As soon as instruction given to the robot it start ploughing and move forward. A container is used to contain seeds. At the bottom of the container a hole is drilled and covered with a small sheet and sheet acts as flip-flop and drops seeds at a periodic interval of time. Flip-Flops are controlled by servo motor. The final step of spraying pesticides can done with the help of solenoid valve. In this, there are some other components related to new technology and are used in it like , humidity and temperature sensor , moisture sensor , Bluetooth module and many other modules. Humidity and temperature sensors are used to know the environmental behaviour for the crops. Moisture sensor are used to check the moisture in the soil and Bluetooth are used to control the whole robot.

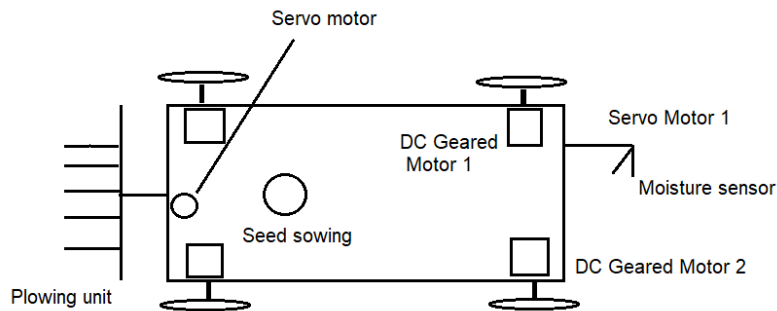


Fig 1: Structural Diagram

This multipurpose agriculture robot is used to control main three functions as we discussed above about all of them. Structural diagram of Advance AGRIBOT is given below.

III. Proposed Architecture

This is the proposed architecture which give some overview about the Advance AGRIBOT:

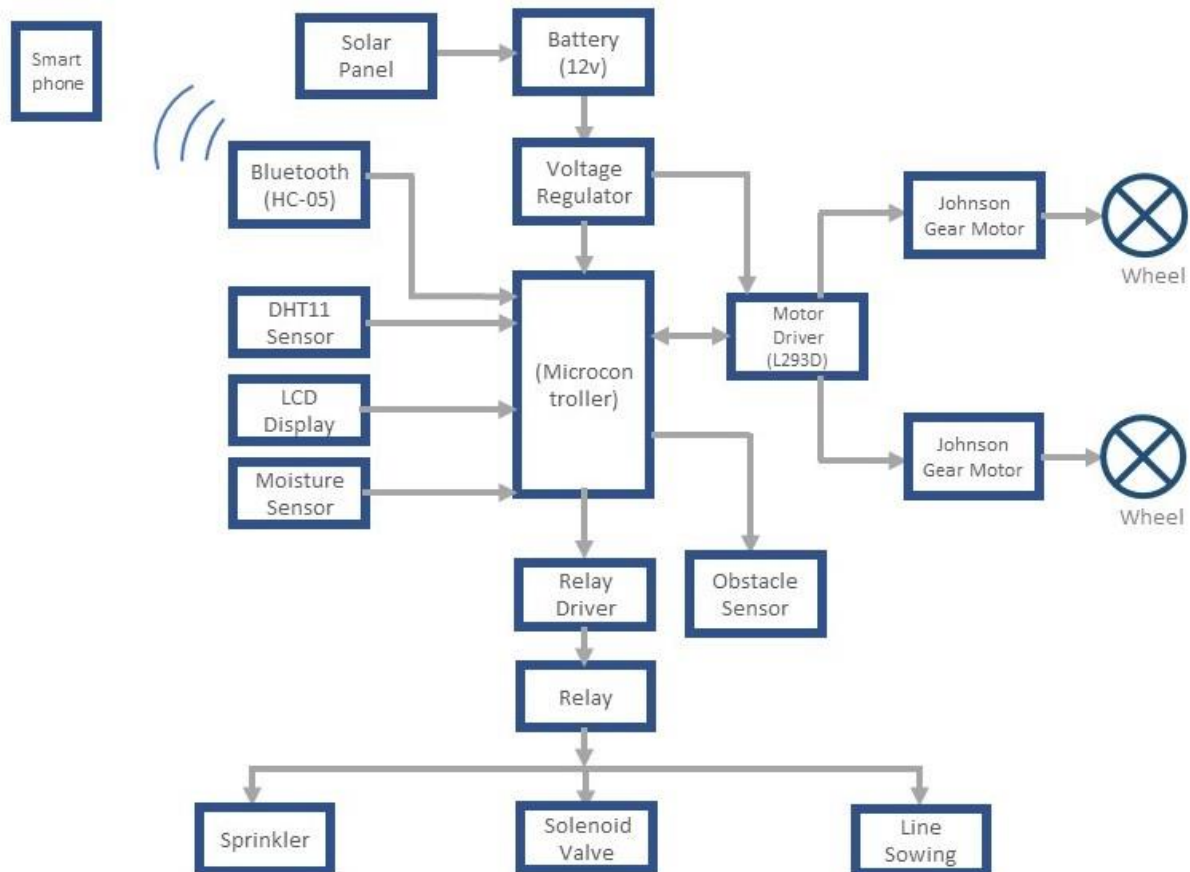


Fig 2: Architecture Of AGRIBOT

Here , we have architecture of Advance AGRIBOT which consists of microcontroller , Johnson Gear Motor , Motor Driver L293D , Solenoid Valve , Relay , Bluetooth (HC-05) , DHT11 sensor , LCD Display , 12 volt Battery , Voltage Regulator etc. This robot is Autonomous agriculture Robot. Here, we firstly instruct to the robot by using smartphone which is connected with Bluetooth. DHT11 is the temperature and humidity sensor which is used to know the environment conditions related to the temperature and humidity in the environment. Johnson Gear Motor is used to move robot along with the heavy load. Because this robot consists of some heavy components on it like battery, water container, seeds container and other components. When robot starts moving in the forward direction then after few minutes it stops and start to drill the ground with the help of drilling mechanism. When it done drilling in the ground then solenoid valve start to drop seeds in the soil. This process is continues until the user does not touch the stop button through the smartphone.

IV. Features of the Robot

1. **Ploughing Function:** Ploughing of the soil is the first purpose because bottom soil of the field is having the fresh nutrients so due to which seeds can grow and fertilize in a proper manner. Through which crop grow with more nutrients and beneficial for the living beings.
2. **Sowing of Seeds:** Planting seeds in soil. In this we have a container in which we contains seeds and dropping of seeds is controlled by servo motor when AGRIBOT wheels are rotated. Only one seed is dropped at particular interval of time through the hole of the container.
3. **Spraying of Pesticides:** Generally the farmers used pesticides to prevent crops from the insects and fungus. So, farmers spray the pesticides which causes health issues to them. Thus , this Advance AGRIBOT equipped with pesticides sprayer and it prevents farmers or workers from the harmful chemical and pesticides.
4. **Line Sowing :** In this model seeds sowing is done through the drill. Seeds are dropped at equal interval of time with uniform depth. Seed bed should be fine and well levelled free from clods. In the market seed drill is easily available. We can use Ferti-seed drill which ensure to uniform depth of sowing, and done proper placement of fertilisers.
5. **Robot Movement Through Smartphone:** This Advance AGRIBOT (Agriculture Robot) is controlled by using the Bluetooth device through which we can give instructions to robot i.e. forward , stop , right , left , and backward. And in this we use android version smartphone.

V. Experimental Hardware

Here, we are having some real hardware images in different modes and Bluetooth application interface.

1. Fig: 3 shows the model of the robot on the ground by using the Android application.

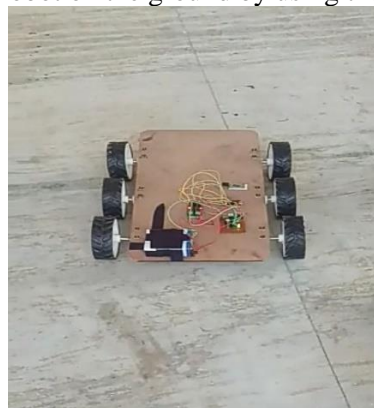


Fig: 3 Model Robot

2. Fig: 4 show the values of the temperature and humidity of the atmosphere on the LCD Display.



Fig: 4 Temperature and Humidity Value on LCD Display

3. Fig: 5 Show the value of the moisture of the soil on LCD Display.

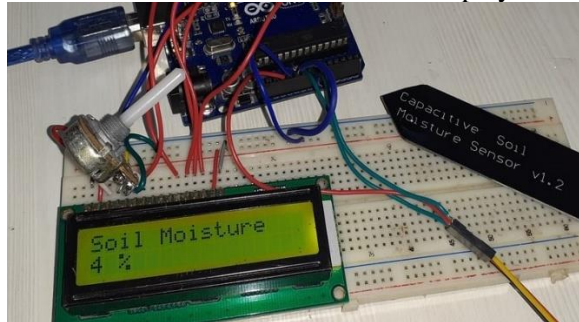


Fig: 5 Value of Soil Moisture on LCD Display

4. Fig: 6 shows the beginning of the robot in which we give the structure of the model and attach some components.

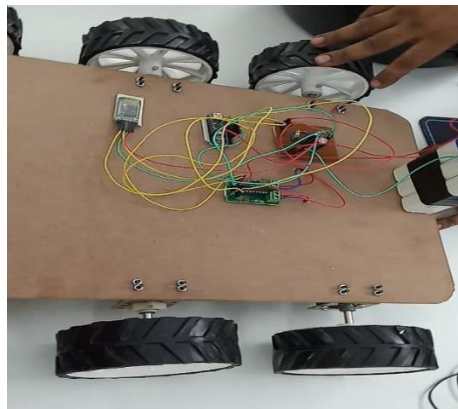


Fig: 6 Beginning Model

VI. Results and Discussion

The main objective of this robot is to reduce the need of man power and to perform multipurpose functions like automatic sowing of seeds in the field, smart irrigation, and smart controllers. This robot provides manual as well as auto control. The first step to do seeding in the field and then spraying pesticides or water to the crop.

There are some results which comes under this:

1. It can work automatically.
2. Drill with uniform depth
3. Seeds drops uniformly and at equal distance.
4. Gives value of the Temperature and Humidity of the environment.
5. Spray pesticides to the crop.
6. Sprinkle water to the crop.
7. It reduces accident probability.
8. Farmer is prevented from chemical pesticides and harmful insects.

VII. Conclusion

In this Advance AGRIBOT System which is controlled by new technology, and designed for the multipurpose in the field by doing line sowing, Drop Seeds in the depth of the ground, Spraying Pesticides to the crop without harming to the farmers. Due to this production of crop will increase and protects farmers from the harmful chemicals.

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