An Automated Sowing Seed using AG-ROBOT

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***Abstract*—Agriculture is an essential thing for survival of the humans and the farmers who do agriculture spend so much of time in ploughing the field and irrigating the field etc. The proposed system is a boon to farmers which combines the robotics with agriculture and capable of moving around the field like a farmer and plough the field and sow the seed in the pre determined row and irrigate the field along the rows autonomously**.

Keywords—Soil moisture Sensor; DHT sensor; Ultrasonic; Bluetooth; DC motor and Servo motor.

I. INTRODUCTION

Agriculture is the main occupation of people in India; more than 50% of the population is dependent on agriculture. It is the backbone of our economy. Despite the focus on industrialization, agriculture remains a dominant sector of the Indian economy both in terms of contribution to gross domestic product (GDP) as well as a source of employment to millions across the country [1]. To boost the economy there is a need to increase the productivity of crops. The volume of production depends not only on the capital investments and marketing strategies but also on the technology used during the production and processing stage. Indian farmers lacks in modern technologies. The farmers are involved in agriculture practices, but proper automation in agriculture makes farmer work ease. There are various equipments that are moisture sensor, ph sensor and soil temperature sensor are implemented with automatic seed sowing machine [2]. This machine helps a farmer in automatic seed sowing which reduces labor work. Automation plays a significant role in enhancing agriculture production needs. Once the automation and agriculture is accepted the adoption rates will become high and the costs of technology will come down. Autonomous agriculture allows farmers to reduce the environmental impact, increase precision in an effective manner.

The plantations of seeds are automatically done by using DC motor. The distance between the two seeds is controlled by the microcontroller. It is also possible to cultivate different kinds of seeds with the different distance. Also the project consists of different sensors like moisture sensor, ph sensor and soil temperature sensor which gives the information about the moisture level, ph level and the soil temperature value, with these all information with the help of Bluetooth module automatic seed sowing machine can be developed. This will reduce the human effort and time.

Agricultural Robots or Agribot is a robot deployed for doing agricultural purposes. Pollution is also a big problem which is eliminated by using solar panel. The energy needed for robotic machine is less as compared with other machines like tractors or any agriculture tools; also this energy is getting from the solar energy which is found abundantly in nature. 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. The main application area of robots in agriculture is at the harvesting stage and Seed Sowing Stage. Driverless robots are designed to replace human labor. The data logger through WiFi module on web server increases the effectiveness of the system so that surveillance of all actions will be maintained [3]. The Agribot developed in this paper performs digging, seed sowing and covering seeds simultaneously and powered by solar panel with a control of Android Application. Also, every movement is monitored on web server as well as on Android Application from anywhere. The future scope for this paper is not only detecting obstacle but also avoiding it successfully without disturbing the main course of the system.

II. LITERATURE WORK

K A Patil and N R Kale [4] worked on agricultural module in integration with ICT. ICT has always mattered in agriculture domain. Village farmers may have planted the same crop for centuries, but over period, soil condition has changed. By using the proposed approach received updated information allows the farmer to cope with and even benefit from these changes. It is really challenging task that needs to provides that knowledge because of highly localized nature of agriculture. The complete real time monitoring of environment information is collected which makes easy access of agricultural facilities such has alters through short messaging service.

Amritha Sneha [5] indicates that most of the system that which work autonomously is more flexible than traditional system. The benefits of reduction in labour costs and restriction on the number of daily working hours. Robotics and automation can play significant role in enhancing agriculture production needs. Automation can be done by man in operation such as seed sowing and plugging.

Arpit Narechania [6] showed that availability of agricultural information directly in farmers hand without him being dependent on others. Collection and documentation of sensor data can only help better predict future behaviors. A wireless seed sowing cum irrigation cum plugging robot can only help farmer by not adversely

affecting health. Use of Bluetooth network establish connection with Arduino will help the farmer by giving information about land.

Xue Jinlin and XU Liming [7] provides a vision based row guidance method is presented to guide a robot platform which is designed independently and helps to find offset and heading angle of the robot platform are selected in real time provides control scheme of the platform is proposed to carry out row guidance.

The proposed model block diagram is shown in the figure 1. The block diagram consists of arduino board which helps in physical connection and it is used to dump the program. Ultrasonic sensor is used to detect the presence of any obstacles on the way. Bluetooth module is used to transmit the signal from receiver part to transmitter. Power supply is given to turn on the arduio board. Different types of sensors are used to measure moisturization, temperature, and humidity of the soil. 16x2 display is placed to note the value find out by the sensors. Two types of motors are used DC motor and Servo motor DC motors are used for movement and servo motors are used for rotation purpose of the robot.

Based on the few research in the field we find few gaps, which can be overcome by advanced technologies. The scope of our project is that robot can be used in agriculture for sowing of seeds; also it reduces the time and reduces the workload. It will help the farmer to do work in any season and conditions. It will reduce the laborer work and the profit to the farmer will be more.

III. PROPOSED METHODOLOGY

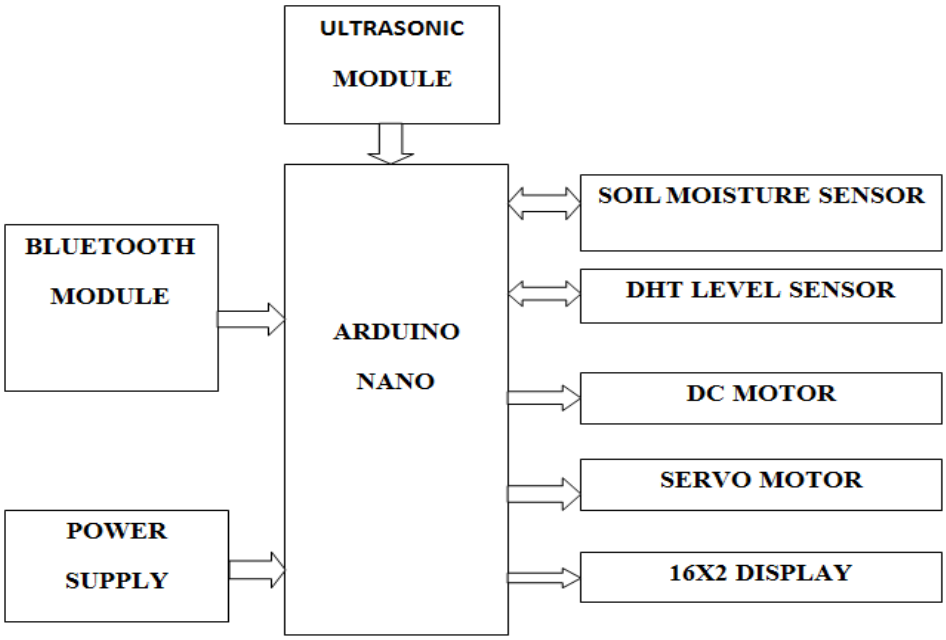

Figure 1: Proposed model block diagram.

In Agribot, we are trying to reduce the cost as well as human dependency by making it fully automated. In [8], the author states that traditional seed sowing includes broadcasting manually, opening furrows by a country plough and dropping seeds by hand, dropping seeds in the furrow through a bamboo/meta flannel attached to a country plough and for sowing in small areas dibbling [9] i.e., making holes or slits by a stick or tool and dropping seeds manually Thus traditional seed sowing has limitations like uniformity in the seed distribution cannot be achieved by manual planting, poor control over depth of seed placement so that labor requirement is high and during kharif sowing, placement of seeds at uneven depth may result in poor emergence. The innovative idea about this project is that agribot is not only performing various operations related with farming but also monitoring all the actions related with the movement of agribot like obstacle detection , battery voltage and panel voltage and compass sensor output.

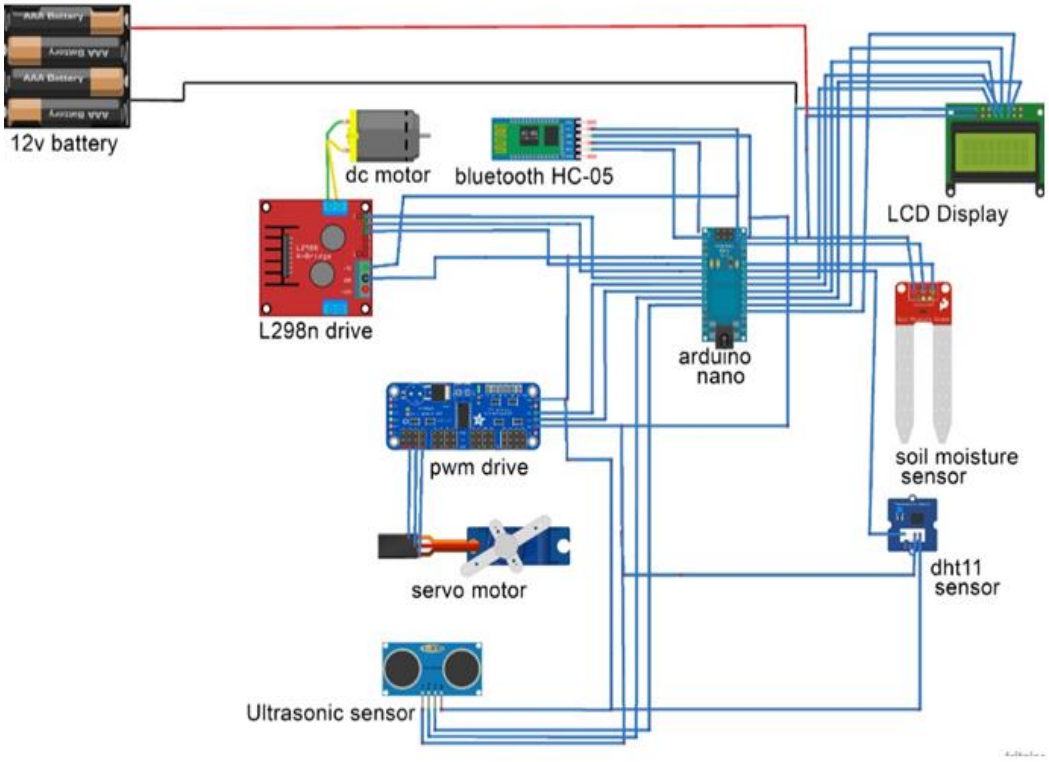

Figure 2: Circuit diagram for the proposed model.

Arduino nano based processor is used to interface all the electronics components such as sensor, motor, Bluetooth and display. The operating voltages of processor varying from 3.5-5V. The ultrasonic senor is used to detect the obstacles interfere in front of the AGRobot. Its uses the sonor emission technique to determine within the distance of AGRobot to obstacles coming in front of it. Sonic sensor uses SONAR to determine the distance of an object just like the bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package from 2 cm to 400 cm or 1" to 13 feet. Android controlled arduino robot car make use of an Android mobile phone for robotic control with the help of HC-05 Bluetooth technology. This is a simple robotics projects using arduino microcontroller. This project is a bluetooth controlled robot. For this the android mobile user has to install an application on her/his mobile. This android application could be downloaded in the android market. Then user needs to turn on the bluetooth in the mobile. The wireless communication techniques used to control the robot is bluetooth technology. User can use various commands like move forward, reverse, stop move left, move right. These commands are sent from the Android mobile to the bluetooth receiver which is interfaced with the Arduino robot. Android based robot has a HC-05 Bluetooth receiver unit which receives the commands and give it to the microcontroller circuit to control the motors. The microcontroller then transmits the signal to the motor driver IC's to operate the motors.

The YL-69 soil moisture sensor allows monitoring the water content in the soil. This is useful if you want to build an automatic watering system. The sensor is set up by two pieces: the electronic board (at the right), and the probe with two pads, that detects the water content (at the left). The sensor has a built-in potentiometer for sensitivity adjustment of the digital output (D0), a power LED and a digital output LED. The issue with such sensors is that the probe itself works by trying to measure the current that goes from one side of it to the other. Because of this electrolysis occurs so it can destroy the probe (YL-69) pretty fast in high-moisture soils. To bypass this, instead of directly linking the VCC to the Arduino's VCC/5V we simply link it to a digital pin and power it (digital pin goes HIGH). Temperature and humidity sensor – DHT11 is used for sensing the temperature and humidity of the surrounding crop so that it can be monitored properly [9].

By connecting an L298 bridge IC to an Arduino, one can control a DC motor. Here DC motors normally have just two leads, one positive and one negative. If you connect these two leads directly to a battery, the motor will rotate. If you switch the leads, the motor will rotate in the opposite direction. To control the direction of the spin of DC motor, without changing the way that the leads are connected, you can use a circuit called an H-Bridge. An H bridge is an electronic circuit that can drive the motor in both directions. H-bridges are used in many different applications, one of the most common being to control motors in robots, It is called an H-bridge driver.

IV. RESULTS

The smart agriculture robot can be directed to various directions like forward, reverse, left and right. These directions are commanded by the user by clicking on the respective options on the webpage. On receiving the command, the arduino will send it to the microcontroller. The microcontroller then drives the motor driver circuit to

move the robot. In addition to these movements, several functions like plugging, seed sowing, watering, obstacle detection and obstacle clearance are performed.

A.PLOUGHING:

The Plugging tool is interfaced with the Arduino. The plugging tool can be operated in three modes namely on, off and mid. The microcontroller will receive the command to work on any of these three modes and it directs the plugging tool to plough the field accordingly.

B.SEED SOWING:

The seeds are stored in a small container and it is closed with a small flip. This flip is controlled by the servomotor to open and close the container. The servomotor is capable of rotating to 180 degrees. Meanwhile, when the servomotor is at 180 degree, it automatically opens the ontainer and hence the seeds are sown in the field.

Figure 3: Snapshot of working model.

C.OBSTACLE DETECTION AND CLEARANCE:

The Ultrasonic sensor is used for the obstacle detection. The obstacles at a distance of 10cm can be detected. After detection, the robot automatically stops. Then the obstacle clearance tool which is connected to the servomotor can be used to break the obstacles.

I. CONCLUSION

For future developments it can be enhanced by developing this system for large acres of land. Also the system can be integrated to check the quality of the soil and the growth of crop in each soil. In addition to this, the weeds can also be detected and removed from the soil. The sensors and microcontroller are successfully interfaced and wireless communication is achieved between various nodes. All observations and experimental tests prove that this project is a complete solution to field activities and irrigation problems. Implementation of such a system in the field can definitely help to improve the yield of the crops and overall production.

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