

Farmer Friendly Agribot

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Abstract- *The paper aims on the design, development and the fabrication of the robot which can dig the soil, put the seeds, leveler to close the mud and sprayer to spray water, these whole systems of the robot work with the battery power. More than 40% of the population in the world chooses agriculture as the primary occupation, in recent years the development of the autonomous vehicles in the agriculture has experienced increased interest. The vehicle is controlled by Relay switch through Bluetooth technology using mobile the idea of applying robotics technology in agriculture is very new. In agriculture, the opportunities for robot-enhanced productivity are immense - and the robots are appearing on farms in various guises and in increasing numbers. We can expect the robots performing agricultural operations autonomously such as seed sowing, mud closing and water spraying and security.*

Indexed Terms- Agribot, Audio nano, Bluetooth Module HC-05.

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. Also, agriculture includes operations like production of cut flowers, timber, fertilizers, animal hides, leather, and industrial chemicals. 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 to make 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 equipment used to perform the operations are very heavy. Due to migration of humans in the cities the labor 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.

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.

1.1 Background:

R. Eaton, R. Eaton, J. Katupitiya, S.D. Pathirana (2008), Autonomous farming: Modeling and control of agricultural machinery in a unified framework, 15th international conference on mechatronics and machine vision in practice, New Zealand.

Chengliang Liu, Mingjun Wang, and Jun Zhou (2008), coordinating control for an agricultural vehicle with individual wheel speeds and steering angles, IEEE control systems magazine

II. METHODOLOGY

There are various seed sowing methods used for agricultural purposes out of which some are cost

effective but required more man power. In Agribot, we are trying to reduce the cost as well as human dependency by making it fully automated.

- Seed sowing operation:

A sheet PVC hopper box is used for Seed storage. We have provided 1 hole to the main wheel shaft, where the Storage box is placed above it. The main wheels are powered by DC motor which is regulated by a Relay switch and is controlled by a remote controller. As the motor is switched on, the wheels tend to rotate and rotation of shaft makes the seeds fall on the cultivated filed.

- Water spraying operation:

A water container is used for water storage. A water pump is used for pumping water to the water sprayer. The water flows to the sprayer through pipe. The power for pump is regulated by a toggle switch.

2.1 Objectives:

This project work described here is quite useful in the agricultural fields.

1. The project aims on the design Agricultural Robot for Spraying water, seeding, Mulching and cutting operation”.
2. More than 42% of the total population in the world has chosen agriculture as their primary occupation. In recent years, the development of autonomous vehicles in agriculture has experienced increased interest.
3. The vehicle is controlled by L293D motor driver through Bluetooth technology using mobile The idea of applying robotics technology in agriculture is very new. In agriculture, the opportunities for robot-enhanced productivity are immense and the robots are appearing on farms in various guises and in increasing numbers. We can expect the robots performing agricultural operations autonomously such as seed sowing, mud closing and water spraying.

2.2. Block diagram

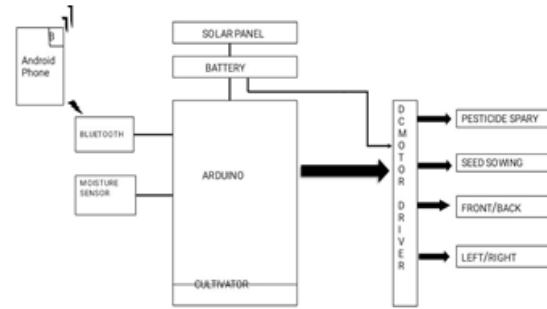


Figure 1: Block Diagram

In this Robot a Arduino is used to control the Robot. Here Arduino is the brain of the robot which is used to control all the operations of the Robot. That gives the desired direction to internal motors and motor drivers.

The block diagram of Agribot consists of Arduino Nano which is controller for the whole assembly as shown in block diagram. the lead-acid battery for storing energy and further it is given to power supply circuitry which is providing +5V for Arduino board and +12V supply for driving DC motors using 1293d. Servomotors are used for Seed Sowing and digging, Arduino and wirelessly with RF module to controlling the whole assembly. Water sprinkler can be done by submersible pump. The hardware of agribot is mounted on Chassis which is 28cm long and 22.5 cm wide. When user press the forward key RF transmitter will transmit the data to robot, it will compare incoming data with stored data if match then the robot will move forward. Each key is having unique data to perform the robot. Whole system of robot works on the battery.

III. DESIGN OF FARMER FRIENDLY AGRIBOT

- CIRCUIT DIAGRAM

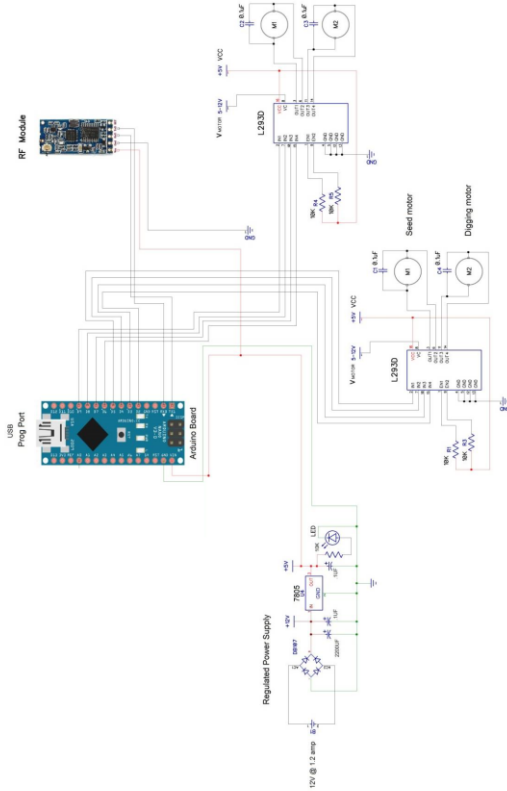


Figure 2: Circuit Diagram

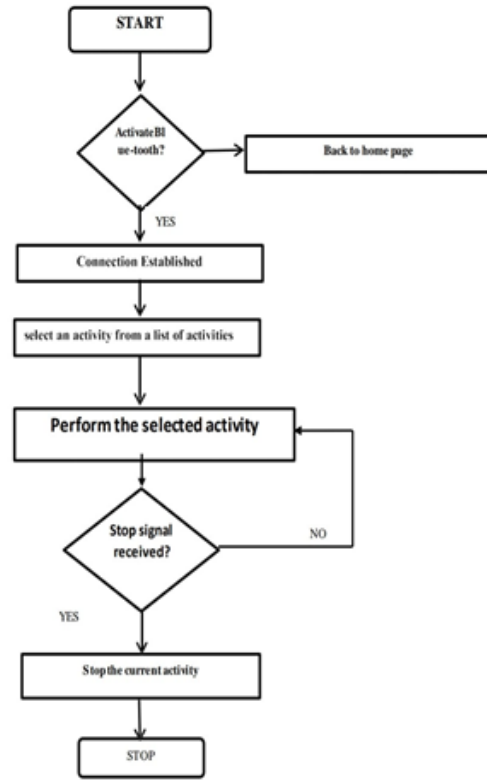


Figure 3: Flow Chart

The block diagram of Agribot consists of Arduino Nano which is controller for the whole assembly as shown in block diagram. the lead-acid battery for storing energy and further it is given to power supply circuitry which is providing +5V for Arduino board and +12V supply for driving DC motors using L293d. Servomotors are used for Seed Sowing and digging, Arduino and wirelessly with RF module to controlling the whole assembly. Water sprinkler can be done by submersible pump. The hardware of agribot is mounted on Chassis which is 28cm long and 22.5 cm wide.

• FLOW CHART

IV. IMPLEMENTATION

The process of this Wireless Controlled Multipurpose Agricultural Robot

We can control this by using Bluetooth module

Bluetooth control

In this case, we can control the robot through an app on the Smartphone. The Bluetooth module is used for this

Step 1

The required components are given below:

- Arduino nano
- DC Motor
- L293D IC (DC MOTOR DRIVER)
- 12 v Battery
- Voltage regulator
- Servo Motor
- Submersible Water Pump
- DC Pump Driver
- HC 05 Bluetooth Module
- Robot Wheels

- Jumping Wires

Step 2

Secondly, cut the foam board piece as 28cm long and 22.5 cm wide.

Step 3

Thirdly, glue the four gear motors to the foam board piece.

Step 4

Then, attach the motor shield to the Arduino board and glue it to the robot chassis.

Step 5

Next, dig two holes on either side of the Arduino board and insert the gear motor wire through these holes.

Step 6

Then, connect the motors to the motor driver shield. To do this, use the circuit diagram below.

Step 7

Next, connect the servo motor and dc motor

Step 8

Then, connect the Bluetooth module to the motor driver shield and glue it to the robot chassis.

Step 9

Now, attach the robot wheels and put the battery.

Step 10

So, let's create the program for this project. This program includes all three functions. We can run these separately.

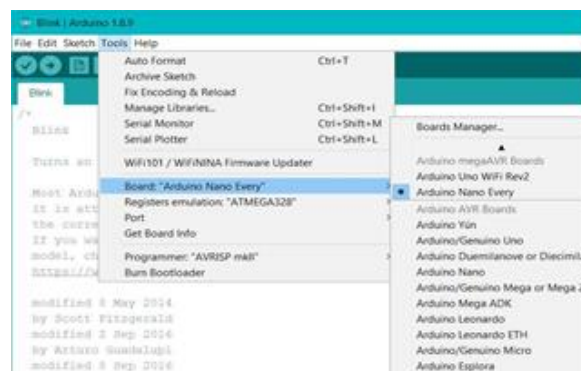


Figure 4: Uploading Code in Arduino Nano

Step 11

OK, now download and install the app below. Then, follow the steps below

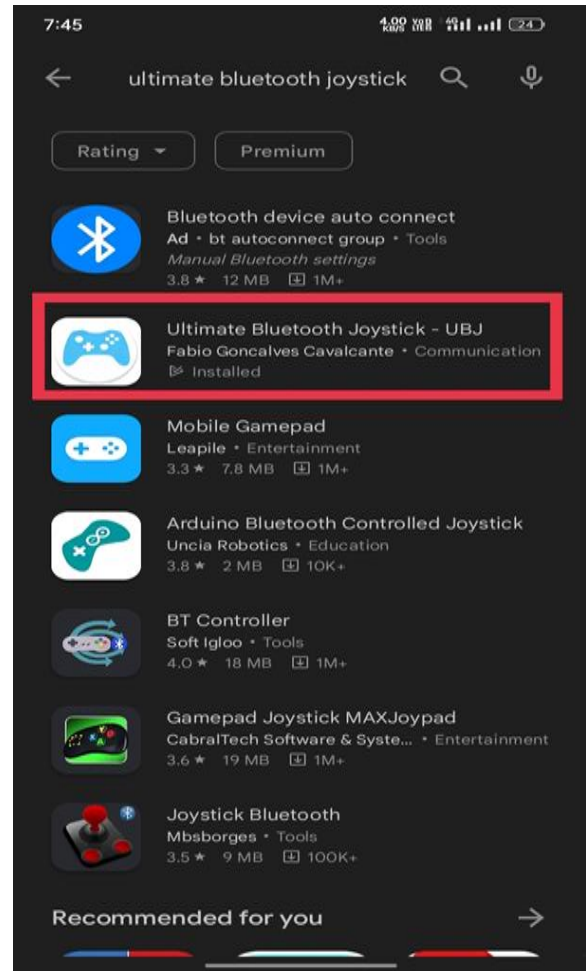


Figure 5: Bluetooth Joystick App

Step 12

After, run this application and click the Settings button. Then, click the "Connect" button and select the name of the Bluetooth module. Now, you can see the green bulb in the corner



Figure 6: Selecting Commands in App

V. ADVANTAGES AND DIS ADVANTAGES

ADVANTAGES:

1. Reducing the risk of electric shocks, deaths due to poisonous creatures in the fields.
2. Watering depends on the moisture level present in the field.
3. Automatic controlling of water pump.
4. It saves water and energy.
5. Fast response
6. User friendly.

DISADVANTAGES:

1. Limited RF Range.
2. Initial Cost is high.

VI. APPLICATIONS

1. Framers field monitoring
2. Public gardening
3. Domestic gardening
4. Green house monitoring.

VII. RESULT



Figure 7: Agribot

CONCLUSION

This Automated seed sowing Agribot has considerable potential to increase productivity. The chassis handles the complete weight of battery and the hardware mounted on Agribot which is able to perform each and every operation skillfully and successfully.

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. Labor 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.

ACKNOWLEDGEMENT

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REFERENCES

- [1] Simon Blackmore, Bill Stout, Maohua Wang, Boris Runov (2005), Robotic agriculture – The future of agriculture mechanism, Agro Technology, the royal veterinary and agriculture university.
- [2] [2] H. Pota, R. Eaton, J. Katupitiya, S.D. Pathirana (2007), Agricultural robotics: A streamlined approach to realization of autonomous farming, Second international conference on industrial and information system, IEEE.
- [3] R. Eaton, R. Eaton, J. Katupitiya, S.D. Pathirana (2008), Autonomous farming: Modeling and control of agricultural machinery in a unified framework, 15th international conference on mechatronics and machine vision in practice, New Zealand.

- [4] Chengliang Liu, Mingjun Wang, and Jun Zhou (2008), coordinating control for an agricultural vehicle with individual wheel speeds and steering angles, IEEE control systems magazine.