# Multipurpose Agri Robot

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***Abstract-*** **In Modern World, Autonomous robot is used in many of the fields such as defense, surveillance, medical field, industries, agricultural and so on. In this project, the robot system is used to develop agricultural processes without the use of manpower. our proposed system aims is to reduce manpower, time, and increase the productivity rate. It also check humidity with the help of humidity sensors. The main component of our proposed system is the Advanced Virtual RISC (AVR) at mega microcontroller that supervises the entire process. For manual control, the robot uses the Bluetooth connection application as a control device and helps in the navigation of the robot inside the field. This is especially important for the safety and health of the workers. Automation is the ideal solution to overcome all the shortcomings by creating machines that perform all operations and automating it to increase yield on a large scale.**

***Index terms-*** **Agricultural robot, Arduino, Robot Architecture, Agricultural Functions, Hygrometer**

## INTRODUCTION

The main purpose of developing automated technology in agriculture is to reduce farmer's efforts, which is common in the developed world. The Robot will be developed capable of performing operations like automatic plowing, seed dispensing and watering. The robot is controlled by Bluetooth through an Android application. The android phone sends commands such as move forward, backward, right, left and stop for the movement of the robot. Robot then follows the commands once reaches the point where the process needs to be started it starts plowing at that point using a heavy drill motor which has a drill bit connected using a chuck. once the plowing process is over its stops the motor and then seed is thrown out of the lid of seed container using a servo motor .the servo motor then comes back to its original position and the lid is now close after this the soil moisture sensor check the moistures content of the soil and if water is needed then its starts watering using a pump motor. Once all these actions are completed then the robot waits for the next movement command from the user .the temperature sensor is used to check the temperature for crop growth.

## LITERATURE SURVEY

Some biggest issues in the Indian agricultural are input costs, skillful labors, absence of water resources and crop checking. to solve this problem the advance mechanization with robots was utilized as a part of agribusiness. To reduce the farmer efforts robotics is useful. The robot performs functions like seeding system, pest control plowing, mud closing water spraying, etc is designed to ease the work of the farmers and increase the outcome. This beats the adversity of farmers in farming their land irrespective of the weather conditions. For software implementation of the robot Arduino is used and the driver L293D is used to control motor direction. The robot is advanced with hardware such as seed container alongside channels and delving system with cutting edges in the mechanical get together of the vehicle. The sensors utilizing the Bluetooth module were effective and demonstrated the capacity of the equipment stage made out of sensors and microcontrollers. The agricultural robot integrated system uses Wi-Fi for communication between two robots. The ultrasonic proximity sensors use to advert the obstacles in the path. A Seed is picked up from the seed container and lead to the vacuum pump and the linear actuator is used to suck a seed inside the funnel. 100 2018 International Conference on Design Innovations for 3Cs Compute Communicate Control 978-1-5386-7523-6/18/$31.00 ©2018 IEEE DOI 10.1109/ICDI3C.2018.00030 Bluetooth module and GSM directly speak with Arduino utilizing I/O port. Using servomotor the Seed sowing is finished then the servomotor pole can be turned by the required degree which is associated with seed holder that point fall in the dirt. A leveling bar furnished with jagged teeth is fixed on it to plowing the soil. Using a servo

mechanism the seed dispenser is done. The advantages of these robots are an efficient use of resources reducing human intervention and ensuring proper irrigation. These robots are helpful in automated weed control, usage of fertilizers based on soil condition, soil sensors are used to check soil conditions in rain feed areas. The proposed design is mainly used to reduce human intervention and plant care.

## PROPOSED SYSTEM

The proposed system would be designed to perform farming activity such as plowing, seeding watering along with monitoring systems using sensors. The multipurpose agricultural robot control by android application through Bluetooth. The robot performs three consecutive tasks, such as drilling seeding and watering. This mode of action is used when the user only wants to water the crops. Here also the movement of the robot depends on the command from the android phone. The robot access through Bluetooth without affecting cost. The proposed system block diagram is shown in the following fig.

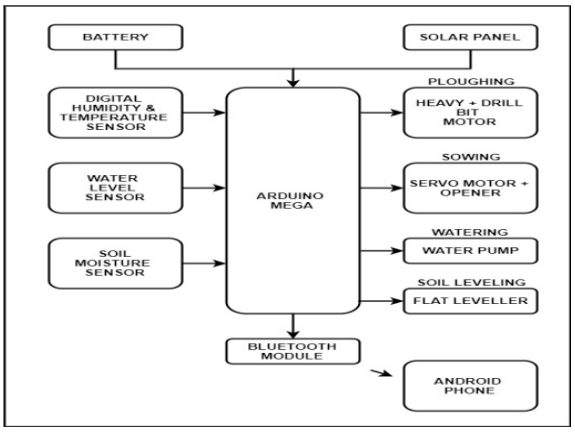


Fig 1.Block diagram of multipurpose agricultural robot

- Hardware Model

The robot's entire system works with batteries and a solar panel. The robot needs a 12 v battery to operate the system. solar panels absorb sunlight and generate current electricity. The base frame consists of 4 wheels with 4 arms attached and the rear wheel is powered by a DC motor. The cultivator at one end of the frame operates a DC motor that is made to dig the soil. The seed is spread through holes drilled on the shaft by mechanisms connected with the excavated soil process. A leveler is made to close the seeds and a water pump sprayer is used by spraying the water. Bluetooth technology is used by smartphones to control the entire operation of the robot for plowing, seeding and watering systems.

The heart of the proposed system is a microcontroller. The microcontroller is interfaced to provide various operations such as Bluetooth module, DC motors, relay plowing, seeding, leveling, and watering. The entire system of the system is controlled by the Bluetooth module on the Android smartphone. Wireless communication of Bluetooth technology enables the robot to move the four directions forward, backward, right and left. Different commands are used to move the robot forward, reverse, stop, left and right. The microcontroller in the proposed model enables various functions in the area according to the commands received from the smartphone.

- Plowing function

The main purpose of plowing is to bring fresh nutrients to the surface by turning the top layer of soil, In the prototype model shown above, a DC motor with screw rod is used to plow the field. While the screw rod is rotating, the nut rotates between the screws of the welded rod towards the cultivator is then lowered and the soil dug up to 2.5 inches the direction of cultivator can be controlled through the Bluetooth app in smartphones.

- Seeding function

Seeding is planting seeds in one place or on an object. the prototype model shown above is used for seeds storage and when the wheels are rotated, the seeds are sown. Shaft seeds drop into the field due to the movement of the wheels of the robot.

- Mud closing and leveling

The flat is to give a flat and even surface area to the field. In the prototype model shown above, the motor drive is used for leveling and closers. In the sown soil the mud is closed and the sliding mechanism is used for leveling.

- Watering function

Watering is the method in which a controlled amount of water supply to crop at regular intervals for agriculture. in the prototype model shown above, drivers are used for the water pump to watering in the field.

- Soil moisture sensor

This Moisture Sensor can be used for detecting the moisture in the soil, let the plant in your garden able to reach out for human help when they are thirsty. This sensor is easy to use, you can simply insert it into the soil and read the data.

- Temperature sensor

A humidity sensor senses and reports the humidity in the air. It measures moisture and air temperature. The humidity, expressed as a percent, is the ratio of actual moisture in the air to the highest amount of moisture air at that temperature can hold. The warmer the air is, the more moisture it can hold, so the humidity changes with fluctuations in temperature.

B. Software model

The Bluetooth module is operating through Bluetooth application. The Bluetooth module can be enabled through a start button. First, make sure that the module is added to the smartphone. Once the Android application establishes a secure connection with the robot then the app is ready for controlling the actions of the robot. The Android App consists of 5 buttons for the movement of the robot. The actions that would be performed by the robot are Forward, Backward, Right, Left and Stop.

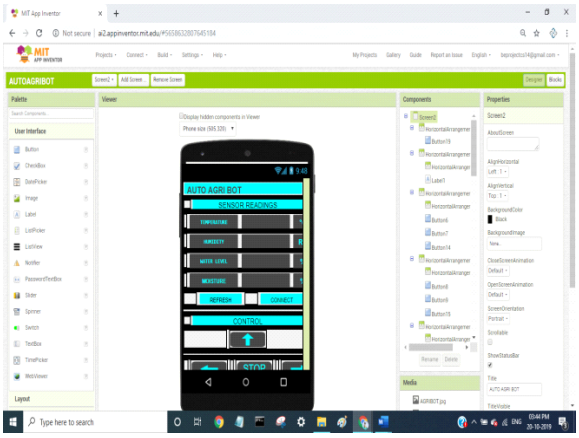


Fig. Android application

METHODOLOGY

This project is an Autonomous Agriculture Robot which is controlled over Bluetooth protocol using an Android App. The Android App consists of 5 buttons for the movement of the robot. The actions that would be performed by the robot are Forward, Backward, Right, Left and Stop. It also consists of a list picker for selecting Bluetooth devices connected to the robot. Once the Android application establishes a secure connection with the robot then the app is ready for controlling the actions of the robot. The robot is capable of Digging, Sowing, Watering and Soil Leveling. Digging is done using Motor Drill. Sowing action will be performed using Servo Motor for lock mechanism. Watering will be done by Pump Motor. Leveling is done using Flat leveler. The Android App has a button for Starting all these processes. The robot also has sensors like the DHT11 sensor, water sensor, and Soil Moisture sensor. The sensor values are automatically sent to the Android App. The DHT11 sensor is used for measuring the temperature and humidity in the surrounding of the robot. The water sensor is used for detecting the water level of the container used for watering. The soil moisture sensor is used to sense the moisture content of the soil. The robot works in two modes. In the first mode, the robot performs actions such as plowing, sowing, watering, and soil leveling along with the movement of the robot. In the second mode, the robot performs only watering action by sensing the soil moisture content. The first mode of operation is used in the initial stages while the second mode of operation is used after the initial stage when the robot only needs to water the field. The sensor data can also be manually updated by the in-app Refresh button.

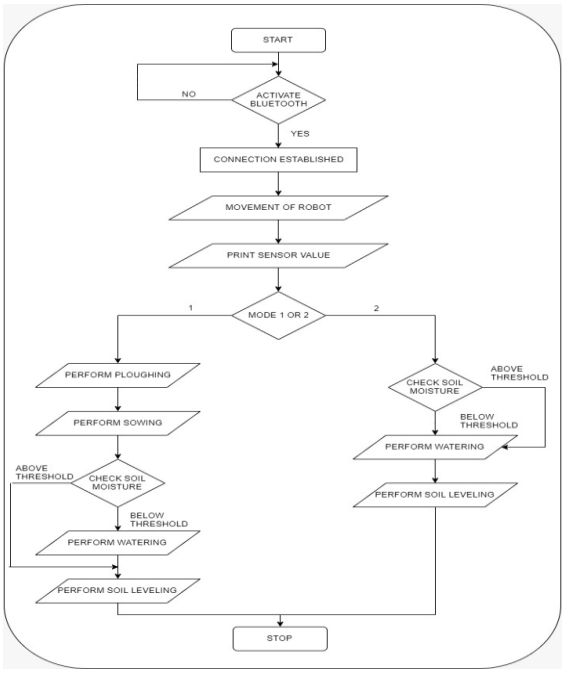


Fig. flowchart for proposed model

## CONCLUSION

An initial outcome of this study indicates that most of these systems which work autonomously are more flexible than traditional systems. The benefits of a reduction in labor costs and restrictions on the number of daily working hours significantly improved. Thus, it has made possible to automate the most significant working routines. The multipurpose autonomous agricultural robot has successfully implemented and tested for various functions like plowing, seeding, leveling, and water spraying.

## REFERENCES

[1] k Durga Sowjanya , R Sindhu, M Parijatham, K Shrikant, P Bhargav" Multipurpose Autonomous agricultural robot"International Conference on Electronic Communication And Aerospace Technology ICECA 2017.

[2] Gulam Amer, S.M.M. Mudassir, M.A. Malik, "Design and operation of Wi-Fi Agribot Integrated system", International Conference on Industrial Instrumentation and Control (ICIC), IEEE, 2015.

[3] Ashish Lalwani, mrunmai Bhide, S. K. Shah, A Review: Autonomous Agribot For Smart Farming, 46th IRF International Conference, 2015

[4] Akhila Gollakota, M.B.Srinivas, Agribot-A multipurpose agricultural robot, India Conference (INDICON), IEEE, 2011.

[5] Sandeep Konam, "Agricultural Aid for Mango cutting (AAM)," Electronics & Communication Engineering, RGUKT, R.K. Valley Kadapa, India, 978-1-4799-3080-7 IEEE 2014.