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Agricultural Robot

Aparna Singh, Bhagyashri Desai, Yangzin Chuskit

singhaparna049@gmail.com,
bhagyashridesai321@gmail.com,
yangzinchuskit85@gmail.com

Electronics Engineering Pune ,India

ABSTRACT

Automation in agricultural sector is too necessary these days, as it reduces man's effort exponentially and also saves time. Hence, to enhance the process of farming, a lot of other tools have been designed and introduced. Likewise, our system will check the moisture contain of the soil and will apply water accordingly, spray pesticides if required and it will be guided by line tracking system. This system will be designed as a robotic vehicle. This AGROBOT will sense the soil whether it is dry or wet, if dry, it will spray water, otherwise, it will move to the next crop. Same procedure will be followed for pesticides. For doing this, it will follow a white powdered line. It will generate ultrasonic sound to avoid birds and insects, especially during night. This is a bluetooth based system and will be operated through our mobile phones. By using this system, we would be able to speed up the farming activities like irrigation and pest control.

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I. INTRODUCTION

The AGROBOT is designed to check moisture contain of the soil and whether or not it needs to be watered. Irrigation is the most important process when it comes to farming. Generally, irrigation and pest spray are few of the processes which are done manually by farmers and takes a lot of effort and time. The aim of this project is to measure the amount moisture content of the soil and water it accordingly if required, track the white straight line and produce ultrasonic sound to avoid birds and insects which might harm the crops or damage it. A lot of other systems has been designed for automating the farming activities like pest spray, seed sowing, etc, whereas this project works on 3 main modes i.e., irrigation mode, line tracking mode and ultrasonic sound producing mode. We will be using an android based robot which will be shaped as a vehicle. This AGROBOT will be entirely controlled and driven by using a mobile phone. There will be a bluetooth module present inside the robot. The robotic arm will plough out some mud and sense the moisture content of the soil, and send the output to microcontroller present inside. After sensing, the robot will pour adequate amount of water to the crop. Same process will be followed if the farmer wants to spray pesticides on the crops. Here we have used Arduino IDE, bluetooth module HC-05, IR sensors, moisture sensors, motor drives as our main components. IR sensors are mainly used for line tracking mechanism. Light emitted by the IR sensors will get reflected when they hit white surface present on the ground and hence, follow a straight path. For robotic motion, motor drives are used here. Robotic arm contains the moisture sensor here. If the crop has enough moisture then the arm won't pour any water to it. We will be using an app to control this robot. This app will be present in our mobile phones and will be connected via bluetooth. A lot of options will be displayed on the phone to control the motion of the robot.

II. LITERATURE SURVEY

[1] Agricultural robot for automatic ploughing and seeding 2017 (IEEE) by Amrita Sneha.A, Abirami.E, Ankita.A, R.Praveena, R. Srimeena. This paper is about making a robot capable of performing activities like ploughing and seeding automatically.

[2] Robots in Agriculture 2017 by Jaime del, Cerro, Juan Jesus, Mario, Jorge. This paper is about automation in agricultural sector, such as greenhouse farming and precision agriculture.

[3] Agricultural Robot 2018 by Kavita Zole, Sanghasevak Gedam, Aditya Dawale, Kiran Nikose, Jayant Hande. In this paper, the robot system is used to develop the process of cultivating agricultural land without using any man power.

[4] Integration and Assessment of a real Fleet of robotics 2014 by Luis Emmi. This paper is all about successful application of the architecture in the RHEA fleet, which basically comprises three ground mobile units based on a commercial tractor chassis.

[5] Robotic Agriculture- The Future of Agricultural Mechanisation 2005 by Simon Blackmore. This paper is about different features of the Agrobot like seed bed preparation, seed mapping, seed placement, Reseeding, crop scouting, weed mapping Robotic weeding, etc.

III. BLOCK DIAGRAM

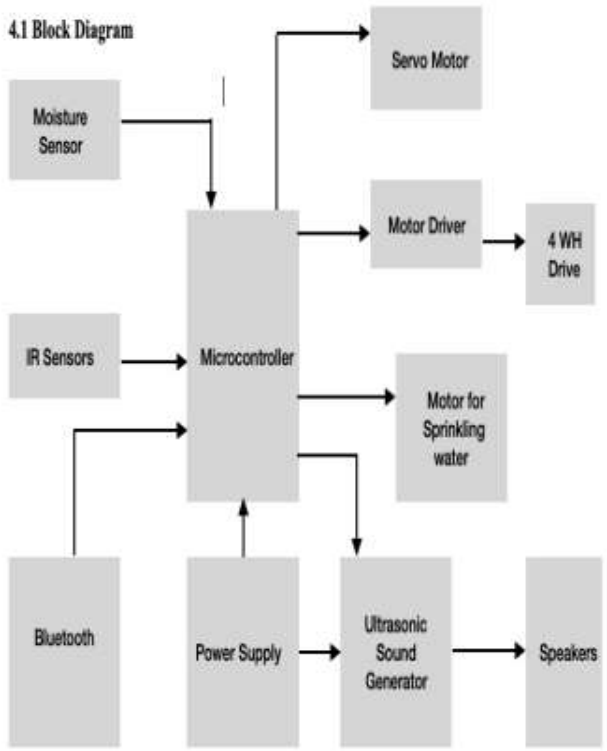

Fig 1. Block Diagram

HARDWARE AND SOFTWARE DESIGN:

As we can see in the block diagram, the major components are:

Microcontroller : Microcontroller will take the codes as input, process it according to our requirement and will give processed output.

Power Supply : It will give the required power supply keeping the regulation constant which might affect the working of the robot. The output of power supply is 12V/1 amp.

Bluetooth : Range of bluetooth is around 10m and its baud rate is 38400bps. Sensors : These components takes physical quantity as input and gives electrical output.

IR Sensors : IR stands for Infra Red which detects the presence of any obstacle in its range.

Motors : These components are the output devices which will sprinkle water, seed, etc.

Sound Generator : It will generate ultrasonic sound.

Descriptions :
- Arduino IDE
- easyEDA Software to build circuit diagram and PCB
- L298 motor driver
- 12V DC geared motors
- Free wheel
- Moisture Sensor
- 5 mm 3V LED
- Resistors (1K, 2K, 5K, 330)ohm
- 5V Buzzer
- IR sensors module
- Bluetooth Electronics App(available at play store)
- 12V, 1.3 Ah Lead acid battery
- Servo motor
- Bluetooth HC-05
- Relay module
- Aqua motor
- Switch (SPST)
- Male/female headers
- Printed Circuit Board
- Single strain wire
- Rainbow wires
- Rechargeable Battery (12V)
- Battery Charger
- PCB printing kit
- Other tools like Glue gun, scissors.

WORKING OF AGROBOT

We have tested the Robot in a classroom sized room. We put white painted strips on the ground in a closed loop form. We have used Bluetooth HC-05 which is controlling all the movement of the robot. To improvise the efficiency, we have done multiple trials: No.of trials: 15 No. of times we got accurate output: 12 Working percentage: (accurate output/ no. of trials)*100 Therefore, working percentage = (12/15)*100= 80% Thus, after 15 trials , we came to know that our robot is 80% efficient. Hence, we are successfully reducing human effort. The robot is also working properly at night with same accuracy. It is able to produce ultrasonic sound continuously so as to irritate insects or birds that might come in the way. Also, minimum amount of water and pesticides are used, so, this Agricultural robot is financially efficient.

PROPOSED SYSTEM

This system is designed to check the moisture content of the soil and provide required amount of water to the crops, track the white straight line, producing ultrasonic sound. In this system, moisture sensors and IR sensors are used for sensing the moisture content and for line tracking mechanism. Arduino IDE, moisture sensor, IR sensors, ultrasound generator and motor drives are the main components in this project. We will be using motor drive A to move the robot forward, back, left and right, and motor drive B to for the arm movement to plough the mud out and pour

IV. RESULT

After completing this project, we were able to check the moisture contain of the soil automatically. Irrigation was done as per the requirements. The robot is successfully following the white strips and also the closed loop.

V. CONCLUSION

Thus, we have seen how this AGROBOT is going to work. This robot does not only avoids excessive wastage of water but it enhances the quality of crops as well. This automatically increases crop production and hence, economy is boosted.

VI. ACKNOWLEDGEMENT

It is our great pleasure in expressing sincere and deep gratitude towards my guide Mrs. Nilima Warade for her valuable guidance and constant support throughout this work and help to pursue additional studies in automation based system. We take this opportunity to thank Head of Department Dr. D.K. Shedge and project coordinator Dr. Sanjay Kurkute and all staff members of Electronics engineering department for all the cooperation. The motivation factor for this work was the inspiration given by our respected Principal Dr. P.B. Mane.

VII.REFERENCES

[1] Agricultural robot for automatic ploughing and seeding 2017 (IEEE) by Amrita Sneha.A, Abirami.E, Ankita.A, R.Praveena, R. Srimeena.

[2] Robots in Agriculture 2017 by Jaime del, Cerro, Juan Jesus, Mario, Jorge.

[3]Agricultural Robot 2018 by Kavita Zole, Sanghasevak Gedam, Aditya Dawale, Kiran Nikose, Jayant Hande.

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