

Agricultural Pesticide Spraying Robot

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Abstract: Farmers are playing a vital role by working harder on the agricultural lands and planting the crops. In India, the usage of pesticides is higher, i.e., 70%, whereas worldwide usage is at 44%. The air is getting polluted by using these pesticides. This is a major problem in agriculture. A robot has been developed which sprays pesticides, cuts the grass, and performs Seeding on its own, which is operated by a human with a mobile application and is less harmful to the environment as well as to humans. This bot can be easily controllable. The bot sprinkles the pesticides, covering all plants on the farm. With this robot's help, the farmer's time and work will be reduced.

Keywords: Agricultural BOT, pesticide, farmers, motor driver, spraying, grass cutting, seeding

I. INTRODUCTION

The main motive of the project is to prepare a BOT that will be useful in the field of agriculture. Spraying pesticides is the main task in agriculture to save crops from pests and insects. Farmers nowadays are spraying pesticides manually, which causes many problems for the farmers. Usage of manual techniques can harm them, like lifting heavy tanks can cause harm to shoulders, skin diseases, and many more. We can get rid of these diseases by using gloves while spraying pesticides in the fields and other safety measures can be taken. In this case, the robots are playing a vital role. So to overcome all those problems, we are creating a bot that performs tasks like spraying pesticides, grass cutting, and seed sowing. All these are controlled by a mobile application. We are implementing this to help the farmers lift heavy tanks and to decrease the amount of agricultural labor. The BOT can perform many tasks, whereas a human can't perform so many tasks. This bot will move in any direction as instructed, like in forwarding, backward, left, and right directions which are controlled with the help of a mobile application. The application can be installed from the play store for free, where everyone can install and use it. We have gone through a few

reference papers. With the help of those papers, we have gained a bit of knowledge, and we are implementing the same techniques in our project with different logic. [1] One of those papers is the Solar E-BOT, which has been operated with the help of solar energy. This bot performs operations like pesticide spraying, but the only drawback is the source of energy, which is solar energy. [2] And the other thing is the smart automated pesticide spraying bot, where this bot sprays the pesticide only and its source of supply is from the battery or the adaptor. In addition to this project, we are also adding a few things like grass cutting and seeding. [3] Agricultural Robot for Ploughing and Seeding. This bot performs only plowing and seeding. These are performed with the help of a mobile application that is operated manually by the owner. [4] Multipurpose Autonomous Agricultural Robot. [5] Autonomous Seed Sowing Agricultural Robot Jayakrishna P V S Suryavamsi Reddy, Jaswanth Sai, Susheel N, Peeyush K P. [6] AgriBot - An intelligent interactive interface to assist farmers in agricultural activities. [7] Automatic Agricultural Robot – Agrobot. [8] Pesticide spraying Remote Guided Vehicle using IDE Arduino UNO. [9] Design and Development of an Autonomous Pesticides Spraying Agricultural Drone. [10] Design and Development of an Agri-bot for Automatic Seeding and Watering Applications.

Contribution of works: As we are three authors, according to that the work was divided like one among us have done the coding part and the other one has made the connections and the other one has completed the documentation, research, preparing PPT and many other work. The work was divided accordingly and the result was successful.

II. METHODS AND MATERIALS

Farmers mainly use hand operated or fuel operated spray pump for this task. This conventional sprayer causes user fatigue due to excessive bulky and heavy

and also due to close interaction with the pesticides farmers are facing side effects like rashes on the body. This motivated us to design and fabricate a model that is basically robot based sprayer.

Arduino UNO

Arduino is an open-source electronics platform where it's easy to use hardware and software. It's a platform used for building electronic projects. An Arduino consists of both a physical programmable board and a bit of software, or IDE (Integrated Development Environment), that runs on your computer and is employed to put in writing and upload code to the physical board, to instruct the project we'd like to code the Arduino.



Fig: Arduino UNO

Bluetooth Module HC-06

The HC-06 may be a Bluetooth device used for wireless communication. It's a 6-pin module. The device is utilized in 2 modes; data mode and command mode. The info mode is employed for data transfer between devices, whereas the command mode is employed for changing the settings of the Bluetooth module.

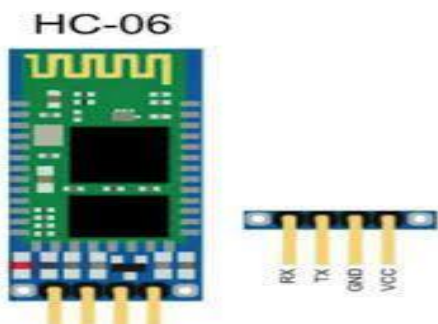


Fig: Bluetooth Module

Motor driver L293D

The L293D is intended to supply bidirectional drive currents of up to 600mA at voltages from 4.5 V to 36V. Both devices are designed to drive inductive

loads like relays, solenoids, dc, and bipolar stepping motors, also as other high-current devices. L293D acts as an interface between the Arduino and therefore the DC motors.

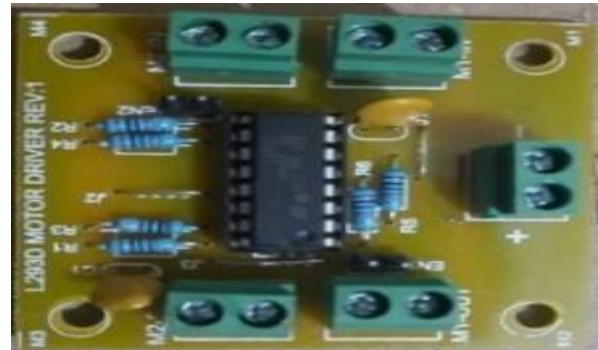


Fig: Motor driver L293D

DC Motor

A DC motor is any of a category of rotary electrical motors that convert DC current into energy. The foremost common types depend on the forces produced by magnetic fields. Nearly all sorts of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of the current part of the motor.



Fig: DC motor

Servo Motor

A servomotor could be an actuator or linear actuator that enables for precise control of angular or linear position, velocity, and acceleration. A servo motor can usually only turn 90° in either direction for a complete 180° movement.

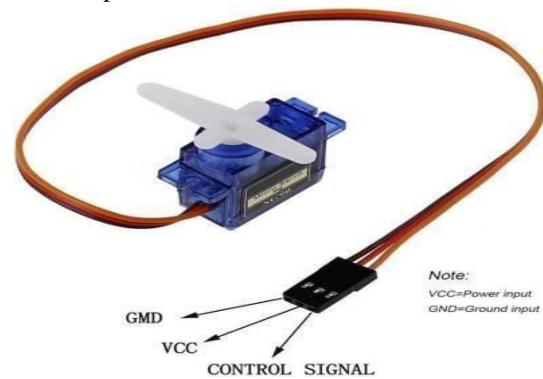


Fig: Servo motor

III. PROPOSED METHOD

The technique that we are implementing acts as a helping hand to the farmers to overcome many problems. Replacing the manual farming technique with present farming, which is a modern farming technique is quite interesting. The entry of robots into the fields is an amazing thing. In our proposed method, we are going to explain in detail the working and implementation of our bot. Our bot is operated manually by a human using a mobile application by connecting via Bluetooth. We are creating this project to reduce the burden on farmers of lifting heavy loads and of those dreadful diseases.

The concept is briefly divided into three parts:

1. Input part
2. Spraying pesticides, seeding, and grass cutting
3. Output part

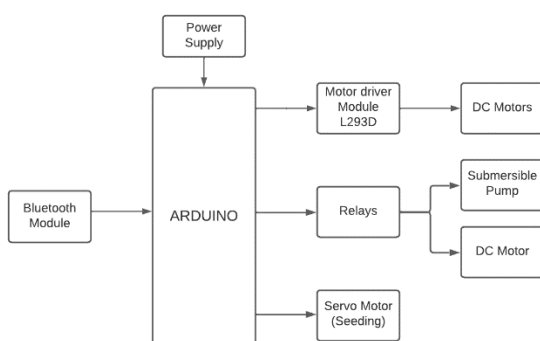


Fig: Block diagram

Input part

The input port is the most vital part where the facility supply is present, as this provides the facility to all or any of the components of the circuit, and also the next thing is the Bluetooth module, which is connected to the Arduino. The complete circuit is operated with Bluetooth which is connected to a portable.

Spraying pesticides, seeding, and grass cutting

As we have mentioned above, our project performs a few tasks like spraying pesticide, seeding, and grass cutting, so with the help of the motor driver, we are connecting the DC motors to the Arduino, where the motor driver acts as an interface between the Arduino and the motors. A pump and a servo motor are used at the nozzle for spraying the pesticide in a particular direction. A DC motor is used for grass cutting.

A relay is used to connect a submersible pump, and a DC motor is used to cut grass, which is connected to the Arduino via a relay.

Output part

The output part consists of a mobile application that is connected wirelessly through Bluetooth, and the whole circuit is operated with the help of Bluetooth.

IV. RESULTS

In the proposed method, the power source is the 12V battery. The 2 DC motors are controlling the BOT to move in forward, backward, left and right directions, a servo motor for seeding, a submersible pump for pesticide spraying, and finally, a gear DC motor for cutting the grass. The entire BOT was controlled by a Bluetooth module HC-06, and the range of this Bluetooth is 10 meters.

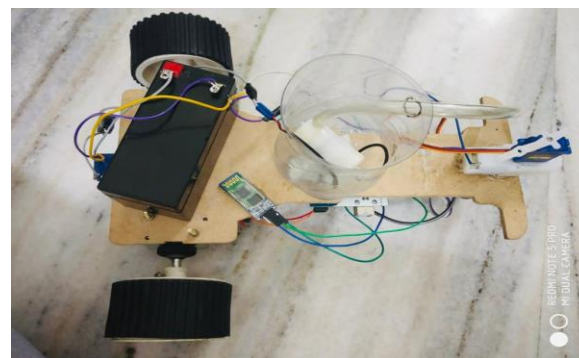


Fig: Frontend section of the BOT

Firstly, the frontend part of our BOT is as shown below, which contains the grass cutting, seeding, and sprayer.

A battery is also placed in the front end. It's a 12v battery, which is sufficient for the BOT to perform all the tasks like the movement of the BOT, pesticide spraying, cutting, and seeding.

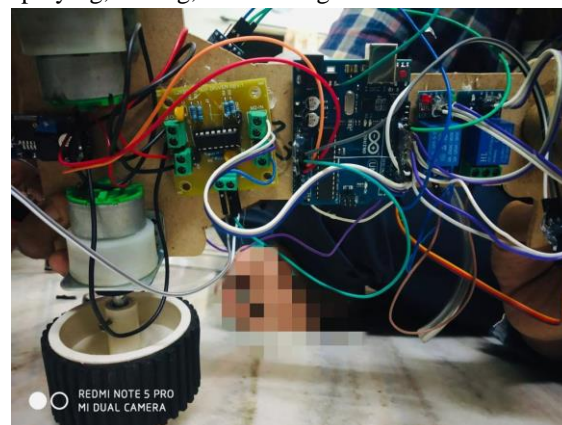


Fig: Backend section of the BOT

Next is the backend section. To make the BOT look simple and good, we made the connections and inverted them so that all the wires and connections couldn't be visible.

Grass cutting, seeding, and pesticide spraying have been operated separately throughout the application, where we can start them individually and stop them too.

V. CONCLUSION AND FUTURE SCOPE

An agricultural pesticide spraying robot is designed to reduce the amount of manual labor in the fields. The main strength and highlight of the project is the automatic spraying of pesticides, which is done automatically by the robot and can be controlled by Bluetooth. The only drawback is that we are using a Bluetooth module. We are in a plan of using a Wi-Fi module or node MCU in the future to overcome these drawbacks.

Further analysis can be focused on a Raspberry Pi microcontroller, which is very effective and efficiently used instead of the ongoing Arduino and Node MCU. A Camera can be used at the front of the BOT for better visuals during the operation. Without using any manual things, this can be operated using IoT with advanced features. We can even make drones too and educate farmers about those things, which would be easy to operate.

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