IOT BASED AGRI-BOT FOR SEEDING AND WATERING

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ABSTRACT

A third of our people relies on agriculture for their livelihood, making it the backbone of our country. The primary objective of this project is to employ agriculture robots, or Agri-bots, to lessen the workload of farmers. Bullock carts, tractors, tillers, and other agricultural implements were traditionally operated by humans. Modern agriculture's biggest issues are rising labor costs, insufficient understanding of soil testing, insufficient water storage, and a shortage of available workers. A robot for agriculture has been created to circumvent all of these limitations. The bot can plant seeds in any direction, spray water and fertilizer, and monitor soil moisture, kind, and nutrients. It also employs a number of approaches to keep tabs on the many actions that go into farming. To program the Agri-bot to move, plant seeds, and water plants, programmers utilize the ARUDINO IDE. To carry out the seeding procedure, an Arduino controls a dc motor. Keep the system's process under control. A certain number of seeds needed for a given field can be accessed through an aperture in a tank containing the corresponding seeds. One of the most time-consuming and culturally significant aspects of running a greenhouse is watering the plants. Whenever plants need water, watering systems make it easy to give it to them.

Keyword: Robot, Iot, esp8266.

1. INTRODUCTION

The field of agriculture is embracing the idea of artificial intelligence technologies. There is a growing presence of robots on farms in a variety of forms, and the potential for robots to increase agricultural output is enormous. Autonomous robots performing spraying and mechanical tasks in agriculture are in the near future. Efficient weed control, fruit selection, and round-the-clock farm monitoring for a fruitful report. For use in farming, there is a robot called an agri-bot. Its purpose is to make farmers' job easier while simultaneously making it faster and more precise. It carries out the most fundamental tasks associated with farming, such as collecting crops, applying pesticides, sowing seeds, and pulling weeds. Gradually, they start to reap the rewards in agricultural output, which include higher yield, more precise applications, and safer handling. Technology may help farmers utilize resources more efficiently, such as seeds, water, pesticides, fertilizers, etc., so they can increase production while minimizing the usage of these scarce commodities, which is becoming increasingly important as the world's population grows. One type of equipment that can carry out efficient work with the use of various calculation algorithms is the agricultural robot. Designing and intelligently controlling agriculture to make it safe and acceptable for everyone is made easier with the updated standard. The author of this research proposes a system where a robot can simultaneously start sowing and keep the soil wet. Since agriculture became a commercial industry, old manual farming practices have persisted. We tend to view individuals as intelligent, but they should display wise behavior in recognized contexts. However, despite the advent of a rapidly growing population and a corresponding increase in food scarcity, agriculture is seeing a decline in participation.

1.1 Objective

This project's overarching goal is to develop and propose an Agri-Bot, a seeding and watering robot that can help farmers save time and money by precisely placing seeds, watering plants, and spraying nutrients. One of the most fundamental tasks in farming is planting seeds. Time and a large amount of human work are needed for this. Using an Arduino to manage the system's processes, a dc motor facilitates the seeding procedure. A conveyor belt with grooves spaced at regular intervals may hold one seed in the sowing mechanism. An aperture in the tank contains the seeds for each crop, and the system is set up to only let in the exact number of seeds needed for that crop.

2. SYSTEM ANALYSIS

2.1 Existing System

The current setup includes the following components: a master microcontroller (ATMEGA2560) and a slave microcontroller (ATMEGA8), both of which are integrated with sensors, grippers, cameras, and other indications (diode, LCD, etc.). A single robot would carry out all the tasks associated with the proposed system—planting, watering, fertilizing, monitoring, and harvesting—automatically. When needed, the gripper arrangement with an arm can be used to spray insecticides onto plants, harvest crops, or both. The growth of the plant may be monitored with the help of the camera.

2.2 Proposed System

A 2 mm-thick metallic element sheet forms the frame of the device designed to automate the seeding process. It has a rectangular form. The created robot is a wheeled robot. The following components make it up. A battery powers the suggested model. DC motors are mounted on wheels so that they may move. You won't lose a single seed when you transfer them from the seed drum to the planting tray. For accurate field navigation when planting, a

DC motor is located on the front panel. In order to plant the second row of seeds, you must turn the seeds over after each row. In order to do this, an application uses a sensor to determine when the line is about to terminate. Conventionally, seeding is done in a single row and then transferred to the second row by hand. Incorporating sensors into this suggested paradigm lessens the need for human involvement. A sensor is linked to a Node MCU, which then controls the system. The L293D driver circuit regulates the DC motor. Due to the efficiency of the seeding equipment, less time and labor are required. Mobile phones and seeding systems can communicate with GSM modules. Seeding system hopper opening and closing is thereafter accomplished by means of the servomotor. It has no effect on plant development rate or yield, is sown at the proper depth, and neither slows nor speeds it up. Precise rows of seeds planted precisely produce abundant food and stimulate economic development. The technology is eco-friendly since it uses a DC motor that is driven by a rechargeable battery.

3. Block Diagram

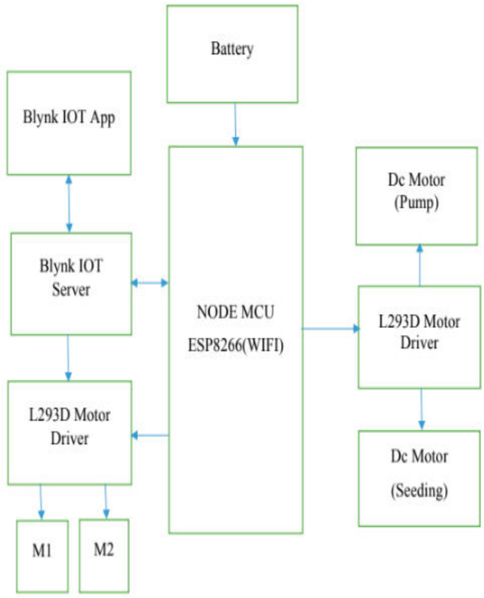

Figure 3.1 Block Diagram.

3.1 Rechargeable Battery

The robot can't begin its operations without a battery. At the moment, the majority of 12V batteries on the market are lithium-ion models. Advantages: Compared to lead-acid 12V batteries, lithium-ion 12V batteries have a lot more to offer. Instead of using acid or any other liquid to increase their capacity, lithium-ion batteries employ lithium salt. As an improvement over lead-acid batteries, lithium-ion batteries make electronic batteries safer and less harmful to the environment. The price of 12V lithium-ion batteries is higher than that of other battery types. The robot's functions are powered by a battery, and the electrical energy is transferred to the external circuit as a result of the free-energy differential. The term "altitude" has traditionally referred to handheld electrical gadgets.

Figure 3.2 Battery.

3.2 NODE MCU ESP 8266(Wi-Fi)

One open-source IoT platform that is inexpensive is the Node MCU. The original hardware and firmware were based on the Espressif Systems ESP-12 module and the ESP8266 Wi-Fi system on a chip, respectively. Support for the ESP32 32-bit microcontroller unit was later added. The firmware for the Node MCU is open source, and there are designs for prototype boards that are also open source. A combination of the words "node" and "MCU" (micro-controller unit) forms the moniker "Node MCU."[8] In a technical sense, the "Node MCU" is more a reference to the firmware than the development kits that go along with it. You may find the designs for the prototype board and firmware online. A scripting language called Lua is utilized by the firmware. The firmware was developed using the Espressif Non-OS SDK for ESP8266 and is based on the Elua project. Open source programs like SPIFFS and lua-cjson are utilized. Users must choose the appropriate modules for their project and create a firmware that suits their demands because of limited resources. As an added bonus, we now support the 32-bit ESP32. Commonly used circuit boards for prototyping include a smaller surface-mounted board with the microcontroller unit (MCU) and antenna, as well as a larger board that acts as a dual in-line package (DIP) and incorporates a USB controller. Prototyping on breadboards is made easier with the DIP format. The original inspiration for the idea came from the ESP-12 module of the ESP8266. This particular module is an Internet of Things (IoT) hotspot that incorporates a Ten silica Xtensa LX106 core into a Wi-Fi system on a chip.

Figure 3.3 Node MCU ESP 8266

3.3 L293D MOTOR DRIVER

To move the robot's wheels, a motor is required. Embedded applications may take use of the L293D motor driver, which offers simple and intuitive user interfaces. The L293D motor driver is attached to a high-quality, one-sided, non-PTH printed circuit board. To facilitate access to the pin functionalities of the L293D motor driver IC, the IC's pins are attached to connectors. With a supply voltage of up to 24V, the L293D, a dual full bridge driver, can drive up to 1Amp per bridge. One or more DC motors, relays, solenoids, etc., can be driven by it. You may use it with any TTL sensor. If you want to make its current capacity 2 Amp, you may connect two L293D H bridges in parallel.

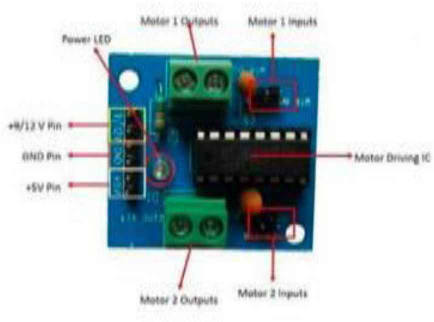

Figure 3.4 L293D Motor Driver

3.4 DC MOTOR

Electric machines that transform electrical energy into mechanical energy are known as direct current (DC) motors. DC motors transform mechanical rotation into electrical power by use of direct current. One kind of electric motor that may transform electrical energy into mechanical energy is the direct current (DC) motor. Any electric motor that runs on direct current (DC) is referred to as a DC motor according to the previous definition. In what follows, you will learn about the parts of a DC motor and how they work to transform the direct current (DC) electrical energy that is given into mechanical energy.

Figure 3.5 Dc Motor

4. Schematic Diagram

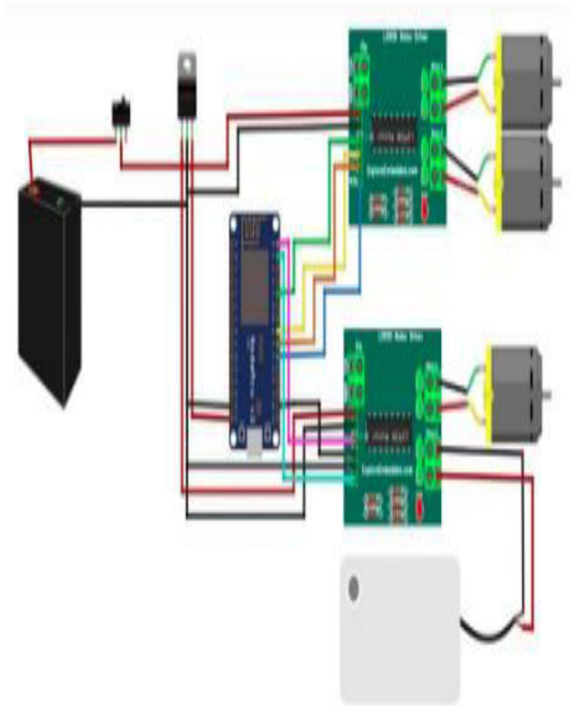

Figure 4.1 Schematic Diagram.

5. Flow Diagram

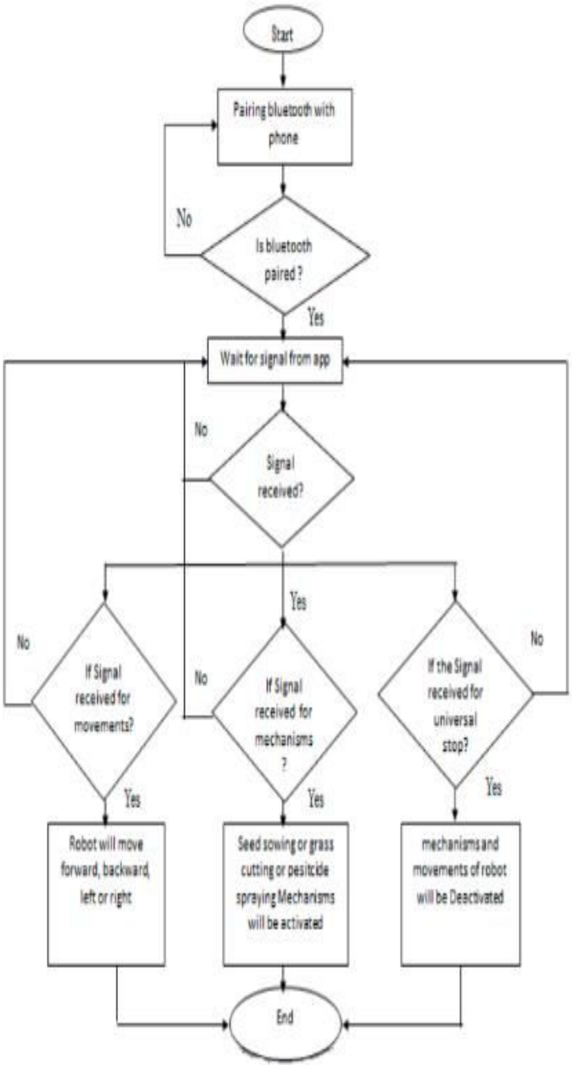

Figure.5.1 Flow Diagram.

6. RESULT AND DISCUSSION

The Agri-bot is a mechanized agricultural tool that alleviates some of the physical labor involved in crop production. When compared to traditional agricultural methods, such as sowing and watering, the Agri-bot is significantly more efficient, accurate, and requires far less human intervention.

1. To begin the seeding process, hit the seeding button.

2. Pressing the forward button on the remote will cause Agri-bot to advance while sowing.

3. When you push the backward button when sowing, Agri-bot will go backward.
4. By pressing the Rotate button on the remote, the Agri-bot may rotate during sowing.

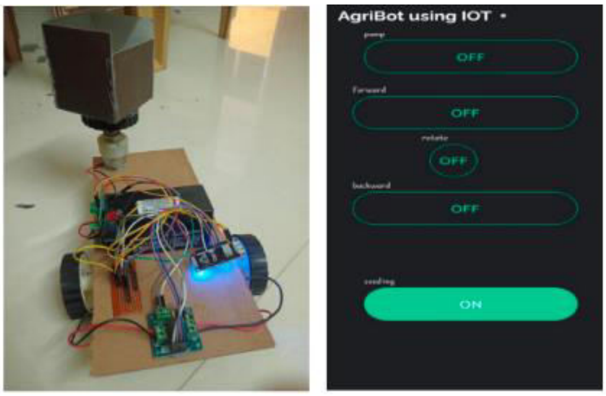

Figure 6.1 IOT Based Agri-bot for seeding.

Drones engineered for chemical application are known as "agricultural spraying drones," and they have tanks for storing and dispersing liquids, as well as spray nozzles. Granular chemicals may be properly distributed using spreaders that can be attached to them. Drones used for spraying cut down on expenses and labor compared to more conventional ways. Drones can effortlessly traverse big regions faster than massive machines or human work.

1. When you hit the pump button, the pumping process will begin.

2. Second, pressing the forward button will cause the Agri-bot to advance while pumping water.

3. Pressing the reverse button causes the Agri-bot to go backward while pumping water.

4. By pressing the Rotate button on the remote, the Agri-bot may rotate while pumping water.

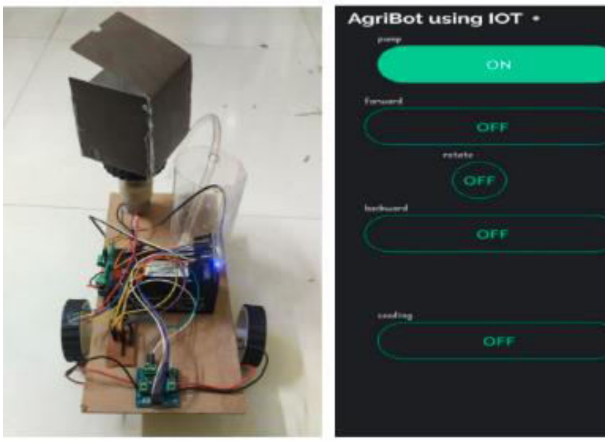

Figure 6.2 IOT Based Agri-Bot for Watering.

6.2 NUMERICAL REPRESENTATION OF INPUT CORRESPONDING OUTPUTS

ELEMENT	INPUT	OUTPUT
L293D Motor Driver	Direction	Forward, Backward movements
Dc Motor	Rotation	It will dispense the seeds when we turn ON, otherwise not
Dc Pump	Pumping	It will pump the water when we turn ON, otherwise not

Table 6.2.1 Numerical Representation of Results

7. CONCLUSION

We have developed an Agri-bot, a type of agricultural robot, that is capable of watering, planting, fertilizing, and applying pesticides. Using less energy and fewer people.

7.1 FUTURE SCOPE

Because its sole purpose is to sow seeds and spray pesticides under the direction of an internet connection, the Agri-bot is uniquely suited for these tasks. It is possible to improve the present project work by adding the following features: If you want to know what kind of fertilizer or pesticide will work best on your soil, you may use a pH meter to find out. Soil moisture content may be determined with the use of a moisture level sensor. It is possible to improve the present project work by adding the following features: Care for various plant species and assist with weed control in agricultural settings.

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