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Bluetooth Based Agrobot Used to Spray the Pesticides

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Abstract: ***The agricultural robot, or Agrobot, that was created here is meant to spray pesticides on the crops. The purpose of a Bluetooth device is to enable mobile phone remote control of a robot. Because it is dangerous for people to be close to the sprayer when deadly chemicals are being sprayed over agricultural fields, this remote-operated sprayer was created so that it can be used from a safelocation.***

For wireless communication across short distances, there is a protocol called Bluetooth. A cell phone can be used to control agricultural equipment including machines for spreading urea, sowing seeds, and pulling weeds with the use of a Bluetooth device connectedto an embedded system. This straightforward technique is made to spray liquid pesticides in this regard.

As a machine control unit that receives command signals from the mobile phone, the Bluetooth device interfaced with embedded systemis created.

The moving mechanism is covered with this control circuit, its power supply, rechargeable batteries, and other devices, including DC motors. This mechanism can be controlled using a cell phone using an android application or an app placed on any smart phone.

With the aid of this programme, users can wirelessly send commands through Bluetooth to the control system. The robot's movement can be controlled by a Bluetooth device connected to an 89C51 microprocessor chip. The mechanism is moved by two DC motors that are each individually controlled by an H Bridge IC.When necessary, liquid pesticide can be sprayed from the vehicle holding a small liquid tank over its chassis using a liquid pumping motor attached to the tanker's body. This pumping motor is likewise operated by the same cell phone.

Keywords: 12V Battery, HC-Bluetooth module, 89C52 microcontroller

I. INTRODUCTION

Almost all appliances, whether they are residential or industrial, including agricultural machinery, can now be perfectly monitored and controlled thanks to technological advancements, especially in the area of Bluetooth communication and control systems. In light of this, we suggest a pesticide spraying system that can be operated by Bluetooth technology on any smart phone. The Bluetooth device is interfaced with the 89c51/52 microcontroller chip that is used to create the control circuit. In order to accomplish this, a wireless connection between a mobile phone and the vehicle control circuit is established using the HC-05 Bluetooth device.

One of the most widely used device-to-device communication protocols is UART (Universal Asynchronous Receiver–Transmitter), which operates on serial communication.

In order to create wireless communication between devices, communication protocol is crucial. Depending on the needs of the system, it can be designed in many ways. UART is a type of hardware communication protocol that is frequently used by embedded systems or microcontroller units. With two wires for both the transmission and receiving ends, UART can be connected to a microcontroller chip.

Regarding the Bluetooth module utilised here, it has six pins, and four of them are widely referred to as the Vcc pin, which needs a stable supply of +5 volts DC, Ground pin, Tx pin, and Rx pin. The gadget has two modes of operation: I, e, data mode, and command mode. While command mode is used to operate the device through, data mode is used to transfer data between devices.

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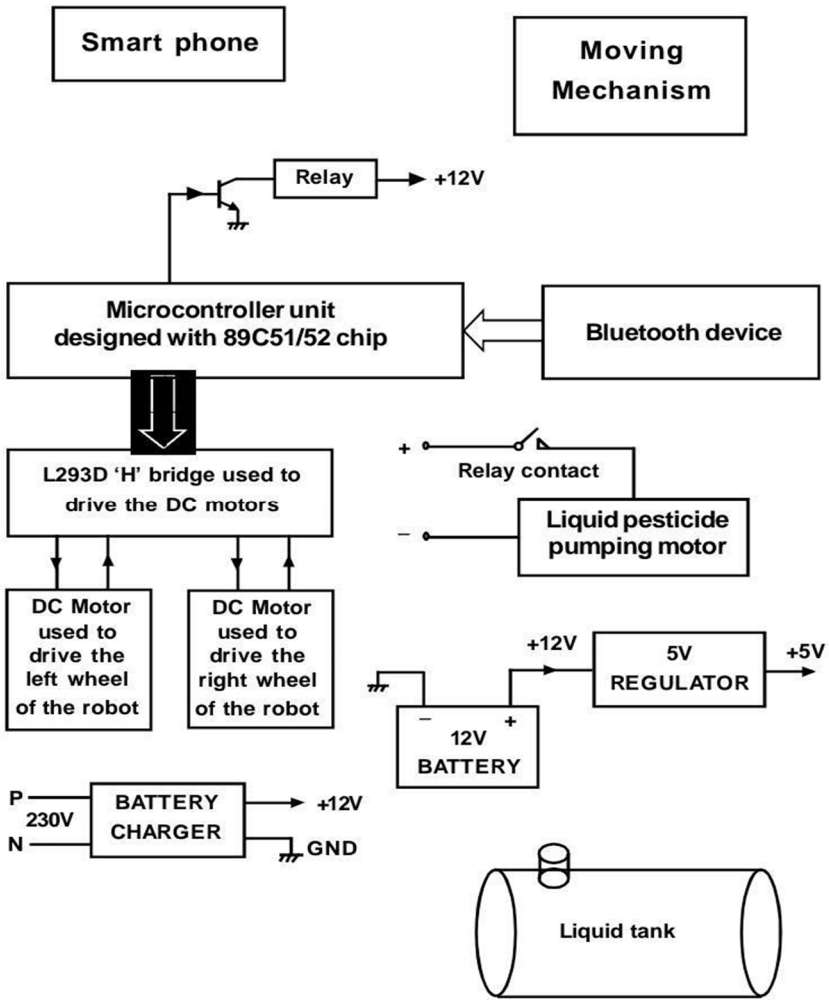
II. BLOCK DIAGRAM



III. LITERATURE SURVEY

Plant diseases have created a significant post-effect scenario because they can drastically reduce agricultural products in terms of both quality and quantity, according to Dr. M.G. Sumithra and G.R. Gayathiri's proposal in their paper "Leaf Disease Diagnosis and Pesticide Spraying Using Agricultural Robot (AGROBOT)". A significant problem when it comes to planting crops is the early detection of pests. In the initial period, plants are carefully and regularly observed. The afflicted parts of the plants will then be photographed using scanners or cameras after the impacted plants have been identified. Following pre-processing, these photos are converted and grouped. These images are then provided to the processor as input, where the processor compares the images. An automated pesticide sprayer will be utilised to spray if the image is impacted.

In their paper titled "Autonomous Pesticide Spraying Robot for use in a Greenhouse," Philip J. Sammons, Tomonari Furukawa, and Andrew Bulgin suggested that one possible engineering solution to the current risks to human health involves spraying potentially toxic chemicals in the cramped environment of a hot, steamy glasshouse. To do this, a self-contained mobile robot that can be used in commercial greenhouses as a tool for disease prevention and insect control is designed and built. The effectiveness of this strategy is demonstrated by the platforms' capacity to move smoothly through greenhouse rows and the pesticide spraying system's ability to evenly cover the plants with the required dosages of spray. The outcomes demonstrated that the robot could pass the physical requirements established by the National Greenhouse Horticulture Centre in order to operate in those greenhouses. The robot also accommodated schedule and financial restrictions. The robot was able to move around the tracks inside the greenhouse. The Induction Proximity Sensors perform adequately and sense the rails properly. When moving along tracks, the spraying system created by another thesis candidate was able to selectively spray certain plant groups in the greenhouse. The crops received a sufficient and reliable dosage of the spray protection.

The authors of Precision Farming: A Global Overview, Naiqian Zhang, Maohua Wang, and Ning Wang, suggested that the previous two years have seen the most significant advancements in precision farming technologies. Themes covered include variation in natural resources, management of uncertainty, management of area, impacts of precision farming technologies on farm productivity and the environment, technological advancements in sensors, controls, and remote sensing, data management, applications globally, and development of accuracy farming technologies, as well as the innovation potential of China's agricultural modernization

IV. WORKFLOW PROCESS

This chapter explains the functional description of the project's work. Each block's explanation is given below for your convenience. The following chapter contains the project's diagrams (block diagram and circuit diagram). The general purpose or mode of operation of the projectwork is described in the paragraphs that follow.

The main purpose of the application is to control agricultural robots. In order to replicate pesticide robots, a 4-wheeled moving mechanismwill be built and powered by DC motors. A motor for pumping liquid is mounted to the chassis of this moving device, which carries a small liquid tank. When the motor is turned on, the small liquid sprinkler attached to it can spray the liquid. Through a smart phone that is in wirelesscommunication with a Bluetooth device, this motor can be powered on or off.

The controller chip may receive the instruction code from the blue tooth device connected to the main processing unit built with an 89C51/52 microcontroller chip. Here, the entire system is managed by 6 separate command codes. The car has four different directions it can go in: forward, reverse, left turn, and right turn. Similar to how the pumping motor is regulated independently, we also require six command codes that can be created and sent by a cell phone.

The entire circuit diagram for controlling the AGROBOT through smartphone is presented at the end of this chapter. Since Bluetooth technology is the primary topic of this project effort, it is thoroughly discussed in the following chapters. An overview of sensing and controlling technologies as they apply to autonomous machines is given at the beginning of the circuit description. A moving mechanism can be driven by DC motors using a system built with a microcontroller. The car responds to the command signal received from the mobile device

V. IMPLEMENTATION

Grass cutting, pesticide application, and seeding will all be done concurrently by a specially designed robot. Heat from the solar panel turns sunlight into power. The charging circuit receives this electrical energy. In order to provide pulsed voltage and prevent reverse current, the charging circuit will operate in accordance with the maximum power point tracking (MPPT) protocol. To charge the battery, the pulsed voltage is applied. Voltage sensors are used to regulate the battery's charge. Due to its bidirectionality, the battery can charge and supply voltage to the Arduino simultaneously. High pass filtering is used to feed the power supply with sustained oscillation into the Arduino.All separate mechanisms receive voltage feed via the channel relay. The DC motors that power the robot are driven by the motor driver. The device uses a bluetooth HC-05 and an android app to send and receive signals, respectively. The robot waits till the app sends signals. The appropriate procedures will be activated and the robot will operate as necessary once the signal is received. The basic idea of the work is realised in the prototype, which has many output portions. the whole automated multifunctional robot prototype that can be managed by an app.On all different kinds of agricultural land, it concurrently carries out seeding, mowing the lawn, and pesticide application. Screenshot of the Bluetooth/Android App-Powered Automated Seed Sowing, Grass Cutting, and Pesticide Sprayer Robot. In order to charge the battery to 12 V, which will provide the necessary power to the controller, DC motor, and various mechanisms, the solar panel displayed in stores converts solar energy into electrical energy. The robot is controlled by a bluetooth/android app that has 12 keys.

When connecting an app with the HC-05 module, scan keys are utilised, and set keys are used to add additional keys as needed. The robot can be moved by pressing the stop, right, left, forward, and reverse keys. The remaining keys, such as grass, spray, and see dare.

VI. CONCLUSION

The "Bluetooth based Agrobot used to spray the pesticides" project work was successfully created and built. A prototype moduleis built for demonstration purposes, and the results are satisfactory. We sought the advice of a few experts with understanding in Mechatronics when designing and developing this prototype module. These professionals, who work for various organisations in Hyderabad, helped us when we were fabricating the spraying robot. Since it is a prototype module, little money is invested, and the entire machine is built with locally accessible parts. In particular, the mechanical components used in this project work were purchased from mechanical fabricators, and they do not meet the requirements. As a result, many design modifications must be made in order to make it as realistic as possible.

This research demonstrated how to construct a spraying robot with great precision and reasonable cost that can be operated by smartphone. The purpose of remote control utilising a phone is to increase operator safety. The system now only has a range of about 30 feet because it uses bluetooth technology, which has a lower transmission strength. This range should be adequate depending on the size of the Agrobot. For operating this type of machine, a range restriction is usually necessary because it cannot be operated for an extended period of time without sufficient visibility. For actual applications, a higher range wireless communication system can be created employing RF modules with a high transmitting power for farther ranges depending on the size of the Agrobot.

VII. FUTURE SCOPE

The Android application is used to implement the Smart halting framework in light of Slot booking. We can reserve our own least priced stopping space by using the space part approach. It is useful for dealing with traffic problems because it beats bottlenecks and offers computerised charging. This work might also be completed as a fully automated framework using a multi-facet halting mechanism. It is also possible to plan safety measures like programmed charging processes and following thecar number and face recognition of the drivers to prevent robberies. We want to expand the real-world testing so that customers can use the "Savvy Stopping" framework on their mobile devices.

VIII. ACKNOWLEDGEMENT

We hereby declare that the work described in the Project report, entitled “Bluetooth Based Agrobot Used To Spray The Pesticides" which is being submitted by us in partial fulfillment for the award of Bachelor of Technology in the Dept. of Electronics & Communication Engineering, Sreenidhi Institute of Science & Technology affiliated to Jawaharlal Nehru Technological University Hyderabad, Kukatpally, Hyderabad (Telangana) is the work on our own effort and has not been submitted elsewhere.

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Place: Hyderabad
Date: -June-2022.

Name of the Candidate:
Moggam Sunny 18311A04F2

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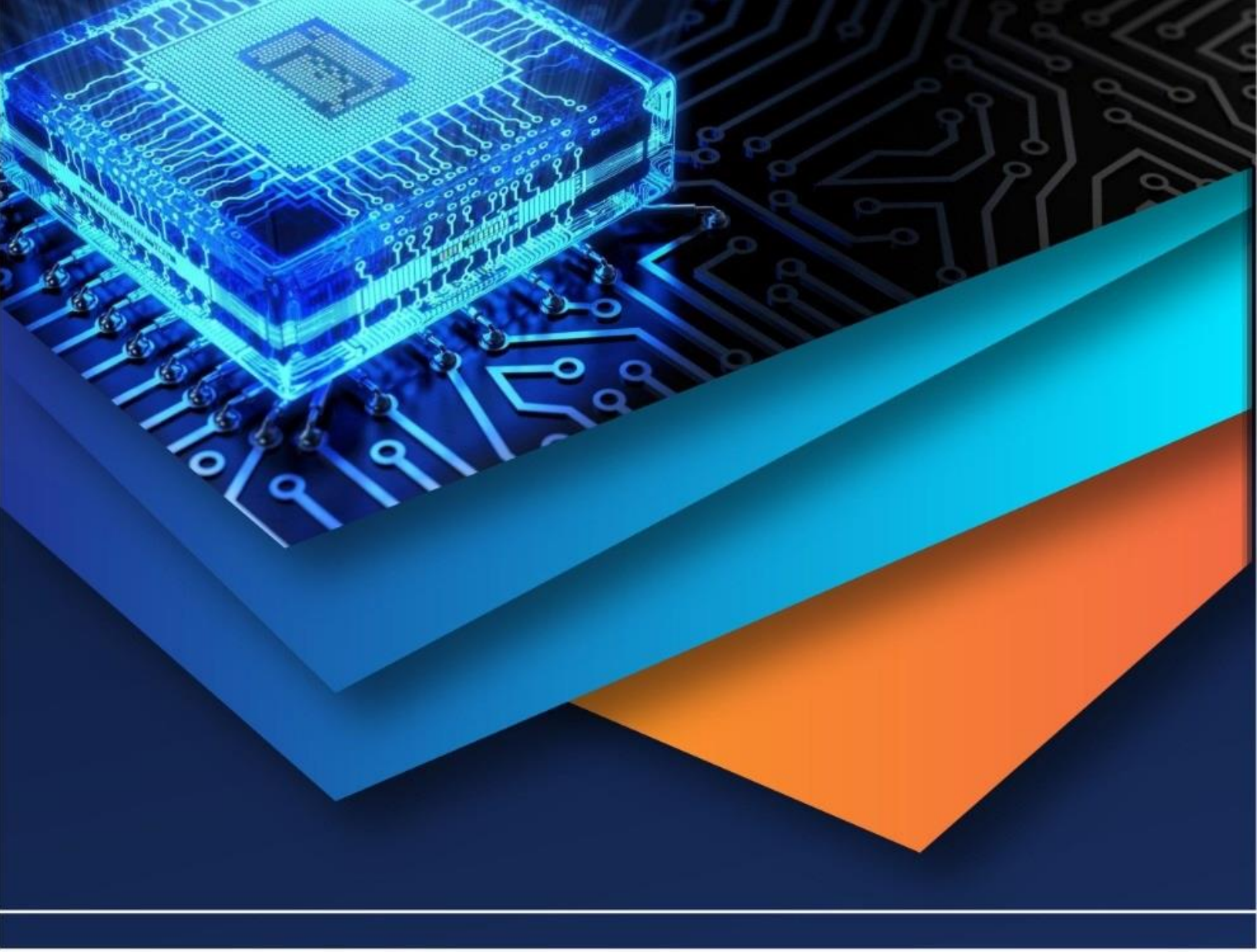

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