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BLUETOOTH EMBEDDED ROBOTIC WITH AGRICULTURE SEEDING AND GRASS CUTTING POWERED BY SOLAR ENENGY

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Abstract— Nearly 70% of the population in India depends on agriculture. Therefore, India's agricultural system needs to be improved to lessen the burden on farmers. In the agricultural sector, numerous operations are carried out, such as seeding, weeding, cutting down waste plants, and ploughing. Plant cutting and seeding are very basic but important operations. However, there are issues with the current plant-cutting, plowing, and sowing techniques. The tools used for seed planting are quite cumbersome and difficult to operate. Therefore, it is necessary to create machinery that will lessen the work required from farmers. This method includes a control mechanism that seeks to scatter seeds while sowing at a specific location with a set spacing between two seeds and lines. With the help of this automated system, the shortcomings of the current system will be successfully eliminated.

Keywords— Microcontroller (Renesas 64 Bit), Ultrasonic Sensor, L293, Four Wheels, Relay.

I. INTRODUCTION

Traditional agricultural practices involve manual labour for each action, such as manual seed sowing, which results in poor seed placement and requires a lot of time and manpower. Modern times will make seed planting better and provide more benefits than earlier times. There are numerous machinery for cultivating and sowing plants, irrigation, plowing, and other aspects of modern agriculture. Robotic technology can replace the use of automatic robot motion and allow for monitoring during seeding. Today, numerous technologies and equipment are developed to boost crop production efficiency and enhance agricultural performance.

Technology did not advance significantly in the past. So they were hand-seeding, hand-plowing, and hand-cutting plants. However, technology has advanced recently. Therefore, it is no longer required to sow seeds in the sun. One can observe the robot's movement while seeding while sitting in a cool environment thanks to robot technology. In order to increase productivity and efficiency, the agriculture sector needs to identify innovative ways to operate. Farmers encounter a variety of issues in the realm of agriculture when performing tasks like weeding, cutting trash plants, and spreading seeds.

II. RELATED WORK

In [1], the author used a set of picture processing rules and MATLAB software to examine the effectiveness of seed-sowing devices. This study provides insight into the effects of seed intensity; it leaves out seeding ratio, overall tool performance, seed germination, and crop production efficiency. The research focuses on a comparison between the conventional sowing method and a new proposed system that may execute numerous simultaneous operations. This proposed device is made in such a way that it accomplishes the following operations: row to row spacing, seed rate, seed to seed spacing, and fertiliser placement vary depending on the crop. This device cuts down on labour costs, labour hours, and sowing time.

In [2], the inventor researched the machine's ability to conduct tasks including sowing and fertilising as well as analyse soil PH, temperature, moisture, and humidity. The robot is made in such a way that it engages in the aforementioned sports while being controlled and observed by a managed remote that is connected to the internet.

In [3], the author looked at a robot platform that engages in high-speed recreation for an advanced agriculture system that involves cultivation. The robot machine is a synthetic, electromechanical agent that moves quickly on its four feet owing to a dc motor, giving the impression that it has a mind of its own. The system is used to cultivate the farm, taking into account the crop while considering precise rows and specific columns. The infrared sensor uses sensor technology to

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navigate the car at turning function at a halt of Land and detect obstructions in the direction. With the aid of water strain, the seed block may be found and resolved. Remote control functionality is provided for the gadget, and a solar panel charges a dc battery. The assembly language programming language is used to programme microcontrollers, which are used to control and observe how a device moves a vehicle using a dc motor.

III. PROPOSED SYSTEM

This paper's main objective is to describe agricultural processes including plowing, sowing, and minimising waste plants (grass). With the use of Android software and robot technology, the farmer may control and complete the tasks listed above by giving the device their input, and the robot will carry out the task in accordance with their input.

A. Ploughing

That is a device for agriculture used to turn or loosen the soil before to planting or spreading seeds. Traditional agricultural methods used oxen and horses to pull the plough, while modern farming practises use tractors. A blade attached to a wooden, iron, or steel body of a plough is used to cut and loosen dirt. Heavy machinery, animals, and people are used in the traditional method of ploughing. The animals might suffer great injury from that kind of plough. One tiller is utilised to till the ground on the suggested device. With the use of this computerised technology, farmers can easily plough their area by giving the system instructions.

Figure 1: Ploughing

B. Seeding

A compressor seed planter or a seed distributor that can precisely and effectively scatter seeds over a specified area could be included on the robotic platform Using Bluetooth technology, the seeding mechanism may be remotely managed, enabling farmers to adjust the sowing pattern and density according to with their unique needs.

Figure 2: Seeding

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C. Grass Cutting

A lawn-cutting device, such as a mower or trimmer, that can efficiently and uniformly cut grass could also be added to the robotic platform. Bluetooth technology might be used to remotely operate the grass-cutting mechanism, enabling farmers to change the cutting height, pace, and direction based on the desired grass length and coverage.

Figure 3: Grass Cutting

BLOCK DIAGRAM

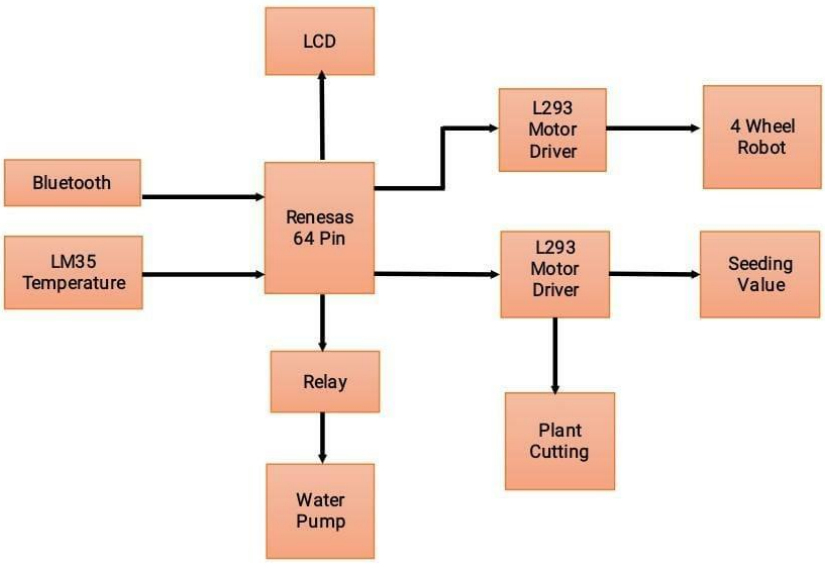

Figure 4: System Architecture

Bluetooth Connectivity: The robotic platform would be equipped with Bluetooth technology, enabling wireless communication with other devices like remote controls or mobile apps. This would make operating the robot more convenient and effective by allowing farmers or operators to control and monitor it remotely. Bluetooth is a Wi-Fi generation widely used for creating personal area networks (pans) and exchanging data over short distances between fixed and mobile devices using short-wavelength uhf radio waves in the industrial, medical, and clinical radio bands, from 2.402 GHz to 2.480 GHz.

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Figure 5: Bluetooth Module

Ultrasonic: The hc-05 ranging module offers a non-touch measurement range of 2 to 400 cm with a 3 mm accuracy. Ultrasonic transmitters, a receiver, and a control circuit make up the modules.

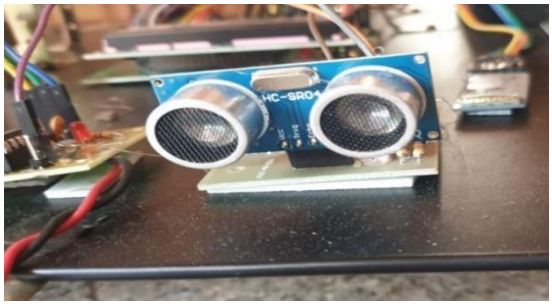

Figure 6: Ultrasonic Sensor

Microcontroller: We are utilising a Renesas 64-bit microcontroller. The electrical segment, communication segment, and controller phase are the three divisions of the microcontroller.

Figure 7: Renesas Microcontroller

Liquid crystal display: A liquid crystal show that allows the LCD display to show the entire process. this was connected to the microcontroller's 16-pin (1x16) connector.

Figure 8: LCD display

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Relays are transfers that are controlled by electricity. The magnetic field produced by the relay pulls a lever and modifies the switch contacts. Relays have two transfer positions and generally include double throw (changeover) transfer contacts because the coil today may be on or off. Relays allow one circuit to switch a second circuit that could be entirely independent from the primary. Relays having four sets of switch contacts, for instance, are readily available. Commonly used relays are normally spdt or dpdt, but they can have many more.

IV. WORKING

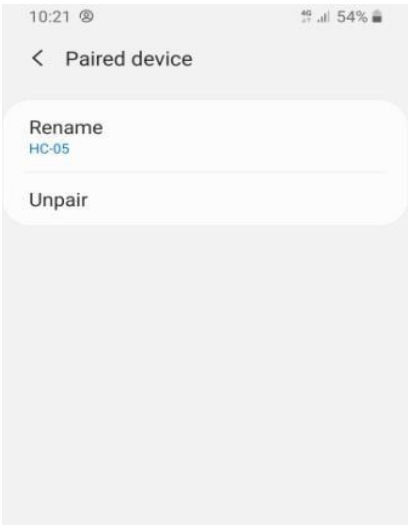

Figure 9: Pairing device

To open the utility, the user must first link their Bluetooth device, as shown in the above illustration. The gadget is called hc-05. Without pairing the device, a person cannot log into the software.

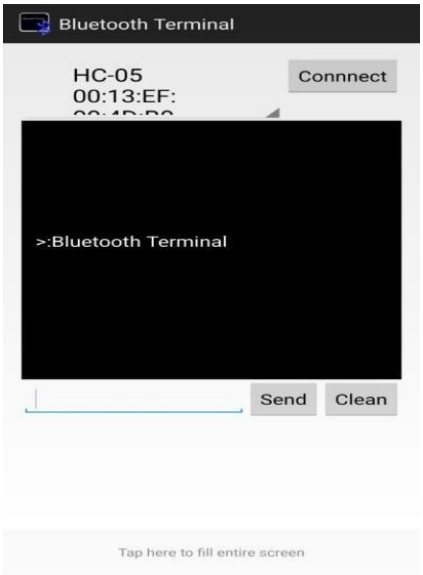

Figure 10: Bluetooth terminal utility

The software Bluetooth terminal is used to deliver input to the robot device by allowing us to choose operations like plowing, sowing, and grass cutting. We can also send cycles and steps as input to the robot device, as illustrated in the following diagram.

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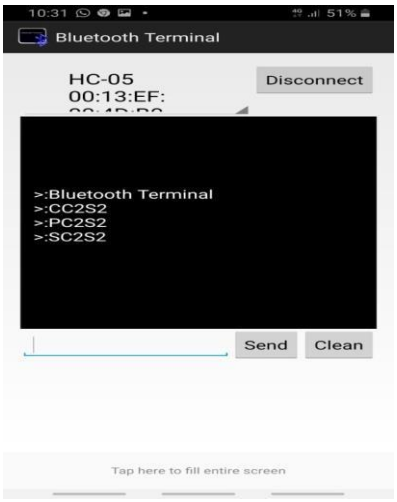

Figure 11: Inputs given

Simulation Running Process

Figure 12: Cube suite+ web page

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As seen in the figure above, the simulation was carried out using the cube suite+.

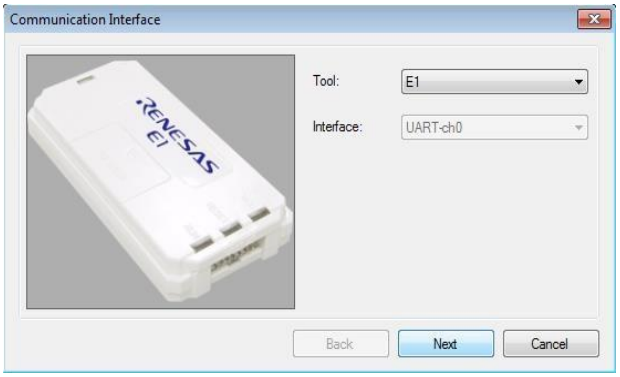

Figure 13: Flash programmer using Renesas flashprogrammer- choose emulator.
As seen above, this is the very last phase in the simulation. For the simulation system to finish, click on begin.

V. RESULT & DISCUSSION

The agricultural robot receives input from the utility and uses a Bluetooth module to play all the sports that the person has chosen. Effects of each agricultural robot module.

1) Grass cutting: dc motor is connected with blades toreduce the grass successfully. (as shown in Figure.14)

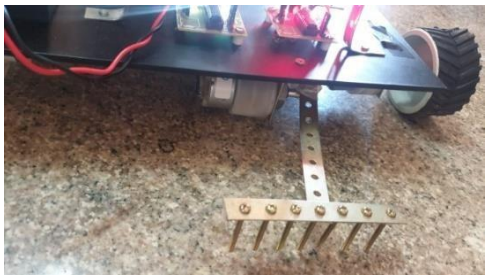

Figure 14: Grass Cutting

2) When ploughing, the screw-powered plough arm descends to plough the earth before being raised (as depicted in Figure 15).

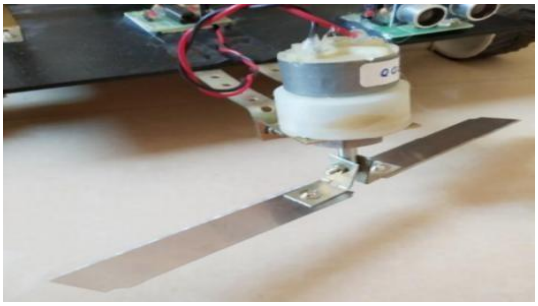

Figure 15: Ploughing

3) Seeding: seeds are dropped from the funnel the usage of the open-near movement of values at identical periods (as shown inFigure.16)

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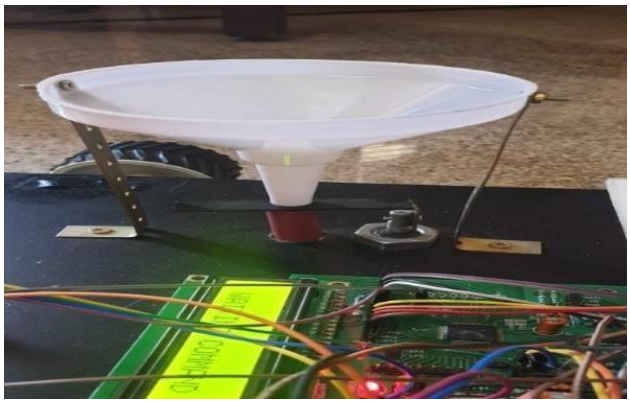

Figure 17: Seeding

VI. CONCLUSION

In its totality, a solar-powered, Bluetooth-enabled robotic system for sowing and cutting grass in agriculture has the potential to revolutionise current agricultural techniques by offering a productive, long-lasting, and remote-controlled solution. It might enhance the regularity of grass cutting, the accuracy of seed sowing, and energy efficiency, resulting in increased crop yields, better grass management, and a less environmental effect.

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