REMOTE-CONTROLLED SEED SOWING AND WATER SPRAYING ROBOT

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Abstract. Agriculture is one of the most important field in life of human being. It is a backbone of our country's economic system. To improve from manual farming to industrial farming, we have designed and developed a remotely controlled robot for seed sowing and water spraying in agricultural fields. This robot is controlled via Bluetooth controller application and is built using Arduino to efficiently plant seeds and sprinkle water. The seeds fall from the seed drums and the seed plantation process can take place smoothly as well as without wastage of seeds. After completing the seed sowing process, pouching system to cover the scattered seeds. If there is any necessity of water we will use the water pump which is controlled through mobile.

Keywords: seed sowing, water spraying, mobile control, agricultural robotic

INTRODUCTION

Agriculture is essential for humans, populations, and communities; however, it has some new advanced problems such as labor force, resource management, and sustainability. The conventional farming techniques usually involve the use of labor, and this is cheap, time-consuming and many times it involves mistakes. In light of these challenges, this project seeks to design Remote-controlled Seed Sowing and Water Spraying Robot among farms in order to improve on efficiency and sustainability of farming.

PROBLEM

Traditional seed sowing and water spraying methods face significant challenges that impact agricultural productivity and resource efficiency. Manual seed sowing techniques often result in uneven seed distribution and inconsistent planting depth, leading to poor crop germination and reduced yields. Similarly, conventional spraying methods are prone to inefficiencies. This results in water wastage and suboptimal crop growth. These issues not only affect the financial stability of farmers by reducing crop yields but also contribute to environmental problems. To address these problems, we propose leveraging Arduino-based technology to remote-controlled and optimize both seed sowing and water spraying processes.

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APPROACH

Our approach integrates Arduino-based technology to optimize seed sowing and water spraying processes. Required resources include an Arduino microcontroller board, sensors, actuators like motors for seed dispensing and water spraying, wheels, relay, Bluetooth module, servo motor, water pump and a power supply (battery). Utilizing the Arduino Integrated Development Environment (IDE) and programming languages such as C/C++, the focus is on developing software algorithms.

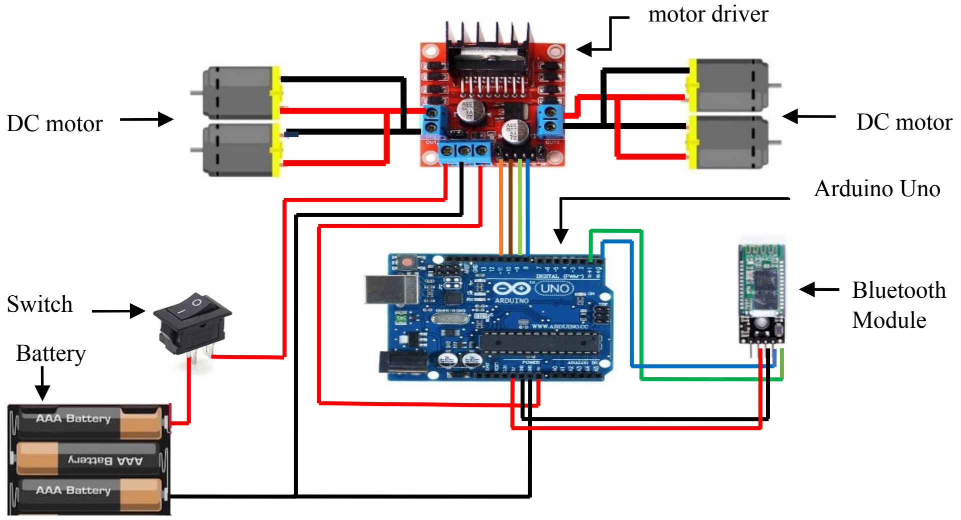

Figure 1: Circuit Diagram for Car Movement Control System

In Figure 1, the Bluetooth Module has six pins: State, VCC, Ground, TXD, RXD, and Key. The TXD pin of the Bluetooth Module is connected to pin D0/RX of the Arduino and the RXD pin is connected to pin D1/TX. The other two pins of VCC and ground is connected to 5-Volt and ground of the Arduino. The motor driver's in1, in2, in3 and in4 pins are connected to the Arduino's pin 8, 9, 10 and 11.

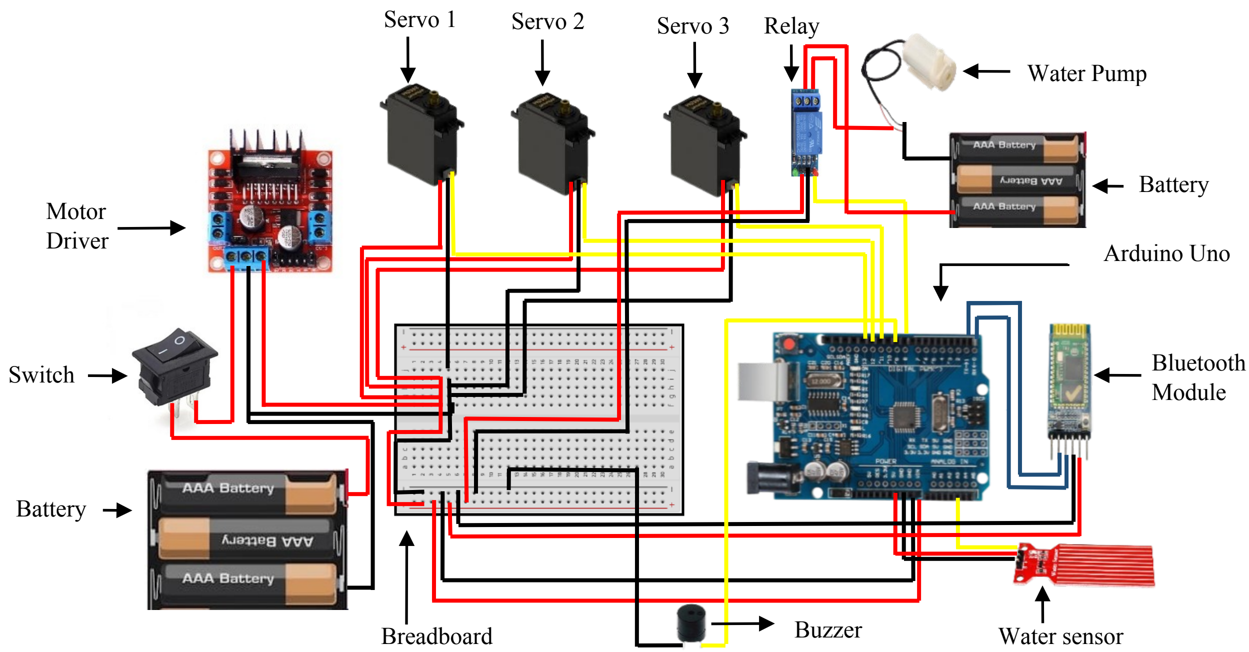

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Figure 2: Circuit Diagram for Seed Sowing and Water Spraying System

The motor driver's power output is connected to the Vcc and GND pins of the three servo motors and the relay. Servo Motor's signal pin is connected to pins 8,9, and 10 of the Arduino. The signal pin of the relay module is connected to pin 11 of the Arduino. the Bluetooth Module has six pins: State, V_{CC}, Ground, TXD, RXD, and Key. The TXD pin of the Bluetooth Module is connected to pin D0/RX of the Arduino and the RXD pin is connected to pin D1/TX. The other two pins of VCC and ground is connected to 5-Volt and ground of the Arduino. Connect the water level sensor to analog input pin, A_2 and buzzer is also connected to pin 7 on the Arduino Board.

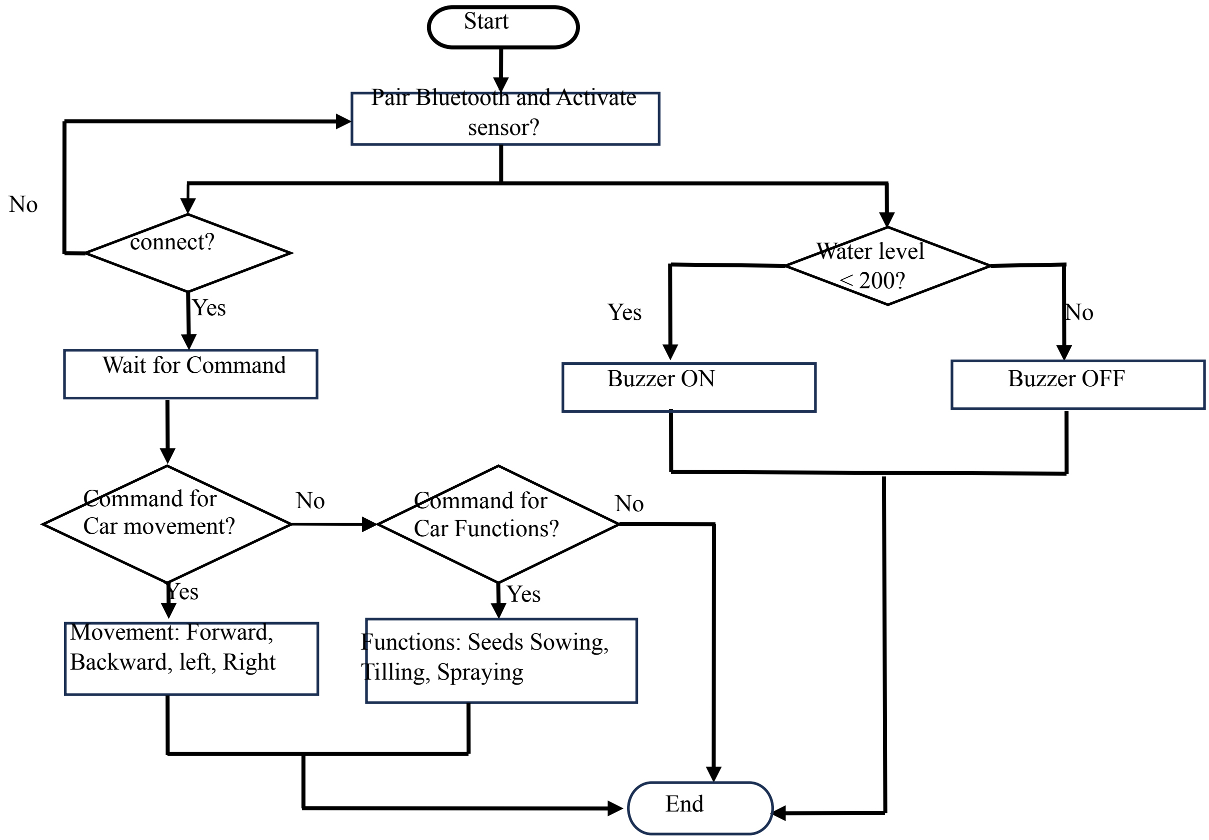

Figure 3: System Flow Diagram

RESULTS

Traditional farming methods often rely heavily on manual labor, which can be time-consuming and labor-intensive. The seed sowing and water spraying robot can solves these processes, significantly increasing efficiency. The robot can work continuously without fatigue, covering larger areas in less time compared to manual labor. Traditional farming is labor-intensive, requiring significant human effort for seed sowing and watering. The robot reduces the need for manual labor, lowering operational costs and freeing up labor for other essential tasks. This capability maximizes productivity and ensures timely completion of farming tasks, which is particularly crucial during critical planting and growing periods.

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These outcomes contribute directly to improved agricultural productivity, sustainability and technological innovation in farming practices.

Figure 4: Overview of System Control Mechanisms

CONCLUSION

The exact effects of developing the remote-controlled seed sowing and water spraying robot includes advancing agricultural technology, promoting sustainable practices, improving global food security and fostering innovation in agricultural fields. Further studies could explore integrating AI for real-time decision-making, advancing sensor tech for precise monitoring, coordinating multi-robot systems for large-scale efficiency, optimizing renewable energy use. Addressing these aspects will advance the field, enhancing efficiency and sustainability in local agriculture.

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