AI Driven Agribot

A Synopsis Submitted

in Partial Fulfillment of the Requirements

for the Degree of

BACHELOR OF TECHNOLOGY

in

Department of Electronics & Telecommunication Engineering

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June, 2024

Synopsis

1. Introduction

Agriculture plays a critical role in the economy, particularly in regions where rice is a staple crop. Traditional rice planting methods are labor-intensive and time-consuming, often leading to inefficiencies and increased costs. To address these challenges, the "AI Driven Agribot" project aims to develop an innovative solution that automates the rice planting and quality analysis process.

This project leverages Artificial Intelligence (AI) and Internet of Things (IoT) technologies to create a smart, automated mechanic system capable of performing precise and efficient rice planting. This mechanism is plant rice seedlings accurately, and monitor plant quality using image processing. By integrating AI, it can make intelligent decisions to optimize crop production by analyzing the rice quality and the weeds and improving crop yield. Sensors will provide continuous data on soil moisture, temperature, and enabling farmers to make informed decisions about crop management.

The introduction of this system aims to revolutionize rice farming by reducing dependency on manual labor, increasing planting accuracy, and enhancing overall productivity. This project represents a significant step towards modernizing agriculture and ensuring food security through technological innovation.

2. Literature Review

Here the robot tractor is used, which helps in turn over the uppermost soil, bringing fresh nutrients to the surface and it also works as a rice planter. This robot can do harvesting on its own to collect the crops on the field. This robot uses special technology for navigation, such as RTK, GPS, and IMS. For communication, it uses the Can Bus protocol which supports real-time communication for timely data exchange. The benefit of this robot is farming alone in the fields, making farming easier and more efficient.[1]

A system is made that works remotely, and it is integrated with the seeding mechanism. It has a four-wheel design for ease of movement. While the seeding mechanism uses a crank slider concept for the continuous seeding. The robot sowed 138 seedings in 5 minutes with 92% accuracy. The battery life of the robot is up to 4 hours and 1.5 hours of recharging time. It is an automated seeding mechanism for the different grain crops, which benefits farmers in efficient seed sowing within a shorter period.[2]

Here the cloud-based data uploading and data management is done using the cloud system, connecting the different sensors to the microcontroller which connected to cloud and analyze the collected data. Collection of the data and analyzing it for the future procedure on the crops on the fields according to the quality of the plants. [3]

Here the AI is used in detecting the trees, leaves, and other factors which are detected in the field like detecting the fruits and quality by using image processing and neural network topology, raspberry Pi, and the display. Detecting the objects in the fields using AI and deciding the its name or the category. [4]

Here the detection of unhealthy region of plant leaves is done using the machine learning and image Processing. The technologies used here are CIELAB colour model is used for the different colour evaluations and identification. An ANN based classifier classifies different plant diseases and uses the combination of textures, colour, and features to recognize those diseases. It is used to remove that noise. The training samples can be increased and shape feature and colour feature along with the optimal features can be given as input condition of disease identification.[5]

Here the different Navigation Algorithms are used to decide the path that the robot is going to take. The sensors used here are Capacitive touch sensor that detects changes in capacitance caused by the presence of a conductive object, such as a finger, to trigger a response. The Azimuth sensor is used to measure the direction. The ground is uneven, and the rows of rice seedlings are not always straight, as is the case in terraced paddies. It is used to detect rice seedlings and measure the movement and direction of the robot.[6]

3. Problem Statement

Rice planting is a labor-intensive and time-consuming process that requires significant manual effort, leading to increased costs and reduced efficiency in agricultural practices. Traditional methods often result in inconsistent planting, suboptimal crop yields, and an inability to promptly respond to changing environmental conditions.

To address these challenges, there is a need for an innovative solution that can automate the rice plantation process, ensuring precision, efficiency, and adaptability. The development of an Agricultural Rice Plantation System using AI and IoT aims to solve these issues by providing an autonomous system capable of performing precise rice planting, monitoring of environmental conditions, and data-driven decision-making to optimize crop management. This solution seeks to enhance productivity, reduce labor dependency, and improve overall agricultural outcomes in rice farming.

4. Methodology

1. System Design:

   - Conceptualizing the overall architecture focusing on mobility and planting precision.

   - Create schematics for component placement.

2. Hardware Setup:

   - Assembling key components, including DC motors and motor drivers.

   - Use Raspberry Pi and Camera for image processing and overall control.

   - Use LM35 for moisture and temperature monitoring.

3. Software Implementation:

   - Developing firmware for motor control and sensor data acquisition.

   - Implementing control algorithms on Raspberry Pi with a user interface for monitoring.

4. Testing:

   - Conducting initial controlled tests to fine-tune hardware and software.

   - Performing field tests to assess planting accuracy and system stability.

5. Documentation:

   - Maintaining comprehensive records of design, development, and testing.

5. Project Plan and Timeline

Days	Working
Day-1 to Day-15	Literature survey, problem Identification, Aim & objective
Day-16 to Day-30	Current methodology, survey, and review, & copyright
Day-31 to Day-60	Phase-I hardware design & programing
Day-61 to Day-75	Phase-II software implement & testing
Day-76 to Day-90	Project model element & paper publication

6. Expected Outcomes

1) Improved rice yields due to resource management.

2)Achieve an improvement in rice quality.

3) Decrease the overall cost and improve profitability by high salary to the labor by the farmers.

7. References

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