

**Department of Electronics and Telecommunication Engineering**

# **AI Driven Agribot**

**REVIEW -3**

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## 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 "Agricultural Rice Plantation Robot using AI & IoT" project aims to develop an innovative solution that automates the rice planting process.

This project leverages Artificial Intelligence (AI) and Internet of Things (IoT) technologies to create a smart, autonomous robotic system capable of performing precise and efficient rice planting. The robot is designed to navigate paddy fields, plant rice seedlings accurately, and monitor environmental conditions in real-time. By integrating AI, the robot can make intelligent decisions to optimize planting patterns and adapt to varying field conditions, ensuring uniform seed distribution, and improving crop yield. IoT sensors will provide continuous data on soil moisture, temperature, and other critical parameters, enabling farmers to make informed decisions about crop management.

The introduction of this robotic 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.

# Literature Survey

Sr. no	Paper Name	Name of Publisher	Publishing Year	Methodology	Result
1	Smart farming for improving agricultural management	Elsevier	2021	Here the cloud based event and data management is done using the cloud system, connecting the different sensors to the cloud and analyse 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.
2	Application of AI techniques and robotics in agriculture	Elsevier	2023	Normal application of AI in detecting the trees, leaves and other factors 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 objects.

Sr. no	Paper Name	Name of Publisher	Publishing Year	Methodology	Result
3	Design and development of the agricultural robot for crop seeding	IJAIEM	2014	Here the fully functional agricultural mini robot is made which can drop the seeds automatically into the fields with the help of Arduino, IR sensor, ultrasonic sensor and motors.	The seed of the plant can be sowed without the human requirements with this automated seed planter robot.
4	Detection of unhealthy region of plant leaves using Image Processing and Genetic Algorithm	IEEE	2015	<ul style="list-style-type: none"> <li>1. Artificial neural network (ANN)</li> <li>2. CIELAB color model</li> <li>3. Color co-occurrence method with SVM classifier</li> </ul>	An ANN based classifier classifies different plant diseases and uses the combination of textures, color and features to recognize those diseases. It is used to remove that noise. The training samples can be increased and shape feature and color feature along with the optimal features can be given as input condition of disease identification.

Sr. no	Paper Name	Name of Publisher	Publishing Year	Methodology	Result
5	Effect for a Paddy Weeding Robot in Wet Rice Culture	Fuji Technology Press	2018	<ol style="list-style-type: none"> <li>1. Navigation Algorithm (PWM control as the basic navigation control)</li> <li>2. Capacitive touch sensors</li> <li>3. Azimuth sensor</li> </ol>	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 direction.
6	Robotics and Automation in Agriculture: Present and Future Applications	ARQII Publication	2020	<ol style="list-style-type: none"> <li>1. Real-Time Kinematic GPS (RTK-GPS) and IMU</li> <li>2. Fuji F660EXR Camera</li> <li>3. Normalized Different Spectral Indices (NDSI)</li> </ol>	This new technology is used for position and attitude sensor for navigation system. To monitor the seed falling trajectories which is attached at the Unissem pneumatic planter outlet. It is used in detecting peanut leaf spots.

# Objectives

## Main Objective:

Develop an Agribot, machinery to sow the rice plant and enhance the quality of rice plantation through crop quality detection.

## Specific Goals:

- Implement Rice plantation Agribot to Reduce labour costs and manual errors.
- Achieve a improvement in rice quality through AI-driven crop quality control measures.
- Identify potential issues after specific period from the day plantation to spray the fertilizers before the crucial impact on the crop.

# Methodology

1

## System Design:

- Data Collection and Integration  
(Sensors, Data Aggregation)
- AI and Analytics Engine(Machine Learning Models, Output Dashboard)

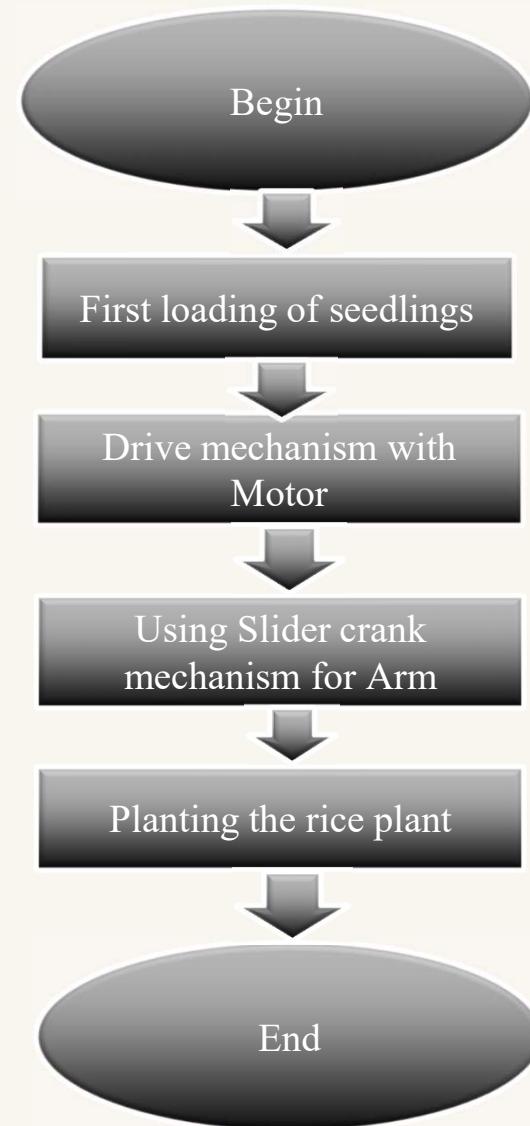
2

## Components:

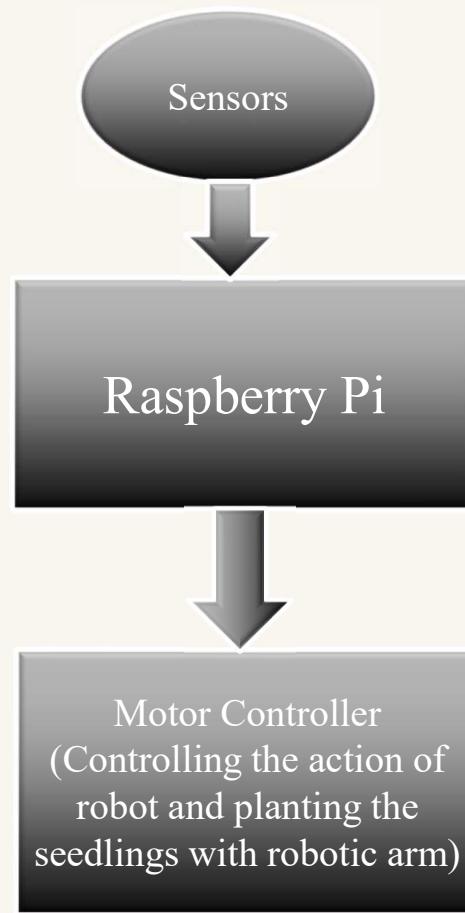
- Hardware
- Software
- Data Collection
- Data Processing and Storage
- AI and Analytics Engine

## Hardware Architecture:

Here is the architecture of the hardware which the rice planter will work and the different actions will be taken by the machine.

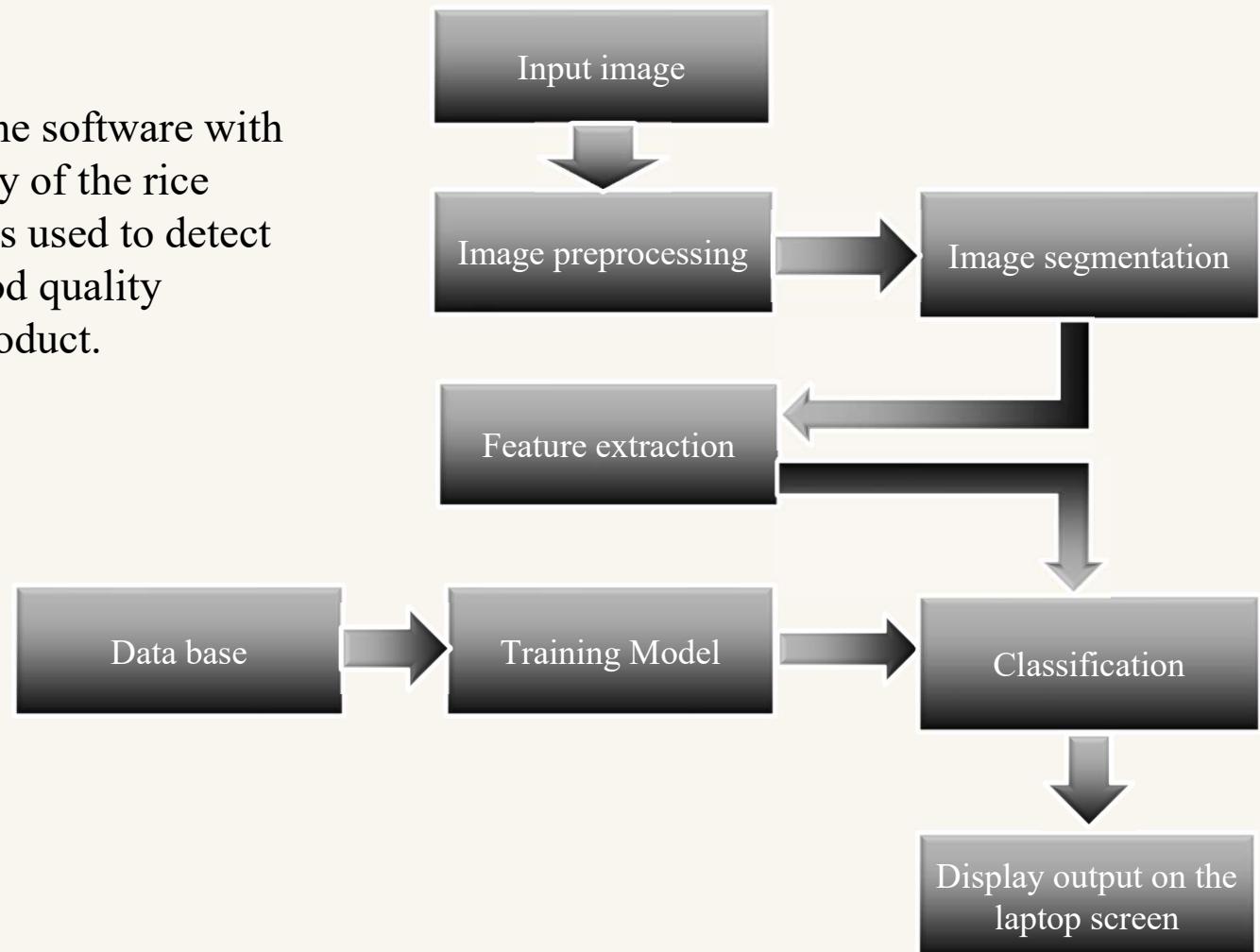


- Block diagram of the Hardware Circuit.



## Software Architecture:

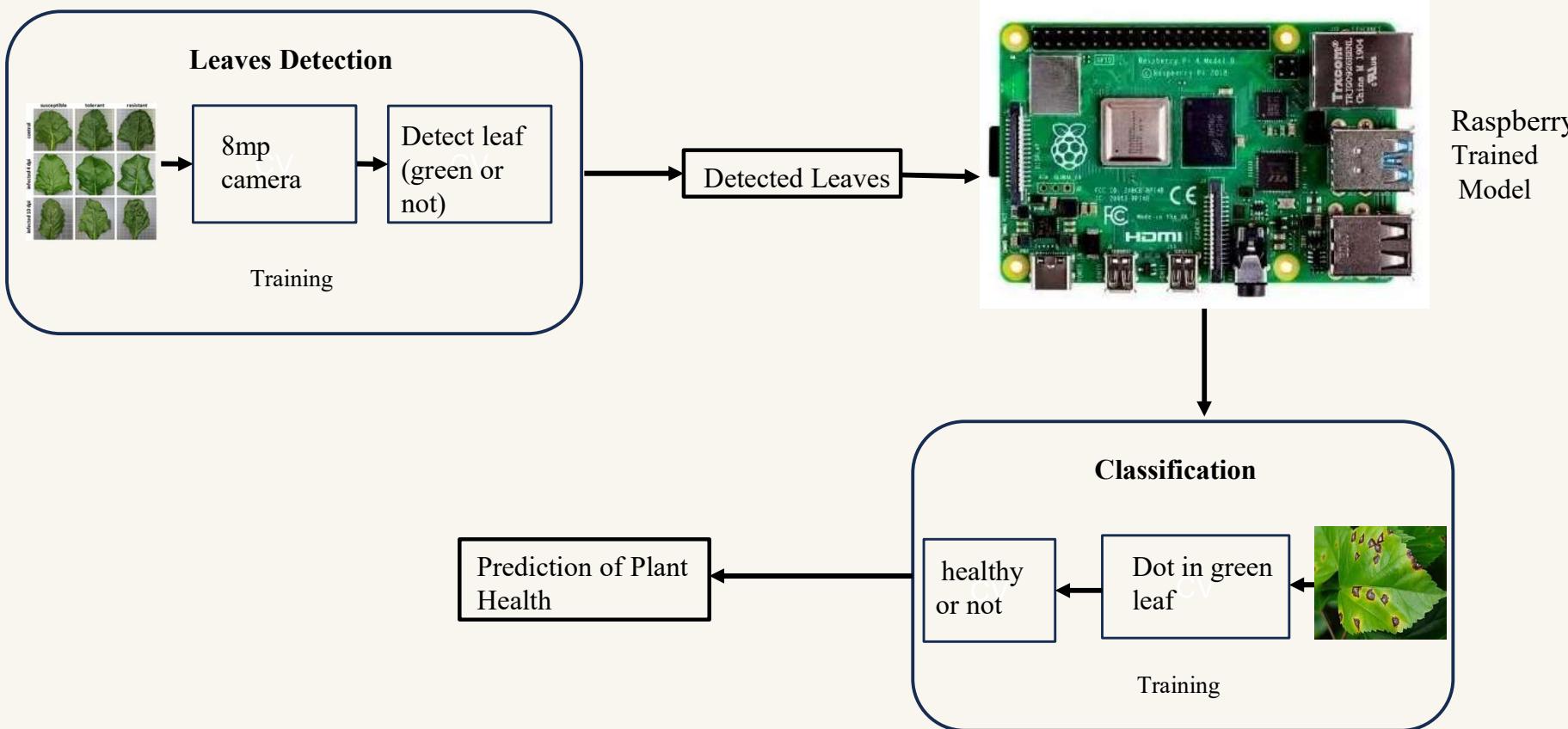
Here is the block diagram of the software with which we can detect the quality of the rice plant. The Machine Learning is used to detect the difference between the good quality product and the bad quality product.



# Components Used:

- Components:
- Raspberry Pi 4 - Model B (4 GB ram)
- Arduino mini
- 12V geared DC motors 2
- 1.2mA 12v Battery pack.
- 12 Voltage regulator.
- L293D motor Driver.
- Ultrasonic Sensor.
- IR colour sensor.
- 8 MP camera
- 5V Servo motor

## Block Diagram :

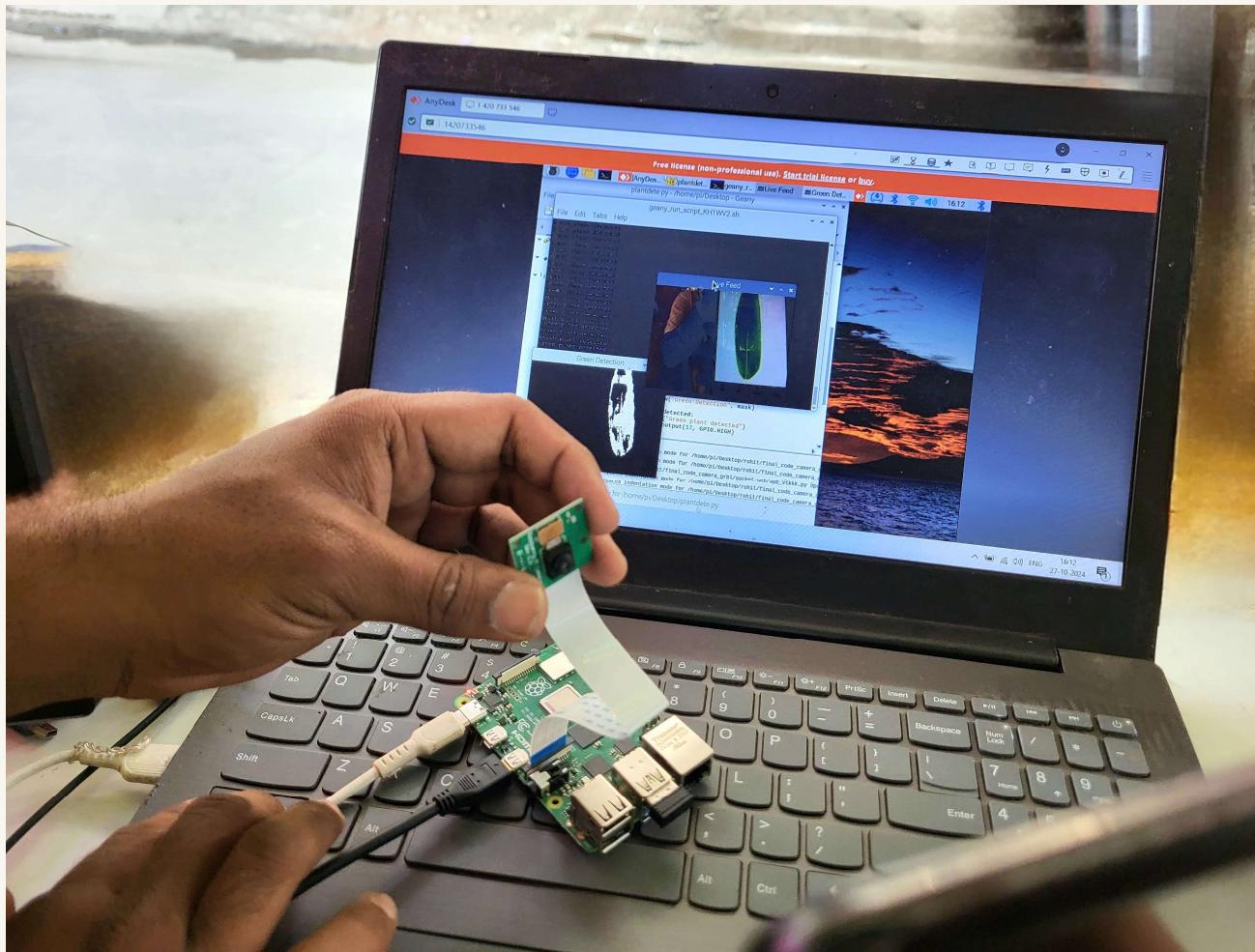


Complete Block Diagram

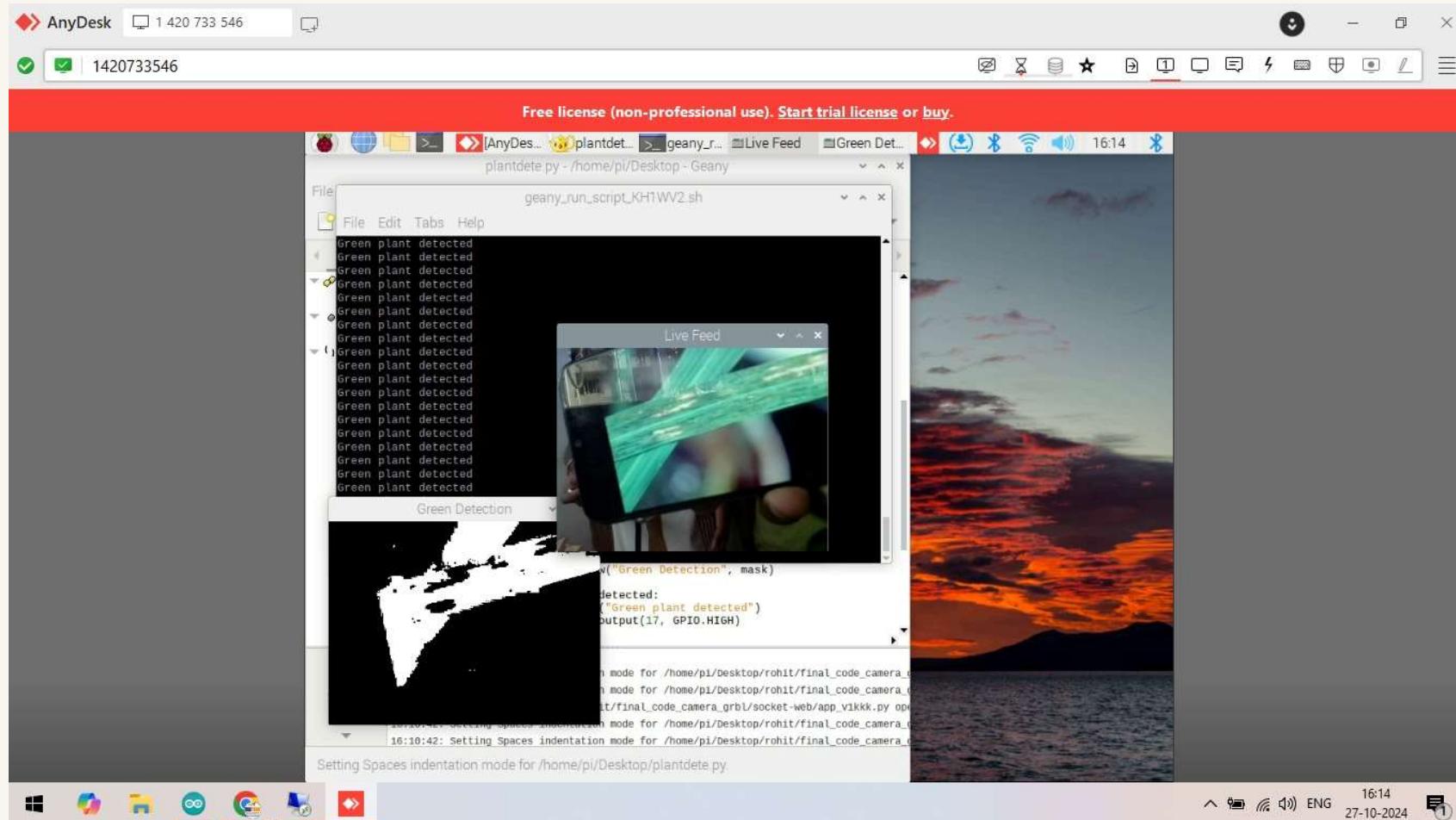
## **Project Work Completed Upto Date:**

- Developing machine learning models for crop quality detection.
- Progress made towards identifying crop health issues, but full functionality is still under development.
- Used the different Python libraries such as Tensorflow, Keras, OpenCV, Scikit etc to make and train the Machine learning model.
- Created the schematic for motors integrated with motor driver and raspberry pi.
- Generated the Code for the controlling motors with Motor controller with raspberry Pi.

## Result obtained :



## **Result obtained :**



# Conclusion

AI Driven Agribot aims to revolutionize rice farming by integrating AI technology with data monitoring to optimize enhance crop quality, and promote sustainable practices. By addressing the inefficiencies and challenges in traditional rice farming, Agribot seeks to improve yields and achieve high-quality production while ensuring environmental stewardship. The whole Machine learning model is still under development and required important changes.

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# Thank You