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Department of Electronics and Telecommunication Engineering

Agribot: Plantation and AI Driven Quality Insights

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Problem Identification

1

Inconsistent Quality Control:

- **Issue:** Ensuring high and consistent rice quality is challenging without comprehensive quality control measures.
- **Impact:** Variability in rice quality can affect market value and consumer trust.

2

Insufficient Labour Power:

- **Issue:** Due to high labour requirement and uncomfortable conditions for farmer due to rice planting field.
- **Impact:** Highly paid labour, cost effective on the overall rice farming.

3

Snakes in Rice fields and bushes :

- **Issue:** Danger to the farmers life due to the hazardous insects and snakes.
- **Impact:** This can cause issues such as not sufficient labour for the work into the fields.

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.

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 Diseased Areas in Plant Leaves Using Image Processing and Genetic Algorithms	IEEE	2015	1. Artificial neural network (ANN) 2. CIELAB colour model	An ANN-based classifier is used to identify various plant diseases by analyzing a combination of texture, color, and other features. It helps to eliminate noise during the process. By increasing the number of training samples, shape and color features, along with optimized feature sets, can be used as input for accurate disease identification.

Sr. no	Paper Name	Name of Publisher	Publishing Year	Methodology	Result
5	Impact of a Paddy Weeding Robot on Wet Rice Cultivation	Fuji Technology Press	2018	1. Navigation Algorithm 2. Capacitive touch sensors 3. Azimuth sensor	The terrain is uneven, and rice seedling rows are often not perfectly straight, especially in terraced paddies. The system is used to detect rice seedlings and determine the direction of movement.
6	Current and Future Applications of Robotics and Automation in Agriculture	ARQII Publication	2020	1. Fuji F660EXR Camera 2. Normalized Different Spectral Indices (NDSI)	This advanced technology serves as a position and attitude sensor for navigation systems. It monitors seed falling trajectories at the outlet of the Unissem pneumatic planter and is also employed in detecting peanut leaf spots.

Methodology

1

System Design:

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

2

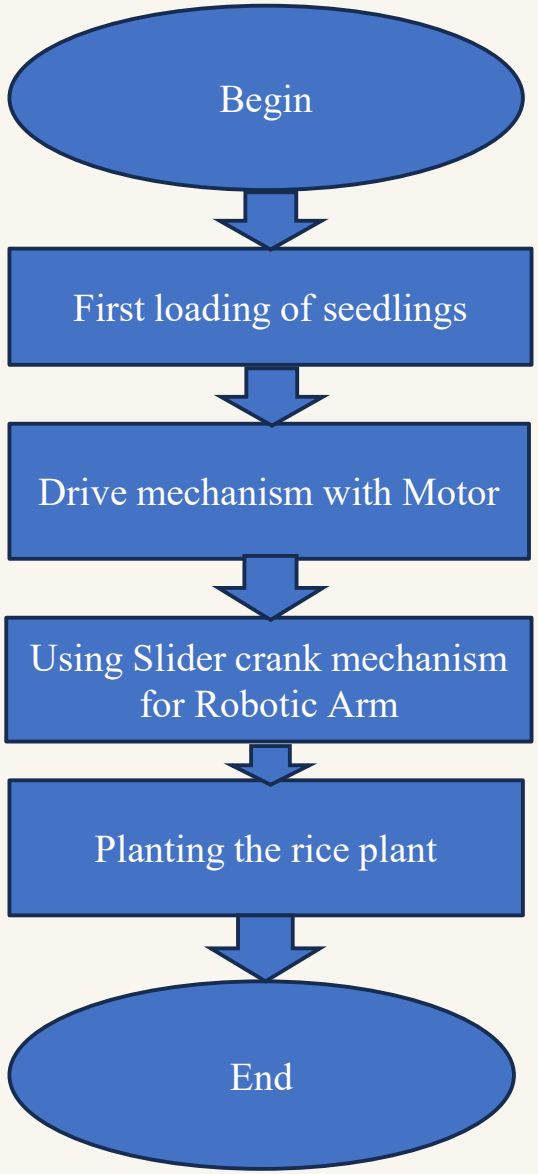
Components:

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

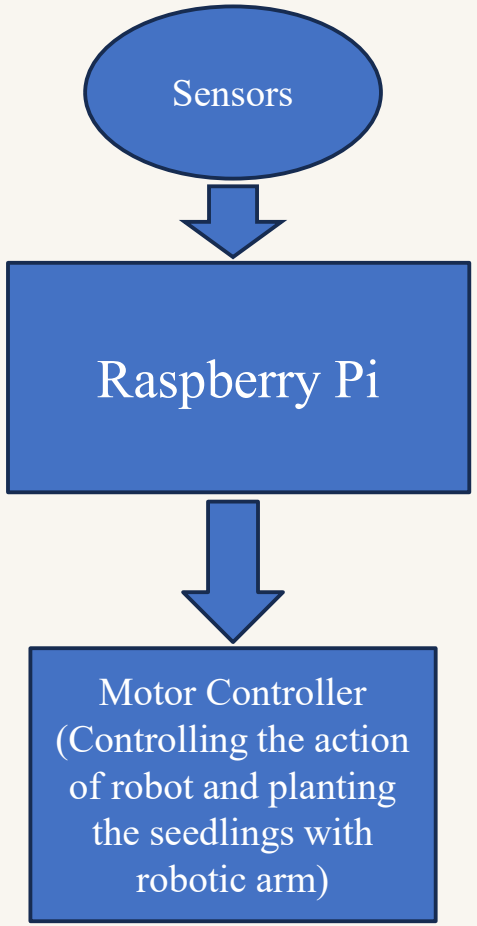
3

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.

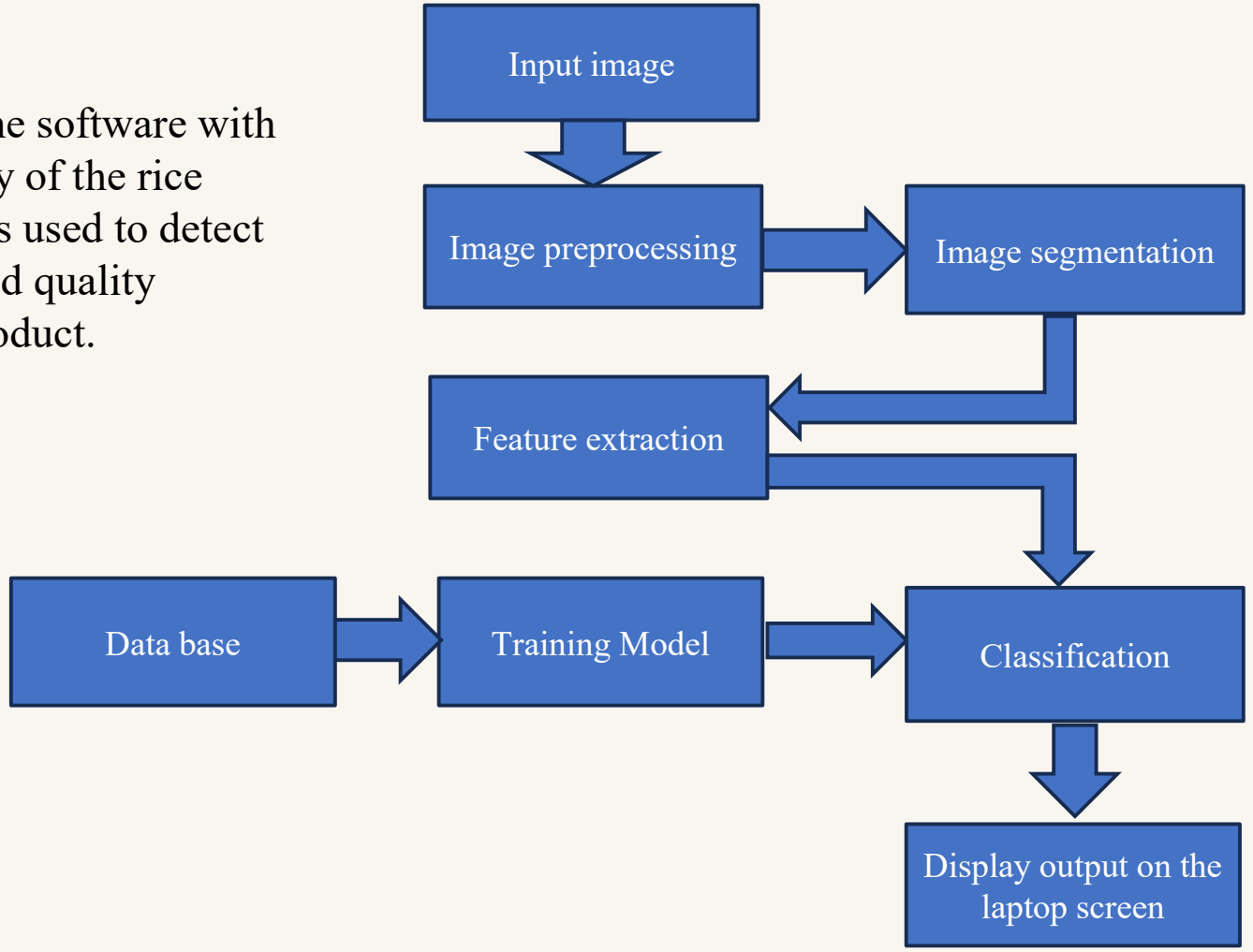


- Block diagram of the Hardware Circuit.



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.



Outcomes

- **Increased Production of the Crop:**
- Improved rice yields due to resource management.

- **Enhanced Quality Control:**
- Achieve a improvement in rice quality.

- **Adoption and Impact:**
- No need to pay high salary to the labor by the farmers, leading to less the overall cost and improve profitability.

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.

References

[1] Hitoshi Sori, Hiroyuki Inoue, Hiroyuki Hatta, and Yasuhiro Ando. ‘‘Effect for a Paddy Weeding Robot in Wet Rice Culture’’. Japan. February 27, 2018.

[2] Elsayed Said Mohamed, Sameh Kotb Abd-Elmabod, Mohammed A El-Shirbeny, Mohamed B Zahran. ‘‘Smart farming for improving agricultural management’’. Egypt, 2019.

[3] Prabira Kumar Sethya, Nalini Kanta Barpandaa, Amiya Kumar Rathod, Santi Kumari. “Image Processing Techniques for Diagnosing Rice Plant Disease”. India.

[4] Muhammad Junaid Asif, Tayyab Shahbaz, Dr. Syed Tahir Hussain Rizvi, Sajid Iqbal. “Rice Grain Identification and Quality Analysis using Image Processing based on Principal Component Analysis”, Pakistan, 2018.

References

[5] Pramod Kumar Sahoo, Dilip Kumar Kushwaha, Nrusingh Charan Pradhan, Yash Makwana, Mohit Kumar, Mahendra Jatoliya, Arjun Naik, Indra Mani, “ROBOTICS APPLICATION IN AGRICULTURE”, India,2022.

[7] Mohd Saiful Azimi Mahmud, Mohamad Shukri Zainal Abidin, Abioye Abiodun Emmanuel and Hameedah Sahib Hasan, “Robotics and Automation in Agriculture: Present and Future Applications”,Malaysia, April 2020.

[8] Vijai Singh Asst Professor, Varsha Asst Professsor, Prof. A K Misra, “Detection of unhealthy region of plant leaves using Image Processing and Genetic Algorithm”, India, 2015.

[9] K. Tamaki, Y. Nagasaka, K. Nishiwaki, M. Saito, Y. Kikuchi, K. Motobayashi, “A Robot System for Paddy Field Farming in Japan”, Japan, 2013.

Thank You