International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 11 | Nov - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

Agribot Using AI and ML

Sarjan B H, Vidyashree S H, Sinchana V, Nidhi K R Chaithanya V

Amruta Institute of Engineering and Management Sciences, Bidadi, Bangalore, India

Guide: Madhusudhan S

Abstract - Agriculture in India faces critical challenges such as labor shortages, climate sensitivity, and limited technological integration, particularly affecting smallholder farmers cultivating high-value crops like saffron, vanilla, and ginseng. To address these issues, Agribot, an AI-powered agricultural robot, is introduced as an innovative, multi-functional solution designed to enhance productivity, precision, and sustainability. Equipped with advanced cameras and sensors, Agribot enables real-time monitoring of crop health, soil conditions, and environmental factors, facilitating data-driven decision-making. Its robotic arm performs delicate tasks like harvesting and pruning with precision, minimizing crop damage and reducing labor dependency. With autonomous navigation supported by GPS and IoT connectivity, Agribot seamlessly integrates with existing farm systems for efficient irrigation, pest detection, and disease prevention.

Key Words: Agribot, AI-powered agriculture, precision farming, automation, IoT, robotic arm,

1.Introduction

Agriculture forms the backbone of India's economy, yet the cultivation of high-value crops such as saffron, vanilla, and ginseng remains constrained by labor intensity, climate vulnerability, and limited technological access. Smallholder farmers face declining profitability due to inefficient manual practices and unpredictable environmental conditions.

To overcome these challenges, **Agribot**, an AI-powered autonomous agricultural robot, is introduced to revolutionize precision farming. Integrating AI, IoT, and advanced sensor technologies, Agribot enables real-time monitoring, automated harvesting, and intelligent resource management, thereby reducing labor dependency, enhancing productivity, and promoting sustainable, technology-driven agricultural practices for India's high-value crop sector.

2. System Design and Methodology

At the core of Agribot's functionality lies its integration of AI and IoT technologies. AI algorithms process the data collected by the camera, sensors, and other modules, enabling real-time decision-making and predictive analytics. This allows Agribot to not only respond to immediate needs, such as adjusting irrigation schedules or detecting diseases, but also predict future trends based on historical data. The IoT connectivity ensures that Agribot can communicate with other smart farm devices, creating a fully integrated and automated farming ecosystem. For example, the robot can trigger irrigation systems, activate pest control measures, or coordinate with other autonomous machines on the farm, ensuring that all operations run smoothly and efficiently

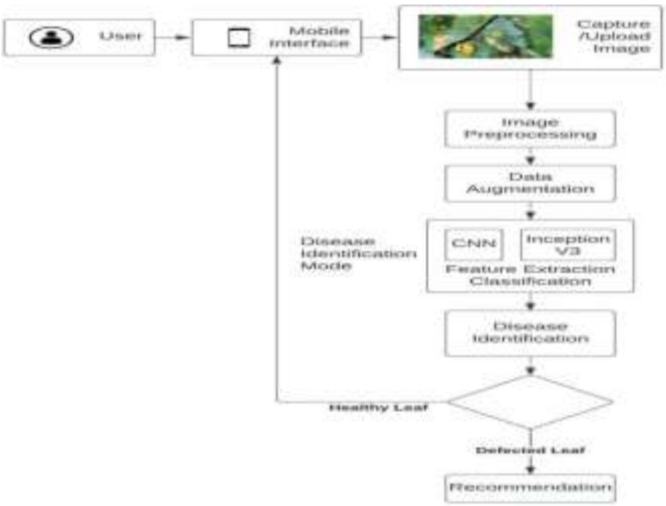

Figure 1: Flow chart

3. Hardware and Software Implementation

The hardware includes Chassis (4-Wheel Base), ESP32-CAM, ESP32, Motor Drivers (L298N), DC Motors (12V, 200RPM), Servo Motors (MG995, SG90), Lead Acid Battery (12V, 1200mAh), DHT11 Temperature & Humidity Sensor, Soil Moisture Sensor, Ultrasonic Sensor (HC-SR04) and GPS Module (Questar). By incorporating AI, IoT, and automation, Agribot significantly enhances the productivity and profitability of smallholder farmers. The robot reduces the reliance on human labor, which is often in short supply and expensive, while improving the precision and efficiency of farm operations.

4. AI and IoT Integration

At the core of Agribot's functionality lies its integration of AI and IoT technologies. AI algorithms process the data collected by the camera, sensors, and other modules, enabling real-time decision-making and predictive analytics. This allows Agribot to not only respond to immediate needs, such as adjusting irrigation schedules or detecting diseases, but also predict future trends based on historical data. The IoT connectivity ensures that Agribot can communicate with other smart farm devices, creating a fully integrated and automated farming ecosystem. For example, the robot can trigger irrigation systems, activate pest control measures, or coordinate with other autonomous machines on the farm, ensuring that all operations run smoothly and efficiently.

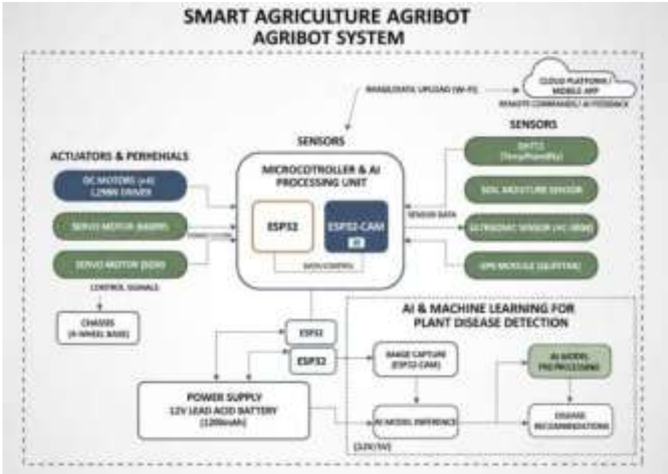

Figure 2: Working Image

5. Applications

1. Precision Agriculture
2. High-Value Crop Cultivation.
3. Livestock Farm Management

6. Advantages and Limitations

Advantages:

- Increased Efficiency and Productivity
- Reduction in Labor Costs
- Precision Farming and Resource Optimization.
- Improved Crop Yield and Quality.

Limitations:

- One-time investment in Agribot leads to long-term cost savings.
- Can be adapted for different crops with minimal modifications.

7. CONCLUSIONS

The development of Agribot represents a significant advancement in precision agriculture, addressing critical challenges faced by farmers, particularly those cultivating high-value, low-volume crops such as saffron, vanilla, ginseng, wasabi, and truffles. By integrating AI, IoT, robotics, and sensor-based automation, the Agribot enhances efficiency, reduces labor dependency, and optimizes resource utilization.

Through autonomous navigation, real-time monitoring, precision harvesting, and climate adaptation, the Agribot minimizes crop losses, improves yield quality, and reduces operational costs. Its application in smart irrigation, disease detection, automated harvesting, and post-harvest management makes it a versatile solution adaptable to various farming environments.

ACKNOWLEDGEMENT

The authors thank the faculty and staff of Amruta Institute of Engineering and Management Sciences, Bidadi for their support and guidance.

REFERENCES

[1] Desai, P. N., Ghodake, P. P., Girmal, S. D., Hajare, P. S., & Ghat, R. S. (2024). “A Review on Multipurpose Agri Robot.

[2] Maqbool, A. (2025). “The Evolution of Agricultural Robotics: A Comprehensive Review and Future Challenges”.

[3] Aswini, T. (2025). “Robotics in Agriculture: Automation Solutions for Precision Farming and Sustainability.

[4] B Geckeler C., Ramos S.E., Schuman M.C., Mintchev S. (2023) “Robotic Volatile Sampling for Early Detection of Plant Stress: Precision Agriculture Beyond Visual Remote Sensing”.