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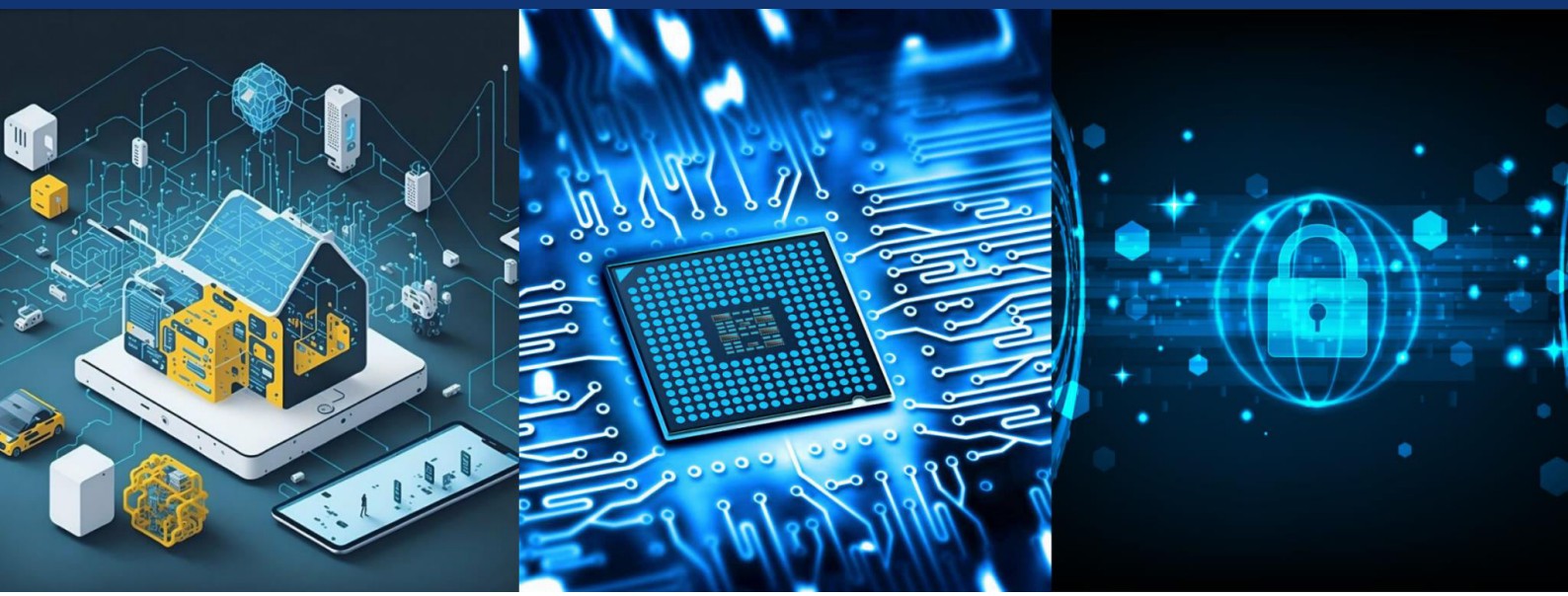

International Journal of Innovative Research in Computer and Communication Engineering

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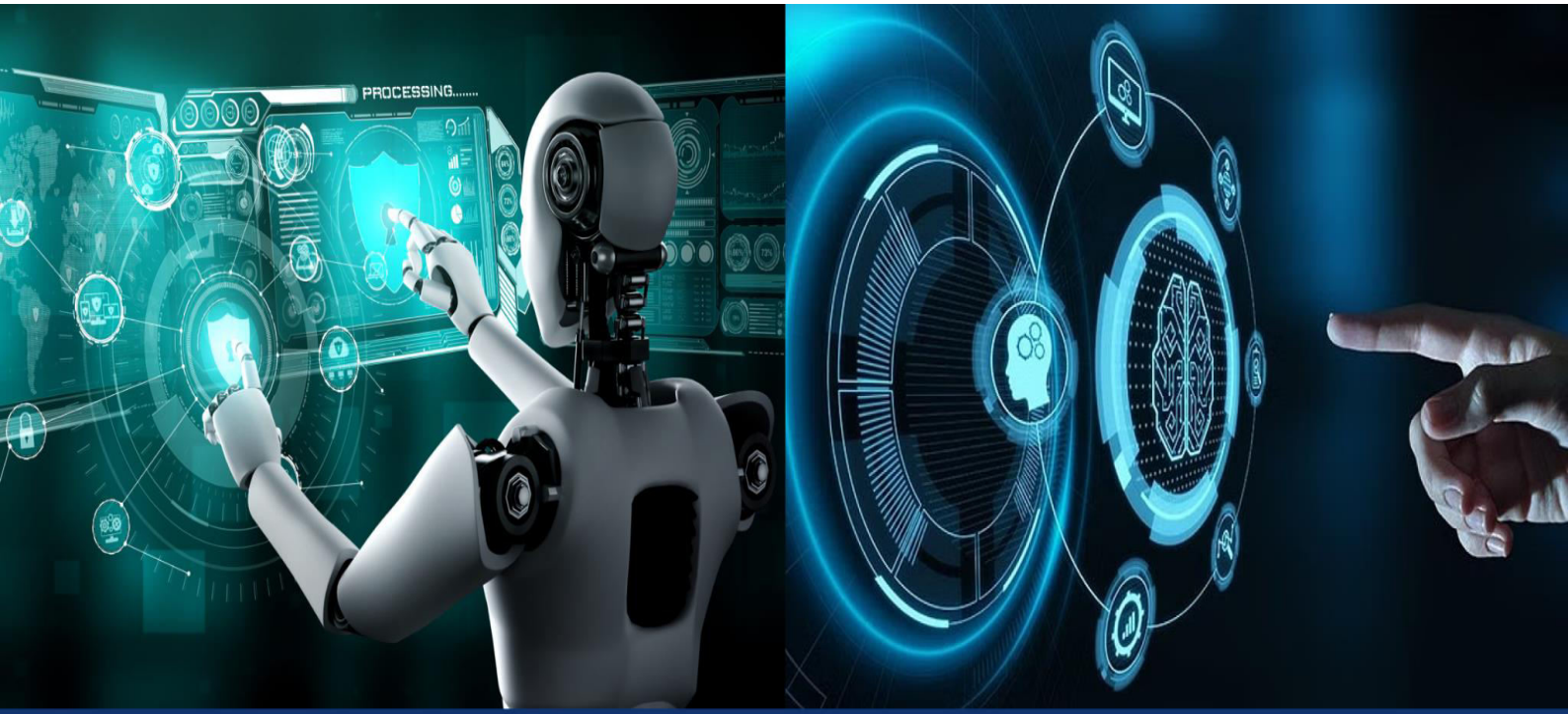

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International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

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Smart Farm Assistant: A Web-Based System for Crop Disease Detection and Advisory

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ABSTRACT: Agriculture plays a crucial role in sustaining livelihoods worldwide; however, crop diseases remain a significant challenge, often leading to reduced yield and economic loss for farmers. Early identification and effective management of plant diseases are essential but are not always accessible, particularly in rural areas. This paper presents a Smart Farm Assistant System developed using Python, Flask, and PostgreSQL. The system is implemented as a web-based application that provides structured information about crops, common diseases, and their preventive as well as corrective measures. Users can easily search for plant details and obtain relevant guidance through a simple and user-friendly interface. Unlike complex machine learning-based systems, the proposed solution emphasizes accessibility, low cost, and ease of use. The system assists farmers in making informed decisions, reduces dependency on agricultural experts, and promotes efficient farming practices. Furthermore, it provides a foundation for future enhancements such as AI-based disease detection and mobile application integration.

KEYWORDS: Smart Agriculture, Crop Disease Management, Farm Assistant System, Web-Based Application.

I. INTRODUCTION

Agriculture remains one of the most vital sectors in developing countries, contributing significantly to economic growth and employment. However, plant diseases continue to pose a major challenge, affecting crop quality and productivity. Timely identification and proper treatment of these diseases are critical for minimizing losses. In many rural areas, farmers rely on traditional knowledge or agricultural experts, whose availability may be limited, leading to delays in diagnosis and treatment.

With the rapid advancement of web technologies, it has become possible to develop systems that provide instant access to agricultural information. Digital platforms can help bridge the gap between farmers and expert knowledge by offering reliable and easily accessible guidance. In this context, the Smart Farm Assistant System is developed to provide a simple and structured solution for accessing crop-related information, including disease identification and management practices.

The proposed system focuses on usability and accessibility, ensuring that even users with limited technical knowledge can benefit from it. By integrating a web-based interface with a structured database, the system enables users to search for crops, identify possible diseases, and obtain preventive and corrective measures efficiently. This approach not only supports better decision-making but also contributes to improving overall agricultural productivity.

II. LITERATURE REVIEW

Several research studies have explored the use of machine learning and image processing techniques for plant disease detection. Mohanty et al. [1] demonstrated the effectiveness of deep learning in identifying plant diseases using images. Similarly, Kamilaris and Prenafeta-Boldú [2] provided a comprehensive survey on the application of deep learning in agriculture. Barbedo [3] emphasized digital image processing techniques, highlighting the importance of visual symptom analysis, though such methods often require significant computational resources and large datasets.

Recent studies have further advanced this field. A review by Shoaib et al. (2023) highlights the rapid growth of deep learning models such as CNNs and their strong performance in plant disease classification tasks, while also noting challenges such as dataset limitations and real-world deployment issues . A more recent systematic review (2024)

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analyzed over 160 studies and concluded that deep learning approaches significantly outperform traditional methods in disease detection, especially when trained on large and diverse datasets .

Furthermore, newer hybrid approaches combining machine learning and deep learning have been proposed to improve accuracy and efficiency. For example, a 2025 study demonstrated that integrating deep feature extraction with machine learning classifiers enhances detection performance while reducing computational complexity . Emerging research also explores transformer-based models and bibliometric trends, indicating a shift toward more advanced architectures and scalable solutions in precision agriculture .Despite these advancements, challenges such as high computational requirements, dependency on large annotated datasets, and limited accessibility remain. FAO [4] emphasizes the importance of practical and scalable disease management solutions for farmers. Patel and Shah [5] proposed a smart farming system integrating web technologies to improve usability.

Compared to these approaches, the proposed system focuses on ease of use, accessibility, and real-time application, making it more suitable for practical deployment in resource-constrained agricultural environments.

III. METHODOLOGY

The proposed system follows a client-server model. The frontend interface allows users to interact with the system, while the backend is implemented using Flask.The database is managed using PostgreSQL, where all crop-related information is stored. When a user searches for a plant, the system retrieves the relevant details from the database and displays information such as plant description, diseases, and remedies.

The system is divided into three main modules:
1.User Interface Module
2.Data Management Module
3.Disease Information Module
This modular approach ensures smooth functioning and easy scalability.

Aim and Objectives
Aim:
To develop a web-based farm assistant system that provides crop disease information and remedies.
Objectives:
To create an easy-to-use interface
To maintain a structured crop database
To provide accurate disease-related information
To support farmers in decision-making

Motivation
Farmers often suffer losses due to lack of timely information about crop diseases. Many rural farmers do not have access to agricultural experts. This motivated the development of a simple, accessible, and informative system that can guide farmers in managing crop diseases effectively.

Applications
1.Agricultural advisory systems
2.Educational tools for students
3.Support systems for farmers
4.Smart farming solutions

Functional Requirements & Non-Functional Requirements
Functional Requirements
1.User login and registration
2.Search plants by name
3.Display plant details
4.Show disease information and remedies

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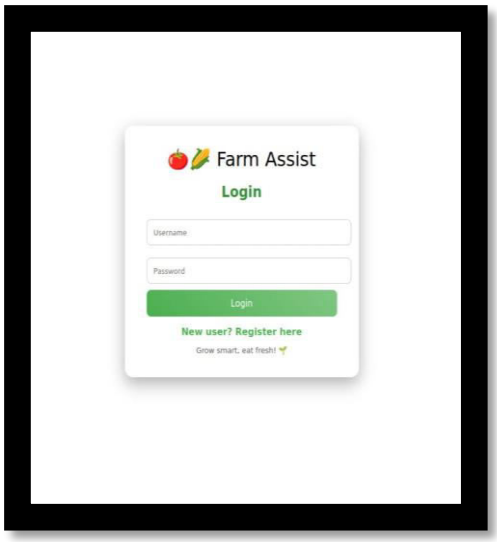
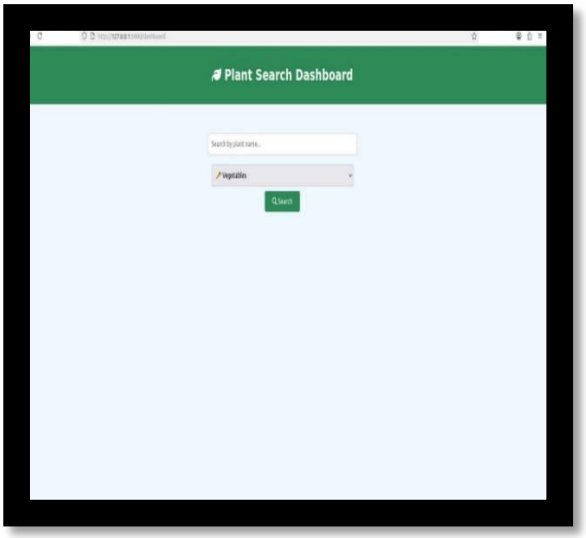
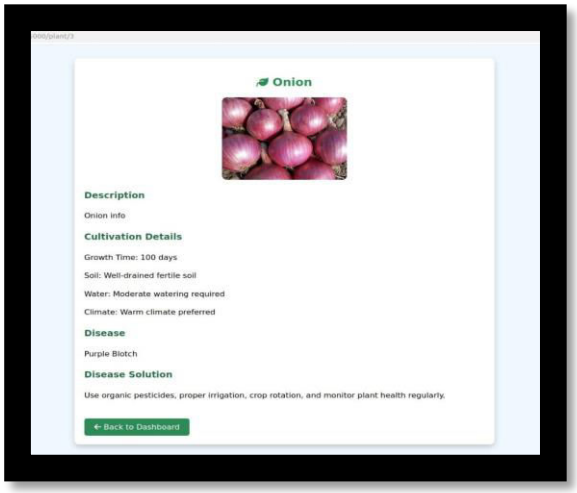
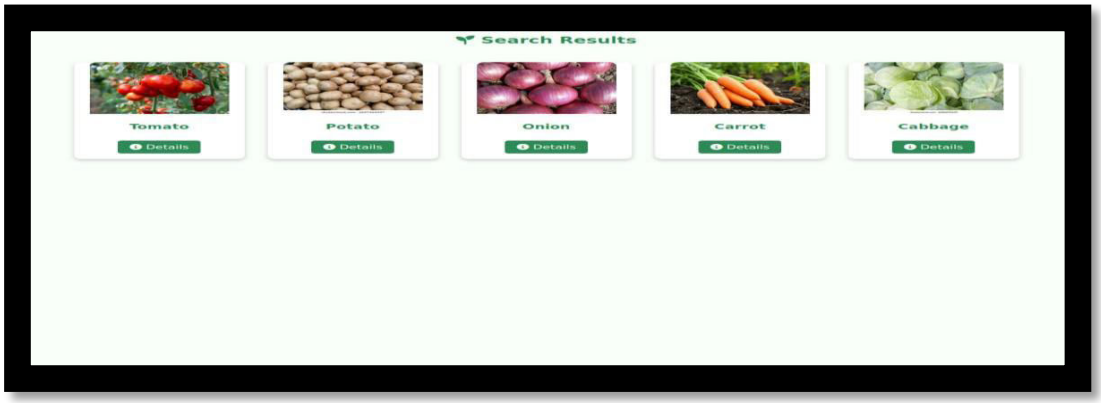
Non-Functional Requirements

1.Simple and user-friendly interface
2.Fast response time
3.Secure data storage
4.Reliable system performance









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IV. RESULTS

The system was tested with multiple plant entries and successfully displayed accurate information. Users were able to search and retrieve plant disease details quickly. The response time was minimal, and the interface was easy to navigate.

Comparative Analysis

Feature	Existing Systems	Proposed System
Complexity	High	Low
Cost	High	Low
Usability	Moderate	High
Accessibility	Limited	Easy

V. CONCLUSION

The Smart Farm Assistant System provides a practical solution for farmers by offering structured information about crop diseases and remedies. The system is simple, efficient, and accessible, making it suitable for real-world usage. It reduces dependency on experts and helps farmers make informed decisions.

VI. FUTURE SCOPE

1.Integration of machine learning for automatic detection
2.Mobile application development
3.Multi-language support
4.Integration with weather data APIs

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