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Plant Care Reminder and Basic Plant Identification Support System

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KEYWORDS

Plant Identification, Image Recognition, Mobile Application, Smart Gardening, Plant Care Management, Reminder System, IoT in Agriculture, User-Centric Design, Knowledge-Based System, Sustainable Gardening

ABSTRACT

PlantPal is a smart mobile application designed to assist plant enthusiasts and gardeners in maintaining healthy plants through timely care reminders and accurate plant identi fication. The app leverages image recognition technology to identify plant species and provide tailored information on watering, sunlight requirements, soil type, and fertilizer usage. In addition, PlantPal offers customizable reminders that notify users when it is time to water, prune, repot, or fertilize their plants, ensuring consistent plant care. The system integrates a user-friendly interface, a plant care knowledge base, and notifica tion services to enhance the overall plant management experience. By combining tech nology with plant care practices, PlantPal aims to make gardening easier, more orga nized, and accessible for both beginners and experienced plant owners.

1. INTRODUCTION

1.1 BRIEF INFORMATION

In recent years, the integration of mobile applications and artificial intelligence has significantly transformed everyday activities, including plant care and gardening. With the growing popularity of indoor plants, home gardening, and urban greenery, people are increasingly interested in maintaining plants. However, proper plant care remains a challenge due to lack of knowledge, busy lifestyles, and inconsistent care routines. Traditional methods of plant care involve manual tracking using memory, calendars, or basic guides, which are often inefficient and prone to errors [2], [3]. Many plant owners struggle with identifying plant species, understanding their specific care requirements, and maintaining consistent schedules for watering, fertilizing, pruning, and repotting [5], [10]. This leads to poor plant health or even plant death [9]. PlantPal is a smart plant care mobile application designed to address these issues by combining image recognition, automated reminders, and a comprehensive plant care knowledge base. The system allows users to identify plants instantly

using images and provides personalized care recommendations along with timely notifications for plant maintenance activities. Additionally, modern agricultural technologies such as IoT-based monitoring systems and sustainable practices like Integrated Pest Management (IPM) further emphasize the importance of intelligent plant care solutions [4], [7], [8].

1.2 PURPOSE

The purpose of this project is to develop a smart and user-friendly mobile application, PlantPal, that simplifies plant care management. The system aims to assist users in maintaining healthy plants by providing accurate plant identification and automated care re minders. By leveraging technologies such as artificial intelligence, image recognition, and cloud-based services, the application ensures that users receive real-time guidance and notifications. The system also provides a knowledge base containing detailed information about plant care practices, enabling users to make informed decisions. The primary goal is to reduce plant neglect, improve plant health, and make gardening accessible and manageable for both beginners and experienced users

1.3 MOTIVATION

In today's fast-paced lifestyle, people often find it difficult to dedicate time to plant care. Forgetting to water plants, lack of knowledge about plant requirements, and difficulty in identifying plant species are some of the common challenges faced by plant owner. These issues result in poor plant growth and discourage individuals from continuing gardening. The motivation behind PlantPal is to create an intelligent solution that auto mates plant care tasks and reduces human effort. By integrating image recognition and smart reminders, the application helps users identify plants instantly and ensures timely care activities. PlantPal empowers users by providing personalized care schedules, educational resources, and progress tracking features. This not only improves plant health but also enhances user engagement and promotes a deeper connection with nature.

1.4 PROBLEM STATEMENT

Plant owners face several challenges in maintaining healthy plants due to lack of knowledge, inconsistent care routines, and difficulty in plant identification. Traditional methods of plant care management are time-consuming, error-prone, and inefficient, especially when handling multiple plants.

The major problems include:

- Difficulty in identifying plant species
- Lack of awareness about specific plant care requirements
- Forgetting essential care activities like watering and fertilizing
- Inefficient manual tracking methods
- Poor management of multiple plants

This project aims to address these challenges by developing a smart plant care system using PlantPal. The application utilizes image recognition for plant identification and automated reminders for timely care. It ensures accurate, efficient, and personalized plant management, thereby improving plant health and user experience.

2. LITERATURE SURVEY

Various studies propose mobile applications, artificial intelligence, and IoT-based solutions to address challenges in plant care, plant identification, and agricultural management. These systems focus on improving plant health, reducing manual effort, and providing real-time assistance through smart technologies. Applications such as plant identification apps, AI-based disease detection systems, and reminder-based plant care systems highlight the importance of automation, accuracy, and user-friendly interfaces in modern plant management.

2.1 Plant Disease Detection using Deep Learning

AUTHORS: Ahmad A., Saraswat D., El Gamal A.

This study presents the use of deep learning techniques, especially Convolutional Neural Networks (CNNs), for detecting plant diseases through image analysis. The system can identify diseases at an early stage with high accuracy by analyzing leaf images. It reduces dependency on manual inspection and helps in timely treatment. However, the system mainly focuses on disease detection and does not provide complete plant care management or reminder functionalities.

2.2 Mobile-Based Pest and Disease Diagnosis System

AUTHORS: Akinyemi A.O., Fadele E., Ojeleye A.E.

This research introduces a mobile application designed for diagnosing plant diseases and pests using image-based analysis. The application provides real-time diagnosis and guidance for farmers. It is especially

useful in rural areas where expert consultation is limited. However, the system mainly targets agricultural crops and lacks features like plant care reminders, plant tracking, and personalized user interaction.

2.3 Smarter Pest Identification Technology (SPIDTECH)

AUTHORS: Guiam A.C., Gutierrez R.D., Gapasin C.V.D., Matalog R.P., Ebuenga M.D

SPIDTECH is a mobile-based system that helps in identifying insect pests and monitoring their impact on crops. It provides real-time alerts and supports decision-making for pest control. Improves agricultural productivity through digital monitoring. However, it is mainly focused on pest identification and does not include plant care scheduling, reminders, or user-friendly plant features.

2.4 IoT-Based Smart Agriculture Monitoring System

AUTHORS: Liang C., Shah T.

This study discusses the use of Internet of Things (IoT) in agriculture for monitoring environmental conditions such as soil moisture, temperature, and humidity. The system enables real-time data collection and improves decision-making for plant growth. While it enhances precision farming, it requires additional hardware and is not easily accessible for common users. It also lacks plant identification and personalized reminder features.

2.5 Image-Based Plant Identification System using AI

AUTHORS: Geetharamani G., Pandian A.J.

This research focuses on identifying plant species using deep learning models trained on large image datasets. The system achieves high accuracy in classification and helps users recognize plant types easily.
However, it only provides identification functionality and does not support plant care guidance, reminders, or user interaction features required for complete plant management.

3. PURPOSED SYSTEM

The proposed system is a smart plant care application called PlantPal, which utilizes mod ern technologies such as image recognition, artificial intelligence, and mobile not to assist users in managing their plants effectively. The system allows users to identify plants by capturing images and provides detailed information about plant species, including water ing, sunlight, soil, and fertilizer requirements. Additionally, the application includes a customizable reminder system that notifies users about important plant care activities such as watering, pruning, repotting, and fertilizing. The system also maintains a plant care history and provides a knowledge base for users to learn best practices in gardening. By digitizing and automating plant care processes, the system improves efficiency, accuracy, and user experience.

Advantages of proposed system:
The proposed system provides automated reminders for plant care activities, reducing the chances of neglect and improving plant health.

- The system enables instant plant identification using image recognition, eliminating the need for manual research.
- It offers personalized care recommendations based on plant type and user preferences, ensuring better plant management.
- The application provides a user-friendly interface and supports managing multiple plants efficiently in one platform.

3.1. System Architecture

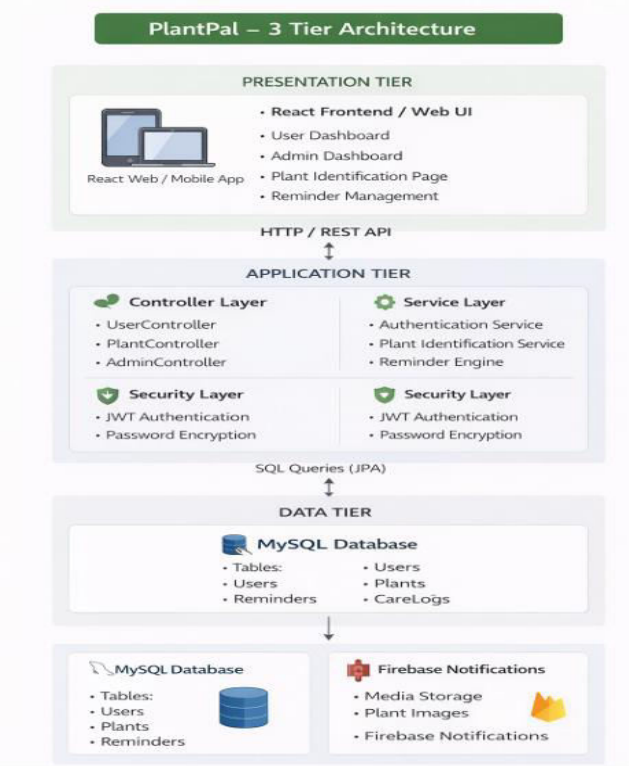


Fig System Architecture

3.2 Use case Diagram

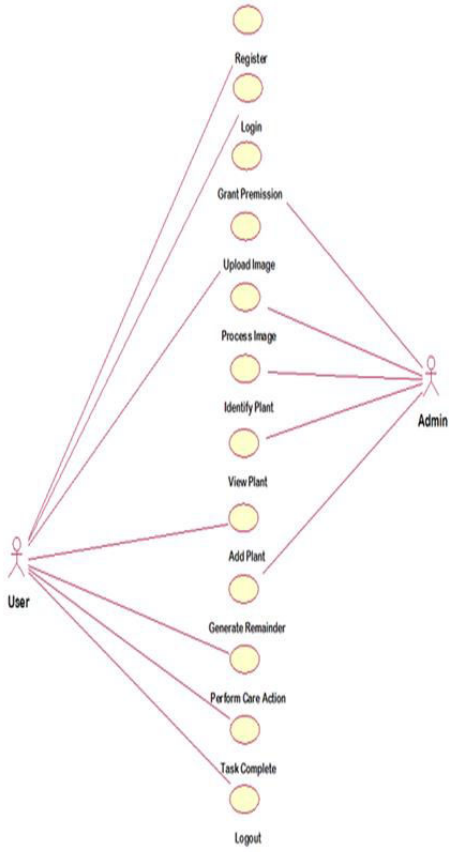


Fig Use Case Diagram

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.

3.3 Class Diagram

The class diagram is used to refine the use case diagram and define a detailed design of the system. The class diagram classifies the actors defined in the use case diagram into a set of interrelated classes. The relationship or association between the classes can be either an "is-a" or "has-a" relationship. Each class in the class diagram may be capable of provid ing certain functionalities. These functionalities provided by the class are termed "meth ods" of the class. Apart from this, each class may have certain "attributes" that uniquely identify the class.

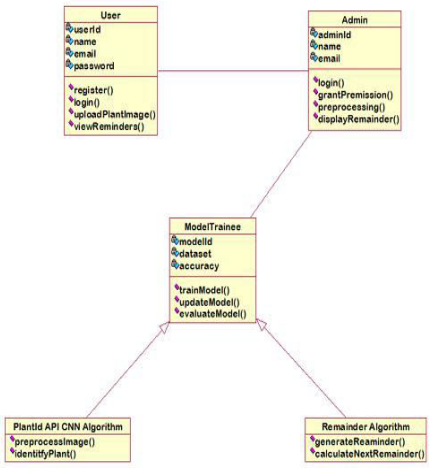
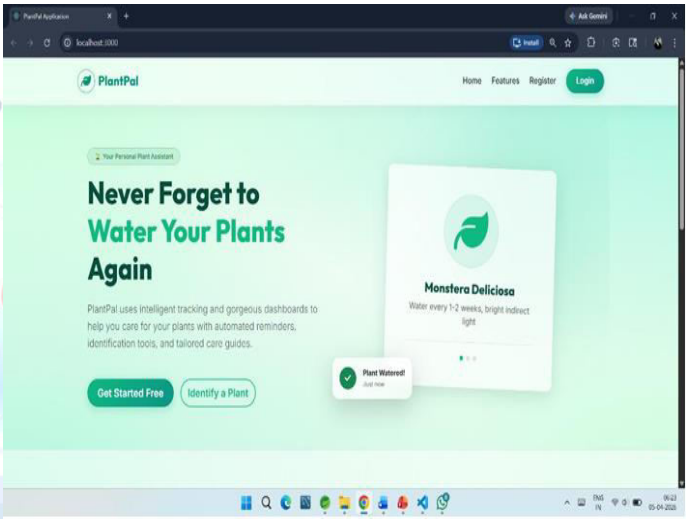


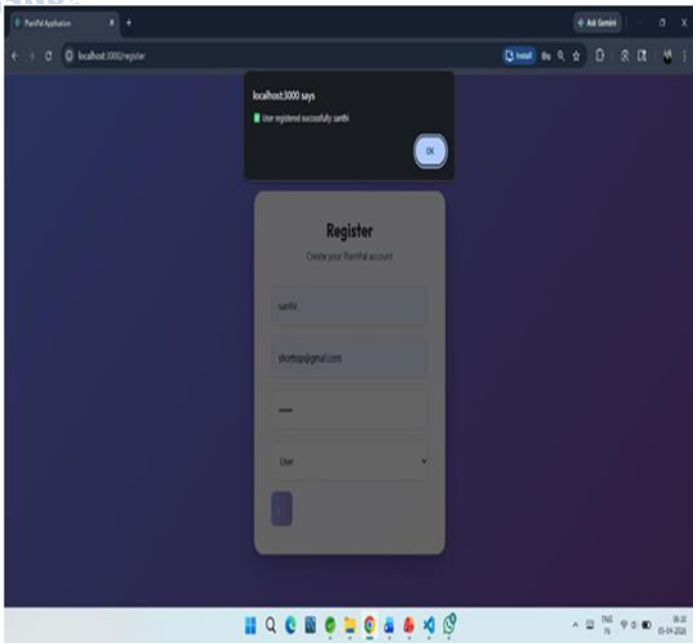
Fig Class Diagram

4. RESULT

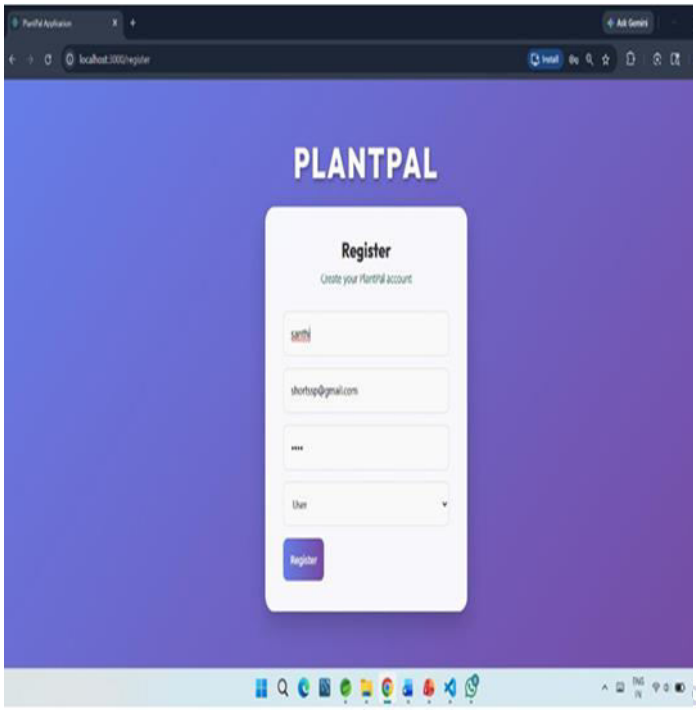


HOMEPAGE

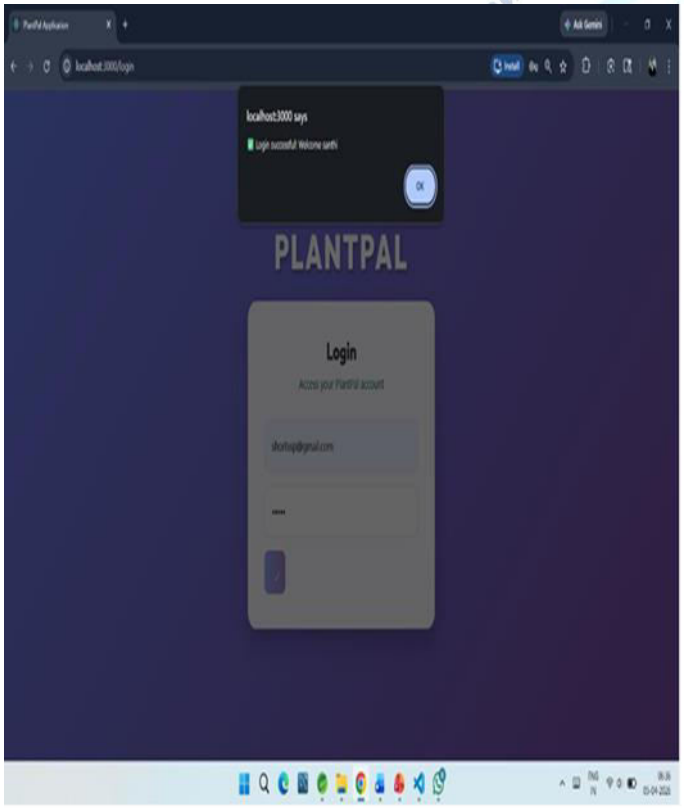
REGISTERATION



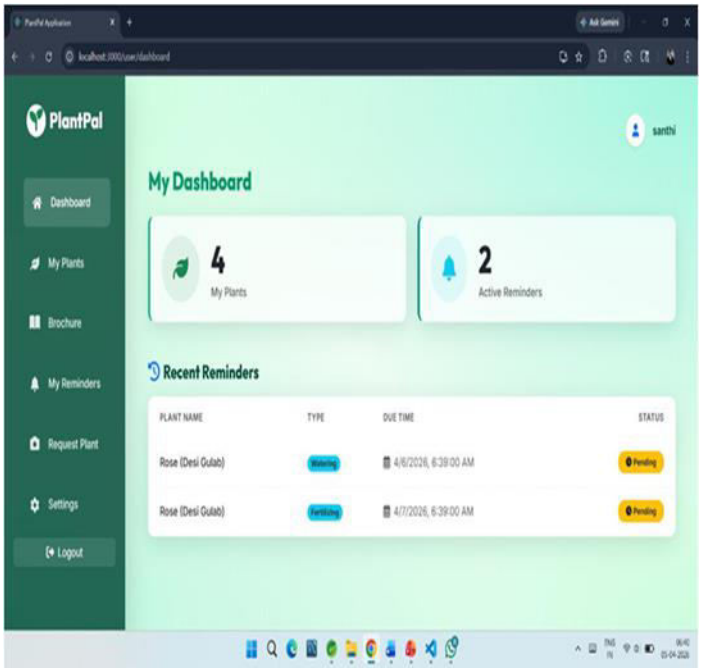
REGISNATION SUCCESSFUL



LOGIN SUCCESSFUL



USER DASHBOARD



USER PLANTS

5. CONCLUSION

Based on the provided diagrams and user interface mockups, PlantPal is a comprehensive, full stack web application designed for plant care management. It successfully integrates a robust backend architecture with a clean, user-friendly frontend to serve two distinct roles: regular users and administrators. The application is built on Spring Boot and utilizes a layered architecture with clear separation of concerns for controllers, services, and repositories, all connected to a MongoDB database.

This backend powers all the core functionalities, from secure user registration and login to the management of plant and reminder data. The frontend provides an intuitive experience tailored to each user type.

Regular users can register, manage their personal collection of plants, and access detailed care information. Administrators, on the other hand, have access to a powerful dashboard to manage all users, oversee the master plant catalog, and view key application analytics through various charts. In conclusion, the project demonstrates a complete and well-thought-out solution that effectively connects a scalable backend system with a functional and visually appeal ing user interface, creating a cohesive platform for plant enthusiasts and system managers.

FUTURE SCOPE

- Implement a fully functional reminder system that delivers real-time push notifications to users' mobile devices for watering, fertilizing, repotting, and other customized plant care activities, ensuring timely maintenance and improved plant health.
- Integrate an AI-powered image recognition model to enhance the Plant Identification feature, enabling users to accurately identify plant species by simply uploading images.
- Develop a community forum platform where users can share plant images, ask queries, exchange gardening tips, and interact with other plant enthusiasts, fostering a collaborative environment.
- Introduce a personal plant journal feature for each plant, allowing users to record ob servations, track growth through photo timelines, and document health conditions and treatments over time.
- Expand the system database to include a comprehensive pest and disease management guide, featuring identification images and recommended organic and chemical treatment solutions.

Enhance the admin analytics dashboard to provide deeper insights into system usage, including user engagement metrics, reminder completion rates, popular plant categories, and activity trends .

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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