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**Revolutionising Indoor Plant Care: The Impact of AI-based IoT Systems on Automated Plant Maintenance**

Indoor gardening has gained popularity due to urbanization and the desire for fresh produce. Recent studies show that it relieves stress, boosts creativity, productivity, focus, and promotes recovery [1]. However, maintaining optimal conditions for plant growth indoors requires a lot of manual work, which includes regulating light, humidity, ventilation and temperature. The integration of Internet of Things technologies with Artificial Intelligence has transformed indoor plant care significantly, leading to the development of automated systems that optimize plant health and growth. These systems offer solutions by combining IoT sensors and AI algorithms to monitor and manage plant care autonomously.

Several studies have demonstrated the effectiveness of AI-based indoor plant care systems. One research introduced an Automated Indoor Plant Health and Pest Control System that utilizes robotic mechanisms and AI algorithms to monitor plant health, detect diseases and control pests. It features automated watering triggered by soil moisture levels and thermal imaging for pest detection [2]. ​ Another study proposed an IoT-Based Indoor Plant Care System that integrates IoT devices to monitor environmental conditions and automate plant care tasks, including an interface for remote monitoring and control. The system not only automates watering and lighting adjustments based on real-time sensor data but also monitors indoor air quality, aiming to enhance the overall indoor environment [3]. Another notable example is a Smart Hydroponics System using AI-based sensing, which collects and analyses parameters such as temperature, water level, pH and nutrient levels. The system automates the addition of water or nutrients as needed and allows users to monitor conditions through a smartphone application [4]. Innovations such as the Artificial Intelligence of Things (AIoT)-based Plant Pot Design (APPD) have demonstrated the capabilities of integrating AI and IoT technologies in indoor plant care, enabling precise control over factors like illumination, photometric exposure and moisture content. These systems exemplify the potential of combining AI and IoT to enhance efficiency and promote stable indoor gardening practices [5].

Despite the advantages of such systems, challenges such as sensor reliability, data scarcity and integration with existing smart home ecosystems persist. Ensuring accurate sensor data is crucial, as inaccuracies can lead to incorrect care decisions. The limited availability of appropriate datasets slows down the development of robust AI models capable of generalizing across diverse plant species and environments. Additionally, integrating these systems seamlessly into existing smart home setups requires addressing compatibility and user interface design issues.

Based on the review of current research and advancements in AI and IoT for indoor plant care, we plan to develop a smart monitoring system that tracks key environmental parameters such as soil moisture, temperature, humidity, and light intensity, and utilises an automatic watering tool. A key innovation in our solution will be the integration of a GPT-based model, which based on the plant species will generate personalised watering and lighting plans. Unlike traditional systems, our approach will focus on caring for a variety of indoor plant species, using GPT to differentiate between them and tailor care recommendations to their specific needs. This adaptability will ensure optimal growth conditions for each plant type. All sensor data will be transmitted to a centralized database in real time, where it will be stored and made accessible through a mobile application. The app will visualize this data through intuitive graphs and dashboards, allowing users to monitor conditions at a glance, track historical trends, and receive timely suggestions. The recommendations will be adjustable through that application, which will serve as both a user interface and a platform for real-time monitoring and system feedback, enabling continuous refinement of care strategies based on plant condition and user input.

Looking ahead, advancements in multimodal data integration, personalized care recommendations, and edge computing are expected to enhance system responsiveness and user engagement. Developing intuitive interfaces, focusing on scalability and cost reduction is expected to further promote widespread adoption, making AI-based plant care more sustainable and accessible.

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