Version [2]- AIDSII: An AI-based digital system for intelligent irrigation

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Abstract

This paper presents an update of Smart irrigation systems powered by IoT technology. This system leverages sensors, data analysis, and automation to collect and analyze real-time data for informed decision-making and real-time control. The hardware includes a central unit utilizing Arduino boards and sensors measuring temperature, humidity, and soil moisture. Data flow and decision-making are managed by incorporating sensor data and external weather information. A predefined set of thresholds for soil moisture, humidity, and temperature guides irrigation decisions. This system provides accurate irrigation assessments, customization, and secure data storage.

Keywords: Irrigation, Web

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Metadata

Nr.	Metadata	Details
C1	Current code version	v3
C2	Permanent link to code/repository used for this code version	link: `https://github.com/MouhibMoughtanim/Smart-irrigation-Web-2`
C3	Code Ocean compute capsule	N/T
C4	Legal Code License	MT.
C5	Code versioning system used	GIT
C6	Software code languages, tools, and services used	Java,C, HTML, CSS, JS, Spring Boot, Spring Security, Thymeleaf, Bootstrap,JQuery,Android, MySql,Python,Arduino.
C7	Compilation requirements, operating environments & dependencies	Java 8 or higher, Java compiler version, Spring Framework, Maven, Java Development Kit
C8	If available Link to developer documentation/manual	link: `https://github.com/MouhibMoughtanim/Smart-irrigation-Web-2/blob/master/README.md`
C9	Support email for questions	lachgar.m@ucd.ac.ma

1. Description of software-update

In the previous iteration, the capability to execute irrigation processes on both mobile and web platforms faced operational limitations. We have effectively addressed this issue, ensuring that the system now seamlessly conducts diagnostics on both mobile and web interfaces.

Mobile Application :

In the mobile segment, significant enhancements have been made to optimize the display of images. Through meticulous code modifications, we have successfully ensured that images now render seamlessly, contributing to an improved and visually appealing user experience. This refinement aligns with our commitment to delivering a user-friendly and aesthetically pleasing interface .

Web Application:

- Plant Management:

We have refined the plant management features for a more intuitive and user-friendly experience. Users can now seamlessly add and manage plant data, streamlining the tracking and monitoring of plant-related information.

- Zone Management:

Installer and Visualizer for IoT device: Efficient zone management is crucial, and this update allows users to effortlessly install and visualize monitoring devices (IoT device) within the zone management interface. This enhancement provides a comprehensive overview of the entire system.

- Admin Section:

We have resolved the issue where clicking the "IoT device" button resulted in a page error. Users can now access the IoT device page seamlessly, ensuring a smooth administrative experience.The issue related to the "Modify" button redirecting users to the wrong page has been addressed. Users can now confidently modify zones with the correct interface readily available.

- User management:

Users can now successfully modify phone numbers within the user management interface, enhancing the accuracy of user information.The password change process now includes a confirmation step, ensuring users can securely update their passwords without unintentional changes.

2. New functionalities

Our latest software update introduces a paradigm shift in irrigation management. Harnessing the power of Artificial Intelligence (AI) and the Internet of Things (IoT), our digital system for intelligent irrigation brings forth a multitude of features aimed at enhancing efficiency, conserving resources, and empowering users with unprecedented control. In this detailed exploration, we delve into the intricacies of the new functionalities within the context of plant, irrigation, and zone management.

- Plant management:

Users now have the capability to effortlessly modify plant data, ensuring that the system accurately reflects the dynamic nature of agricultural practices.The addition of plant deletion functionality allows for the seamless removal of outdated or irrelevant plant information, maintaining a streamlined and organized database.

- Irrigation Management:

Users can now modify irrigation schedules, leveraging AI algorithms to adapt to changing environmental conditions and optimizing water usage.This feature provides flexibility in adjusting irrigation plans, enabling users to delete obsolete schedules and refine their water management strategies.

- Zone management:

Users gain the ability to delete and modify historical data within the Zone Management interface, ensuring accuracy in recorded information and facilitating comprehensive analysis. The capacity to modify the plant associated with a specific zone enhances precision in data representation, accommodating changes in crop rotations or plant varieties.Users can now dynamically modify zone configurations based on real-time data and AI-driven insights, allowing for adaptive and responsive zone management.

This comprehensive update marks a significant stride toward a more intelligent and adaptive irrigation management system. As we continue to integrate cutting-edge technologies, we envision a future where precision agriculture meets sustainability through the seamless synergy of AI and IoT. We encourage users to explore these features which include:

Real-Time Data Display : The system leverages Arduino technology in conjunction with soil moisture sensors to provide farmers with real-time data on soil conditions. These sensors measure the moisture content of the soil, enabling precise irrigation control based on actual environmental conditions. The real-time data display empowers farmers with valuable insights into the moisture levels of their fields, optimizing water usage and promoting efficient irrigation practices.

Notifications to the Farmer: The integration of AI algorithms allows the system to analyze data and send notifications to farmers. Farmers receive timely alerts and notifications regarding crucial information such as:Soil moisture levels reaching a specified threshold,Weather conditions that may impact irrigation schedules,System diagnostics and alerts for proactive maintenance. These notifications enhance decision-making by keeping farmers informed and enabling them to take prompt actions to address evolving conditions in their fields.

Efficient Resource Management: The system intelligently adapts irrigation schedules based on real-time data, optimizing water usage and conserving resources. AI algorithms analyze environmental factors, ensuring that irrigation is precisely tailored to the specific needs of the crops and the current weather conditions. This efficient resource management not only

contributes to water conservation but also promotes sustainable agricultural practices.

These features collectively empower farmers with advanced tools for informed decision-making, resource optimization, and sustainable farming practices. We believe that by embracing these innovations, farmers can enhance productivity while contributing to a more sustainable and environmentally conscious agricultural landscape.

3. Conclusion

With the update to version 2 our software represents a significant advancement, marking a transition towards a more streamlined, user-centric, and intelligent platform. Thoroughly addressing functional limitations has not only improved operational efficiency but has also enhanced the system's diagnostic capabilities across both mobile and web interfaces.

The introduction of new features, powered by Artificial Intelligence (AI) and the Internet of Things (IoT), heralds a paradigm shift in irrigation management. Users now have unprecedented control, from dynamically modifying zone configurations to adapting irrigation schedules based on real-time data and AI-driven insights. The capability to modify plant data effortlessly and the addition of plant deletion functionality contribute to a more adaptable and organized database.

References

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