Development of a Smart Plant Irrigation Model

Quách Tố Huy
Thai Nguyen University of Information and Communication Technology
Thai Nguyen University, Thai Nguyen, Vietnam
dtc16hd5103010024@ictu.edu.vn

***Abstract*—This thesis presents the construction of a smart irrigation system for trees, focusing on the design and implementation of a system that can be controlled via Wi-Fi or mobile devices, and automatically irrigates based on environmental parameters. The author designed and implemented a system that includes environmental parameter collection, automatic irrigation scheduling, and remote control capabilities. However, the system is still bulky and lacks economic efficiency, and it only addresses temporary control issues without considering specific site conditions. The system demonstrates the feasibility of smart irrigation for trees but requires further optimization for practical deployment.**

***Index Terms*—smart irrigation, tree irrigation, Arduino, NodeMCU ESP8266, environmental parameter, automatic irrigation**

I. Introduction

The thesis provides an overview of current irrigation methods and automatic irrigation systems, emphasizing the need for more efficient and automated irrigation solutions in agriculture. The author designed and implemented a smart irrigation system for trees, incorporating environmental parameter collection, automatic irrigation scheduling, and remote control capabilities. The system aims to address the challenges of traditional irrigation methods, such as water wastage and labor-intensive manual watering, by leveraging modern technology [1]. Published articles on the methods and subject of this project provide context for this English summary [2], [3], [4], [5], [7], [8], [9], [10]. Published books on the methods and subject of this project provide context for this English summary [6].

II. Methods

The author conducted a comprehensive study of relevant technologies and devices, designed a smart irrigation system with functions such as environmental parameter collection, automatic irrigation scheduling, remote control via Wi-Fi or mobile devices, and emergency shutdown. The system was implemented using Arduino and NodeMCU ESP8266 microcontrollers. The author utilized software libraries for communication and data processing, including the Blynk library for remote control and the DHT22 sensor for environmental parameter collection. The system was tested in a controlled environment to ensure its functionality and reliability [1].

Supervisor: Vũ Thành Vinh, Thai Nguyen University of Information and Communication Technology (vtvinh@ictu.edu.vn).

III. Results

The author successfully implemented a smart irrigation system for trees, which can collect environmental parameters, schedule irrigation automatically, and control irrigation remotely via Wi-Fi or mobile devices. The system includes a water pump controlled by a relay module, which can be activated based on environmental conditions. However, the system is still bulky and lacks economic efficiency, and it only addresses temporary control issues without considering specific site conditions. The system was tested in a controlled environment, and the author documented the implementation process and system behavior [1].

IV. Discussion

The system demonstrates the feasibility of smart irrigation for trees, but there are limitations in terms of size and economic efficiency. The author suggests that the system could be scaled down for smaller irrigation areas such as balcony gardens in apartment complexes or small-scale urban gardens. The system's performance could be improved by optimizing the hardware design and reducing the system's bulkiness. Additionally, the author recommends further research to address the specific site conditions and improve the system's adaptability to different environments [1].

V. Conclusion

The thesis successfully designed and implemented a smart irrigation system for trees, but it still has room for improvement in terms of size and economic efficiency. The system serves as a foundation for future research and development of more optimized and economically viable smart irrigation systems. The author's work provides a valuable contribution to the field of smart agriculture and highlights the potential benefits of integrating modern technology into traditional irrigation methods [1].

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