INTERNET OF THINGS-BASED PLANTING MEDIA MONITORING SYSTEM FOR SPINACH PLANTS USING THINGSPEAK MEDIA

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ABSTRACT

Optimal plant growth is highly dependent on the condition of the growing medium, particularly its moisture content and balanced nutrient availability. Manual monitoring of growing medium conditions is still widely practiced, but this method is considered inefficient and carries the risk of errors in watering and nutrient application, which can hinder spinach growth. This research aims to design and implement an Internet of Things (IoT)-based automatic soil moisture and nutrient monitoring and control system to support spinach cultivation. The method used involves integrating soil moisture and pH sensors with an ESP32 microcontroller, which reads environmental data. The obtained data is sent in real time to the ThingSpeak platform to be displayed in the form of monitoring graphs and used as the basis for the system to automatically activate water or nutrient pumps if conditions do not meet predetermined thresholds. Test results show that the system is able to accurately detect soil moisture and pH values and provide a rapid, automatic response to changes in growing medium conditions. The system can also be accessed remotely via an internet connection, eliminating the need for on-site monitoring. With these capabilities, the system can help improve the efficiency of water and nutrient use and support smarter, more sustainable, technology-based agricultural productivity.
Keywords*: Internet of Things, Soil Moisture, Soil pH, ThingSpeak, Monitoring.*