IMPLEMENTATION OF AN IOT-BASED NUTRITION AND PH CONTROL SYSTEM TO IMPROVE HYDROPONIC STRAWBERRY PRODUCTIVITY USING NODE-RED

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ABSTRACT

Hydroponics is a method of cultivating plants without soil, using nutrient solutions to produce nutrients. Strawberries (Fragaria sp.) are a highly profitable horticultural crop that requires controlled environmental conditions. The purpose of this research is to develop and implement an Internet of Things (IoT)-based system that can monitor and control strawberry hydroponic parameters. The system uses the Water Cultivation System (WCS) method with parameters such as pH, nutrient concentration (TDS), and water temperature. The hardware consists of an ESP32 microcontroller, pH sensors, TDS sensors, and water temperature sensors, as well as a relay to control the pump. Images are displayed in real time after data is sent to Node-RED via the MQTT protocol. Test results indicate ideal conditions with an average pH of 6.81, nutrients between 700 and 1100 ppm, and a water temperature of 26.75°C.

Keywords: Hydroponics, Strawberries, pH, TDS, Water Temperature, ESP32