

ABSTRACT

The rapid population growth and limited agricultural land in urban areas like Bandung pose a challenge to local food security. Hydroponics offers a potential solution as it does not require soil and can be applied in narrow spaces. The success of hydroponic cultivation heavily depends on balanced nutrient delivery, particularly through AB Mix solutions containing essential macro and micronutrients. However, manual nutrient dosing often leads to errors that hinder plant growth. This research develops an IoT-based monitoring and automatic control system for AB Mix nutrient delivery in hydroponic media. The system utilizes an ESP32 microcontroller integrated with pH and TDS, to monitor the solution's quality and quantity in real-time, and sensor data is sent to Firebase. The system includes an automation feature that activates nutrient pumps based on TDS values to maintain optimal nutrient concentration. Implementation results show that the system effectively maintains solution stability and reduces human error, supporting more efficient plant growth.

Keywords: Hydroponics, AB Mix, IoT, ESP32, Automatic Control, Firebase