ABSTRACT

Crab cultivation using the vertical crab house method is an innovation that can optimize limited space in urban environments. However, the main challenge in this system is the need for accurate, efficient, and sustainable water quality monitoring. This study aims to develop an Internet of Things (IoT)-based water quality monitoring system using an ESP32 microcontroller and four types of sensors: pH 4502C, temperature DS18B20, TDS, and dissolved oxygen (DO). Each sensor data is filtered using the Kalman Filter algorithm to improve accuracy and reduce noise before being sent in real-time to the ThingSpeak cloud platform, and displayed locally via an I2C LCD. The test was carried out for 480 minutes with a recording interval of every 30 minutes. The results showed that the Kalman Filter succeeded in increasing data stability on pH, temperature, and TDS parameters, with a low average error compared to industrial sensors. However, in the DO parameter, there was a decreasing trend in values that were inconsistent with the reference data, indicating the need for further development of the sensor or filtering method. This system has been successfully implemented and shows potential as a tool for monitoring water quality in small-scale crab cultivation automatically and in real-time.

Keywords: Internet of Things (IoT), ESP32, Kalman Filter, Water Quality Monitoring, Crab Cultivation, Vertical Crab House