

ABSTRACT

Nile tilapia aquaculture is one of the freshwater fishery sectors with high economic potential in Indonesia. The success of cultivation is strongly influenced by water quality can lead to stress, reduced growth performance, and even mass mortality in fish. This study aims to design an automatic water quality monitoring and classification system for tilapia ponds using Internet of Things (IoT) technology and the mamdani *fuzzy* logic method. The system utilizes a DS18B20 temperature sensor, a pH sensor, and a TGS2602 gas sensor to measure ammonia levels. Sensor data is transmitted wirelessly using a NodeMCU ESP8266 and displayed on a mobile application developed with kodular. The mamdani *fuzzy* logic is employed to classify water quality into three categories: good, moderate, and poor. The classification output is used to control an actuator in the form of a servo motor that responds based on the detected water condition. Experimental results indicate that the system is capable of monitoring water quality in *real-time*, providing accurate classification, and helping maintain an optimal environment for aquaculture. This system enables farmers to reduce the risk of crop failure caused by deteriorating water conditions.

Keywords: Nile tilapia aquaculture, Water quality, Monitoring, Fuzzy mamdani, Internet of Things