

***Mechanics and Design of IoT (Internet of Things)-Based Water Monitoring
Equipment in Shrimp Ponds***

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ABSTRACT

Water quality in ponds is a major determining factor in the success of shrimp farming, where fluctuations in water parameters can cause stress and mass mortality in shrimp. Manual monitoring processes are considered time-inefficient and prone to human error. This study aims to design the mechanics and an Internet of Things (IoT)-based water quality monitoring system for shrimp ponds capable of automating water circulation in real-time. The system is controlled by an ESP32 Wroom microcontroller integrated with a DS18B20 temperature sensor, a pH sensor, a TDS sensor, and water float sensors. All hardware components are protected using a waterproof Vange Box Panel Duradus. If the water parameters fall outside the ideal limits, the system automatically triggers relays to activate 1-phase water pumps to drain and refill the pond water, while data is monitored via the Blynk application. The functionality test results showed that the device operated with a 100% success rate across 5 trials. Mechanical testing proved the panel box could withstand water penetration (0% leakage) for up to 15 disassemblies. Furthermore, the maximum internal temperature of the panel box reached only 42°C, which proved to be highly safe and well below the critical component damage limit of 60°C.

Keywords: *Water Quality, Shrimp Pond, Internet of Things (IoT), ESP32, Automated Circulation.*