

## ABSTRACT

*In order to solve the problem of limited knowledge regarding ideal water conditions, this study builds an Internet of Things (IoT)-based system for real-time monitoring and automatic water quality control in koi fish cultivation. The system combines controllers (filter, cooler, and heater) with IoT devices, including pH, ammonia, temperature, total dissolved solid (TDS), and turbidity sensors, with a mobile application called "AquaKoi". IoT device testing ensuring that all of the sensors and controllers are operating as intended, and accuracy is confirmed by comparing sensor data to water quality criteria. Several sensors were calibrated using digital sensors as a reference. Mobile application testing covers four aspects: User acceptance testing (UAT), black box testing, notification warning testing, and Quality of Service (QoS) assessment. While QoS measurement assesses the application's responsiveness, Black Box Testing makes sure that every functionality operates flawlessly. A UAT with students and koi growers revealed a 92% user satisfaction score. Testing for notification warnings was successful in ensuring that alerts were sent out when water parameters varied from the norm. The outcomes demonstrate that, despite certain issues like the ESP32 microcontroller overheating, the system performs as intended and meets requirements. A fan was used as a temporary fix that worked well to resolve this problem. All things considered, the AquaKoi method shows a great deal of promise for raising the productivity of koi fish cultivation. However, further development is recommended to address technical challenges, enhance the user interface, and expand system capabilities to meet more diverse user needs.*

*Keywords: Internet of Things (IoT), real-time monitoring, automatic water quality control, koi fish cultivation*