**Developing a Fish Tank Management System via an Online Application**

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**ABSTRACT**

Fish tank owners often face challenges in maintaining optimal environmental conditions due to time constraints and a lack of real-time monitoring tools. To address this, our research team developed an online fish tank management application with two key objectives: 1) to design an efficient management system and 2) to evaluate its performance. Developed using Flutter for compatibility with both Android and iOS, the system supports automatic and manual control modes. In automatic mode, users can configure pH and turbidity levels based on specific fish requirements, while manual mode allows direct control over feeding, lighting, and water filtration. The system integrates micro-controllers to gather real-time data from turbidity, pH, and temperature sensors, transmitting this information to ThingSpeak cloud for storage and analysis. The application provides graphical data visualization and facilitates remote control by sending commands through Firebase cloud to the micro-controller, which then operates connected devices via relay modules. Performance evaluations confirmed the system's reliability, with command response tests conducted over 100 trials yielding the following average latency times: 1) LED Activation: 2.86 seconds | Deactivation: 2.72 seconds; 2) Feeding System Activation: 2.61 seconds | Deactivation: 2.78 seconds; 3) Timer-Based Feeding Operations: 2.42 seconds. This innovative system enables fish tank owners to remotely monitor and manage environmental conditions, significantly reducing maintenance time while ensuring continuous monitoring for improved aquatic life management.

**Key words:** Fish tank, Application, Flutter

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