

Fish Tank: An IoT-Based Mini Aquarium Control System

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Abstract: *The manual management of aquarium systems is a meticulous process involving hands-on monitoring of various critical parameters such as water quality, feeding, lighting, and maintenance. However, this approach comes with challenges, including significant time consumption, the potential for human errors, and a lack of remote monitoring capabilities. To overcome these challenges, the development of automated smart aquarium systems has emerged as a transformative solution. These systems aim to simplify maintenance, enhance the well-being of aquatic life, provide remote accessibility, and contribute valuable data for research and education in the field. In the context of this evolutionary shift, this paper proposes a comprehensive Fish Tank system built upon the innovative IoT solution, IoT talk. This system utilizes sensors to drive actuators in real-time, enabling intelligent control of various water conditions within the aquarium. A notable feature of this proposed system is the implementation of a precise fish-feeding mechanism, enhancing the overall care provided to aquatic life. The paper goes further to present an analytic model, simulation, and measurement experiments that delve into the effects of IoT message delays and loss on water condition control, contributing valuable insights to the efficiency of the proposed system. Moreover, the proposed Fish Tank system incorporates advanced monitoring tools seamlessly connected to a robust database. This integration allows for efficient data storage and retrieval, enhancing the overall performance and reliability of the system. By extending this connectivity to a mobile application, the solution not only reduces human effort and errors in aquarium management but also provides users with convenient remote access. This transformative approach ensures continuous monitoring and control of the aquarium environment, ultimately contributing to the sustained health and well-being of aquatic life.*

Keywords: Internet of Things (IoT), Water Monitoring, Smart Aquarium, Automated Fish Feeders, Sensors, Actuators

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