



UNDERGRADUATE THESIS

**IOT-BASED FIRE-BELLY NEWT PALUDARIUM
MONITORING AND CONTROL SYSTEM USING
THE TYPE-2 FUZZY METHOD**

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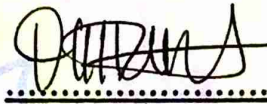
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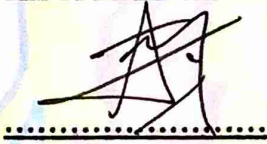
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ABSTRACT

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Fire-Belly Newt is a semi-aquatic amphibian that requires stable environmental conditions to survive properly. Environmental parameters such as water temperature, light intensity, and water turbidity play an important role in maintaining its health and survival. Therefore, this study aims to develop an Internet of Things (IoT)-based monitoring and control system for a Fire-Belly Newt paludarium using the Interval Type-2 Fuzzy Logic method.

The developed system uses an ESP32 microcontroller as the main controller, a DS18B20 sensor to measure water temperature, an LDR sensor to detect light intensity, and a turbidity sensor to measure water turbidity levels. Sensor data are processed using the Interval Type-2 Fuzzy Logic method to handle uncertainty in sensor readings and generate automatic control decisions for actuators such as the Peltier Cooler, lamps, pumps, and alarms. The system is also integrated with an IoT platform for real-time monitoring.

The results show that the system can monitor environmental parameters in real time and perform automatic control according to predefined conditions. The implementation of Interval Type-2 Fuzzy Logic improves the system's ability to handle sensor data uncertainty and maintain environmental stability based on the needs of the Fire-Belly Newt. Thus, the system can support more efficient paludarium maintenance and reduce the risk of health problems caused by unstable environmental conditions.

Keywords: Fire-Belly Newt, Paludarium, Internet of Things, Interval Type-2 Fuzzy Logic, Monitoring, Control.

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Surabaya, June 1, 2026



Author

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