



UNDERGRADUATE THESIS

PID (PROPORTIONAL–INTEGRAL–DERIVATIVE) CONTROL SYSTEM WITH PSO ALGORITHM ON IOT-BASED BIOACTIVE VIVARIUM FOR CROCODILE SKINS

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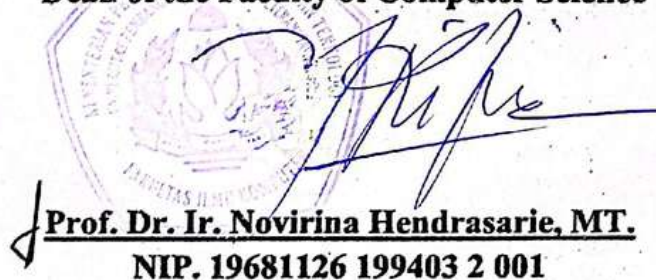
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ABSTRACT

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System with PSO Algorithm on IoT-Based
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ABSTRACT

The stability of micro-environmental parameters is a crucial factor in the maintenance of Crocodile Skinks (*Tribolonotus gracilis*) within bioactive vivarium ecosystems. Instability in temperature and humidity often triggers biological stress and increases mortality risks due to opportunistic bacterial infections, such as *Aeromonas hydrophila*. This research aims to design an Internet of Things (IoT)-based automated control system using the ESP32 microcontroller to maintain the stability of temperature, air humidity, and soil moisture. The implemented control method is Proportional-Integral-Derivative (PID), with parameters optimized using the Particle Swarm Optimization (PSO) algorithm to minimize overshoot and accelerate system response time in reaching the set-point. The development methodology employed is Rapid Application Development (RAD). The system integrates DHT22 and YL-69 sensors as inputs, and actuators including a Peltier cooler, mist maker, and mini submersible pump as outputs. The expected results of this research are the creation of a stable micro-environment within the ideal temperature range of 22°C - 25°C, air humidity of 70% - 85%, and soil moisturize in 70% to support biotic welfare and the sustainability of self-sufficient nutrient cycles in bioactive vivariums.

Keywords: Crocodile Skink, Bioactive Vivarium, IoT, PID, PSO, ESP32.

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Surabaya, July 10 2026

Author

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