

***Implementation for Optimizing Temperature, Humidity, and Light Intensity
Control in Oyster Mushroom Cultivation***

Khen Dedes, S.Tr.Kom., M.T. as a Supervisor

Firmansyah Rachman Putra

Study Program of Informatics Engineering

Majoring in Information Technology

ABSTRACT

Oyster mushroom cultivation requires optimal environmental conditions, particularly temperature, humidity, and light intensity. Manual environmental control is often unable to maintain these parameters consistently, which may affect mushroom growth. This study implements the Adaptive Neuro-Fuzzy Inference System (ANFIS) method in an Internet of Things (IoT)-based environmental monitoring and control system to automate environmental regulation in oyster mushroom cultivation. The system utilizes DHT21 and BH1750 sensors to collect environmental data and employs a fan, humidifier, and LED lamp as actuators controlled by an ESP32 microcontroller. The ANFIS model was trained using 23,101 data records with three input variables and three Generalized Bell membership functions for each variable, resulting in 27 fuzzy rules. The testing results show that the ANFIS model achieved an RMSE of 0.0045, an MAE of 0.0026, and an R^2 value of 0.9982. Black Box Testing demonstrated a 100% success rate for all system functions, while User Acceptance Testing (UAT) achieved a user satisfaction score of 89.4%, categorized as very good. These results indicate that the ANFIS method can provide accurate and adaptive environmental control decisions for IoT-based oyster mushroom cultivation systems.

Keywords: ANFIS, Internet of Things, Oyster Mushroom, Monitoring, Environmental Control.