

IOT-Based Air Temperature And Humidity Monitoring System In Aquaponics Using The K-Nearest Neighbors (KNN) Method To Predict Optimal Plant Conditions

Dhony Manggala Putra, S.E., M.M. as Supervisor

Muhammad Haris Suhud

Program Studi Teknik Informatika
Jurusan Teknologi Informasi

ABSTRACT

This research aims to design and implement a temperature and humidity monitoring system for an aquaponic system based on the Internet of Things (IoT) integrated with the K-Nearest Neighbor (KNN) method to predict optimal plant growth conditions. The system uses a DHT22 sensor to measure air temperature and humidity, as well as a DS18B20 sensor to measure water temperature. All data is processed by the NodeMCU ESP8266 microcontroller and transmitted to the Firebase Realtime Database via the internet for real-time processing. The collected data is then preprocessed and normalized using the Min-Max Normalization method before being used in the classification process. The K-Nearest Neighbor (KNN) method is applied using Euclidean Distance to classify aquaponic environmental conditions into optimal and non-optimal categories. Experiments were conducted using different K values ($K = 3, 5$, and 7), and the best result was achieved at $K = 3$ with an accuracy of 86% based on the confusion matrix evaluation. The results show that the system is capable of performing real-time environmental monitoring while also providing accurate predictions of optimal plant conditions. This system enables users to remotely monitor aquaponic conditions and supports decision-making to maintain ecosystem stability.

Keywords: *IoT, Aquaponics, KNN, NodeMCU ESP8266, Monitoring, Firebase*