

ABSTRAK

PENERAPAN SISTEM TERTANAM DAN *INTERNET OF THINGS* DALAM PENGEMBANGAN *AUTOMATIC WEATHER STATION* (AWS) TERPADU DI KAWASAN HUTAN MANGROVE PETENGORAN

Oleh

Muhammad Rafi Ramadhan

Penelitian ini mengembangkan dan menerapkan *Automatic Weather Station* (AWS) berbasis *Internet of Things* (IoT) untuk memantau atribut iklim di kawasan konservasi hutan mangrove Petengoran, Lampung. Hutan mangrove merupakan ekosistem penting untuk mitigasi perubahan iklim, tetapi mengalami degradasi akibat aktivitas manusia. AWS dirancang untuk menyediakan data iklim yang akurat dan real-time, mendukung analisis perubahan iklim, serta konservasi berkelanjutan.

AWS ini menggunakan ESP32 dan Raspberry Pi 4 sebagai pusat kendali, dilengkapi sensor untuk mengukur suhu, kelembapan, curah hujan, kecepatan dan arah angin, radiasi matahari, serta gas. Data dikumpulkan setiap sepuluh menit, dikirim melalui protokol MQTT, dan divisualisasikan dalam dashboard web. Sistem ini memudahkan pemantauan data di wilayah terpencil.

Hasil penelitian menunjukkan AWS mampu menghasilkan data iklim yang akurat dan relevan untuk konservasi mangrove serta penelitian perubahan iklim. Sistem ini tahan terhadap kondisi lingkungan kompleks dan mempermudah akses data real-time melalui dashboard interaktif.

Kata Kunci: *Automatic Weather Station, Internet of Things, Hutan Mangrove Petengoran, Mitigasi Perubahan Iklim, Real-time Monitoring*

ABSTRACT

IMPLEMENTATION OF EMBEDDED SYSTEMS AND INTERNET OF THINGS IN THE DEVELOPMENT OF AN INTEGRATED AUTOMATIC WEATHER STATION (AWS) AT PETENGORAN MANGROVE FOREST

By

Muhammad Rafi Ramadhan

This study presents the development and implementation of an Internet of Things (IoT)-based Automatic Weather Station (AWS) for monitoring climate attributes in the Petengoran mangrove forest conservation area, Lampung. As vital ecosystems for climate change mitigation, mangrove forests are increasingly threatened by anthropogenic pressures. The proposed AWS aims to deliver accurate, real-time climate data to support environmental analysis and sustainable conservation efforts.

The system integrates ESP32 and Raspberry Pi 4 as control units and is equipped with sensors to measure temperature, humidity, rainfall, wind speed and direction, solar radiation, and gas concentrations. Data is collected at ten minutes interval, transmitted via MQTT protocol, and visualized through a web-based dashboard, enabling efficient and remote environmental monitoring. in remote areas.

Results show that the AWS provides reliable and precise climate data, proving its suitability for mangrove conservation and climate-related research. The system is robust under complex environmental conditions and facilitates real-time data access through an interactive and user-friendly interface.

Keywords: Automatic Weather Station, Internet of Things, Petengoran Mangrove Forest, Climate Change Mitigation, Real-Time Monitoring