

INTISARI

IMPLEMENTASI SISTEM PEMANTAUAN *REAL-TIME* STABILITAS DAN PERFORMA JARINGAN WI-FI KAMPUS BERBASIS ESP32 DENGAN VISUALISASI GRAFIK

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Universitas Gadjah Mada memanfaatkan jaringan CAN untuk mendukung aktivitas daring, namun kendala akses sering muncul akibat tingginya kepadatan pengguna dan perangkat nirkabel. Penelitian ini mengembangkan sistem pemantauan kekuatan sinyal Wi-Fi secara real-time menggunakan lima perangkat ESP32 di lokasi berbeda, yang menampilkan data melalui grafik garis dan heatmap di situs web. Hasil menunjukkan ESP32 ketiga paling optimal, mendeteksi hingga tiga AP per siklus, waktu pemindaian rata-rata tujuh detik, dan kekuatan sinyal maksimum -63 dBm. Estimasi jarak berdasarkan model *Long Distance Path Loss Model* berkisar antara 18,2 hingga 23,99 meter. Data disimpan di server VPS dalam basis data MySQL, dan situs web menyajikan lokasi dengan koneksi terbaik secara praktis. Sistem ini membantu mahasiswa menemukan titik akses optimal tanpa uji manual serta mendukung pengambilan keputusan teknis untuk optimalisasi jaringan kampus.

Kata kunci: ESP32, Wi-Fi, RSSI, *Heatmap*, IoT

ABSTRACT

IMPLEMENTATION OF A REAL-TIME MONITORING SYSTEM FOR CAMPUS WI-FI NETWORK STABILITY AND PERFORMANCE BASED ON ESP32 WITH GRAPHICAL VISUALIZATION

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Gajah Mada University utilizes a CAN network to support online activities, but access issues frequently arise due to high user density and wireless devices. This study developed a real-time Wi-Fi signal strength monitoring system using five ESP32 devices at different locations, displaying data through line graphs and heatmaps on a website. Results indicate that the third ESP32 is the most optimal, detecting up to three access points (APs) per cycle, with an average scanning time of seven seconds and a maximum signal strength of -63 dBm. Distance estimates based on the Long Distance Path Loss Model range from 18.2 to 23.99 meters. Data is stored on a VPS server in a MySQL database, and the website practically presents locations with the best connections. This system helps students find the optimal access point without manual testing and supports technical decision-making for campus network optimization.

Keywords: *ESP32, Wi-Fi, RSSI, Heatmap, IoT*