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Pengembangan Sistem Kontrol Pengisian Daya Mobil Listrik Berbasis Aplikasi Web dan IoT di Hotel Tentrem Yogyakarta
Rafli Rajendra Permana, Ir. Nur Rohman Rosyid, S.T., M.T., D.Eng
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INTISARI

PENGEMBANGAN SISTEM KONTROL PENGISIAN DAYA MOBIL LISTRIK BERBASIS APLIKASI *WEB* DAN IOT DI HOTEL TENTREM YOGYAKARTA

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Penggunaan kendaraan listrik di Indonesia mengalami peningkatan signifikan yang ditandai dengan kenaikan penjualan mobil listrik sebesar 39,91% pada Mei 2024 dibandingkan tahun sebelumnya. Peningkatan ini mendorong munculnya infrastruktur pendukung seperti *charging station* di kota-kota besar. Hotel Tentrem Yogyakarta memiliki *charging station* bermerek Porsche yang masih dioperasikan secara manual. Pengoperasian memerlukan bantuan mekanik atau *engineer* setelah tamu membeli waktu pengisian di register. Sistem manual ini dinilai kurang efisien dibandingkan *charging station* yang dapat melayani sendiri. Berdasarkan permasalahan tersebut, dikembangkan sistem *token* berbasis IoT dengan *timer* otomatis pada *charging station*.

Pengembangan sistem memanfaatkan beberapa komponen utama. ESP32 digunakan sebagai *microcontroller*. Sensor arus SCT-013 dipasang untuk mendeteksi penggunaan *charging station*. Antarmuka pengguna dikembangkan dalam bentuk aplikasi *web* berbasis *Laravel Framework*. Protokol MQTT diimplementasikan dalam komunikasi antara perangkat IoT dan aplikasi *web*. Hasil pengujian menunjukkan keberhasilan integrasi perangkat IoT dengan aplikasi *web*. Sistem *token* berhasil diterapkan dengan mekanisme penggunaan berulang dalam rentang waktu 24 jam hingga durasi habis. *Timer* berjalan secara otomatis saat arus terdeteksi melebihi 0,5 A dan dapat dihentikan sementara ketika arus turun di bawah 0,3 A. Antarmuka *monitoring* berhasil disinkronkan dengan antarmuka *charging station* secara *real-time*.

Kata kunci: *charging station*, IoT, Laravel, MQTT, LAMP *Stack*

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ABSTRACT

DEVELOPMENT OF WEB APPLICATION AND IOT BASED CHARGING STATION CONTROL SYSTEM AT HOTEL TENTREM YOGYAKARTA

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The use of electric vehicles in Indonesia has experienced a significant increase, with electric car sales rising by 39.91% in May 2024 compared to the previous year. This increase has led to the emergence of electric vehicle supporting infrastructure such as charging stations in major cities. Hotel Tentrem Yogyakarta has a Porsche-branded charging station that are still operated manually, requiring assistance from engineers to operate them after the guest purchase charging time at the register. This manual system is less efficient compared to self-serving charging stations. Based on this issue, this project was conducted to develop an IoT-based token system with automatic timer for these charging stations.

The system uses ESP32 as the microcontroller, SCT-013 current sensor to detect charging station usage, a Laravel Framework-based web application for the user interface, and MQTT for communication between IoT devices and the web application. Test results show that the system successfully integrated IoT devices with the web application. The token system was successfully implemented with a logic allowing repeated use within a 24-hour period until the remaining time or duration is exhausted. The timer can run automatically when current is detected above 0.5 A and can be temporarily paused when current drops below 0.3 A. The monitoring interface successfully synchronizes with the charging station interface to monitor usage in real-time.

Keyword: charging station, IoT, Laravel, MQTT, LAMP Stack