

ABSTRAK

RANCANG BANGUN SISTEM MONITORING DAN KONTROL JARAK JAUH PADA RENTAL MOTOR BERBASIS IOT DENGAN *GEOFENCING*

(Achmad Doli Harahap: 82 Halaman)

Rental motor menghadapi masalah dalam memantau posisi kendaraan secara *real-time*, risiko keterlambatan pengembalian, serta potensi penipuan yang dapat menurunkan efisiensi dan keamanan operasional. Penelitian ini bertujuan untuk merancang dan membangun sistem monitoring dan kontrol jarak jauh berbasis *Internet of Things* (IoT) dengan fitur *geofencing* guna meningkatkan efisiensi dan keamanan operasional rental motor. Sistem dirancang menggunakan Arduino Mega 2560, modul GPS Ublox NEO-6M, SIM7000G untuk komunikasi GSM, serta buzzer dan relay sebagai aktuator. Dari sisi perangkat lunak, digunakan Laravel sebagai *backend* dan dashboard monitoring, serta Telegram untuk notifikasi otomatis. Hasil pengujian menunjukkan bahwa modul GPS memiliki rata-rata selisih akurasi 12.10 meter dibandingkan Google Maps. Fungsi *geofencing* berhasil mendeteksi kendaraan saat berada di dalam maupun di luar area operasional Kota Palembang. Relay tetap aktif saat kendaraan di dalam area, sedangkan pemutusan mesin dan aktivasi buzzer terjadi saat kendaraan keluar area *geofence*. Selain itu, fitur pengendalian waktu sewa berfungsi stabil dengan pemberian notifikasi dan pemutusan mesin secara otomatis saat masa sewa habis. Dengan demikian, sistem ini berhasil diimplementasikan untuk memantau posisi kendaraan secara *real-time*, mengontrol kendaraan berbasis lokasi dan durasi sewa, serta mendukung pengelolaan rental motor yang lebih aman dan efisien.

Kata kunci : *Internet of Things*, Rental Motor, GPS, GSM, *Geofencing*, *Website*

ABSTRACT

DESIGN AND IMPLEMENTATION OF AN IOT-BASED REMOTE MONITORING AND CONTROL SYSTEM FOR MOTORCYCLE RENTAL USING GEOFENCING

(Achmad Doli Harahap: (82 Pages)

Motorcycle rental businesses face challenges in monitoring vehicle positions in real-time, the risk of late returns, and potential fraud, all of which can reduce operational efficiency and security. This study aims to design and develop a remote monitoring and control system based on the Internet of Things (IoT) with geofencing features to enhance the operational efficiency and security of motorcycle rentals. The system is designed using an Arduino Mega 2560, a Ublox NEO-6M GPS module, a SIM7000G module for GSM communication, as well as a buzzer and relay as actuators. On the software side, Laravel is used as the backend and monitoring dashboard, while Telegram is utilized for automatic notifications. Test results show that the GPS module has an average accuracy deviation of 12.10 meters compared to Google Maps. The geofencing function successfully detects the vehicle's position both inside and outside the operational area of Palembang City. The relay remains active when the vehicle is within the designated area, while engine cut-off and buzzer activation occur when the vehicle leaves the geofenced area. Additionally, the rental time control feature operates reliably, providing automatic notifications and engine cut-off when the rental period ends. Thus, this system has been successfully implemented to monitor vehicle positions in real-time, control vehicles based on location and rental duration, and support safer and more efficient motorcycle rental management.

Keywords : Internet of Things, Rental Motor, GPS, GSM, Geofencing, Website