

ABSTRAK

Peningkatan Keamanan dan Efisiensi Pada *Diesel Generator* Berbasis IoT (*Internet of things*) dengan Enkripsi AES (*Advanced Encryption Standard*) di Stasiun Kramasan PT. KAI (Persero) Divre III Palembang

(2025: XV + 77 Halaman + 43 Gambar + 15 Tabel + 7 Lampiran)

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**PROGRAM STUDI SARJANA TERAPAN TEKNIK TELEKOMUNIKASI
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Stasiun Kramasan PT Kereta Api Indonesia (Persero) Divre III Palembang memerlukan sistem pasokan listrik cadangan yang andal. Namun, monitoring *Diesel Generator* (DG) masih dilakukan secara manual sehingga rentan keterlambatan informasi dan human error. Penelitian ini bertujuan merancang dan mengimplementasikan sistem monitoring DG berbasis Internet of Things (IoT) dengan algoritma enkripsi *Advanced Encryption Standard* (AES-128) untuk meningkatkan keamanan data. Perancangan meliputi penggunaan mikrokontroler ESP8266, sensor PZEM-004T, sensor ultrasonik HC-SR04, dan sensor DC, serta integrasi dengan Firebase Realtime Database dan aplikasi mobile Flutter. Data sensor dienkripsi sebelum dikirim ke server. Hasil pengujian menunjukkan rata-rata error relatif sebesar 0,44% (tegangan), 7,5% (arus), 1,32% (daya), dan 4,00% (level bahan bakar). Data berhasil disimpan dan didekripsi tanpa kehilangan informasi, dengan sinkronisasi real-time yang stabil. Sistem ini terbukti meningkatkan keamanan dan mendukung monitoring DG secara otomatis, akurat, dan efisien.

Kata kunci: *Diesel Generator*, IoT, ESP8266, Firebase, Enkripsi AES

ABSTRACT

Enhancing Security and Efficiency of an IoT-Based Diesel Generator System Using AES (Advanced Encryption Standard) at Kramasan Station, PT. KAI (Persero) Divre III Palembang

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Kramasan Station of PT Kereta Api Indonesia (Persero) Divre III Palembang requires a reliable backup power supply system. However, the monitoring of the Diesel Generator (DG) is still performed manually, making it prone to information delays and human error. This study aims to design and implement a DG monitoring system based on the Internet of Things (IoT) equipped with an Advanced Encryption Standard (AES-128) algorithm to enhance data security. The system design involves the use of an ESP8266 microcontroller, PZEM-004T sensor, HC-SR04 ultrasonic sensor, and DC sensor, integrated with the Firebase Realtime Database and a mobile application built with Flutter. Sensor data is encrypted before being transmitted to the server. Testing results show an average relative error of 0.44% (voltage), 7.5% (current), 1.32% (power), and 4.00% (fuel level). The encrypted data was successfully stored and decrypted without information loss, with stable real-time synchronization. This system has been proven to improve data security and support automatic, accurate, and efficient DG monitoring.

Keywords: Diesel Generator, IoT, ESP8266, Firebase, AES Encryption