ABSTRAK

Zainurrofik.
Sistem Monitoring dan Analisa battery yang berbasis AI untuk menjaga kesiapan pada Emergency Diesel Generator (EDG)
Dibimbing oleh Crishtine Widyastuti S.T., M.T

Emergency Diesel Generator (EDG) memerlukan baterai yang andal sebagai sumber energi awal saat proses start, sehingga penurunan kapasitas dan kesehatan baterai dapat menyebabkan kegagalan sistem pada kondisi darurat. Penelitian ini bertujuan merancang sistem monitoring dan analisis baterai berbasis Artificial Intelligence (AI) untuk memantau kondisi baterai secara real-time serta memprediksi State of Health (SoH). Sistem menggunakan sensor tegangan dan arus untuk memperoleh data operasional yang kemudian diolah menjadi parameter Depth of Discharge (DoD), Equivalent Full Cycle (EFC), dan estimasi SoH berbasis model AI. Hasil pengujian periode Januari–Februari 2026 menunjukkan laju degradasi SoH sebesar ±0,025% per hari atau ±0,75% per bulan. Berdasarkan laju tersebut, sistem memproyeksikan bahwa SoH baterai akan mencapai batas minimum 80% pada kisaran Maret–April 2028. Implementasi sistem ini memungkinkan penerapan predictive maintenance, sehingga keputusan penggantian baterai dilakukan berdasarkan kondisi aktual, bukan jadwal tetap, serta meningkatkan keandalan sistem start EDG dalam mendukung kontinuitas pasokan listrik darurat.

Kata kunci: *Emergency Diesel Generator, State of Health (SoH), Equivalent Full Cycle (EFC),* kecerdasan buatan, sistem monitoring baterai.

ABSTRACT

Zainurrofik.

"Design and Implementation of an AI-Based Battery Monitoring and Analysis System to Maintain the Readiness of Emergency Diesel Generator (EDG)"

Supervised by Crishtine Widyastuti S.T., M.T

The readiness of an Emergency Diesel Generator (EDG) highly depends on the reliability of its battery as the initial power source during the starting process; therefore, battery degradation may lead to system failure under emergency conditions. This study aims to design and implement an Artificial Intelligence (AI)-based battery monitoring and analysis system to perform real-time condition monitoring and State of Health (SoH) prediction. The system utilizes voltage and current sensors to collect operational data, which are processed into parameters such as Depth of Discharge (DoD), Equivalent Full Cycle (EFC), and AI-based SoH estimation. Based on experimental data collected from January to February 2026, the battery degradation rate was identified at approximately ±0.025% per day or ±0.75% per month. Using this degradation rate, the system projects that the battery SoH will reach the minimum threshold of 80% around March–April 2028. The implementation of this system supports predictive maintenance by enabling condition-based battery replacement decisions rather than fixed schedule-based maintenance, thereby improving the reliability of the EDG starting system and ensuring the continuity of emergency power supply.

Keywords: *Emergency Diesel Generator, State of Health (SoH), Equivalent Full Cycle (EFC), Artificial Intelligence, battery monitoring system.*