

Implementasi AI-IoT (Artificial Intelligence - Internet of Things) dalam Transformasi Green Smart Hospital: Manajemen Energi dan Lingkungan Terintegrasi pada Infrastruktur IRC dan RSPTN Universitas Lampung

(Implementation of AI-IoT (Artificial Intelligence - Internet of Things) in Green Smart Hospital Transformation: Integrated Energy and Environmental Management at the IRC and RSPTN Infrastructure of the University of Lampung.)

Gigih Forda Nama*, Dikpride Despa, Trisya Septiana, Rio Aristia P, Herri Gusmedi

¹Fakultas Teknik, Universitas Lampung

* Email Korespondensi: gigih@eng.unila.ac.id

Abstrak: Penelitian ini mengusulkan kerangka kerja cerdas berbasis AI-IoT (Artificial Intelligence - Internet of Things) untuk mentransformasi manajemen energi dan kondisi lingkungan pada gedung Integrated Research Center (IRC) dan Rumah Sakit Perguruan Tinggi Negeri (RSPTN) Universitas Lampung. Masalah utama yang diangkat adalah tingginya konsumsi energi serta perlunya standarisasi kualitas lingkungan (Indoor Environmental Quality - IEQ) yang spesifik bagi fasilitas riset dan layanan medis. Sistem ini mengintegrasikan jaringan multi-node IoT yang dilengkapi sensor parameter elektrik (tegangan, arus, daya, energi) dan sensor lingkungan (suhu, kelembapan, kualitas udara, kebisingan). Data tersebut ditransmisikan secara kontinu ke platform terpusat untuk diolah menggunakan algoritma Machine Learning sebagai mesin prediktif. Berbeda dengan sistem pemantauan konvensional, pendekatan ini mampu melakukan prediksi beban puncak listrik, deteksi dini anomali sistem secara otomatis, serta memberikan rekomendasi kebijakan operasional yang presisi melalui visualisasi dashboard yang intuitif. Hasil penelitian mampu memberikan kontribusi nyata terhadap program Unila Green Metric melalui reduksi biaya operasional dan efisiensi energi yang terukur. Selain itu, penelitian ini bertujuan menciptakan model Transformasi Green Smart Hospital yang dapat direplikasi di fasilitas kesehatan nasional, sekaligus memperkuat posisi Universitas Lampung dalam inovasi teknologi kesehatan digital berbasis data. Penelitian ini juga memberikan kontribusi ilmiah terhadap pengembangan konsep rumah sakit pintar (smart hospital) di Indonesia, serta memberikan model implementasi teknologi IoT dan machine learning yang dapat direplikasi di fasilitas kesehatan lainnya. Hasil dari penelitian ini akan memberikan dampak nyata terhadap efisiensi operasional dan peningkatan kualitas layanan kesehatan secara menyeluruh, sejalan dengan upaya transformasi digital di sektor kesehatan nasional.

Kata kunci: Internet of Things (IoT), Smart Hospital, Monitoring Energi, Integrated Research Center (IRC), Rumah Sakit Pendidikan

Abstract: This research proposes an intelligent framework based on AI-IoT (Artificial Intelligence - Internet of Things) to transform energy management and environmental conditions in the Integrated Research Center (IRC) and the State University Hospital (RSPTN) buildings at the University of Lampung. The main issues addressed are the high energy consumption and the need for specific Indoor Environmental Quality (IEQ) standardization for research facilities and medical services. This system integrates a multi-node IoT network equipped with electrical parameter sensors (voltage, current, power, energy) and environmental sensors (temperature, humidity, air quality, noise). The data is continuously transmitted to a centralized platform to be processed using Machine Learning algorithms as a predictive engine. Unlike conventional monitoring systems, this approach is capable of predicting peak electrical loads, automatically detecting early system anomalies, and providing precise operational policy recommendations through an intuitive visualization dashboard. The results of this research provide a tangible contribution to the Unila Green Metric program through operational cost reductions and measurable energy efficiency. In addition, this research aims to create a Green Smart Hospital Transformation model that can be replicated in national healthcare facilities, while simultaneously strengthening the University of Lampung's position in data-driven digital health technology innovation. This research also provides a scientific contribution to the development of the smart hospital concept in Indonesia, as well as providing a model for implementing IoT and machine learning technologies that can be replicated in other healthcare facilities. The results of this study will have a real impact on operational efficiency and the overall improvement of healthcare service quality, in line with digital transformation efforts in the national healthcare sector.

Keywords: Internet of Things (IoT), Smart Hospital, Monitoring Energi, Integrated Research Center (IRC), Rumah Sakit Pendidikan
