Analisis Building Energy Management dengan Kontrol Unit Pendingin Ruangan Berbasis Peramalan suhu Menggunakan Metode Deep Learning = Analysis of Building Energy Management with Cooling Unit Control Based on Temperature Forecasting Using Deep Learning Method

Elvina Sunardi, author

Abstrak

Efisiensi energi merupakan langkah penting dalam upaya pengurangan emisi karbon, terutama di sektor pendingin ruangan yang menyumbang hingga 30% dari total permintaan listrik di kawasan Asia Tenggara. Di Indonesia, peningkatan signifikan dalam penggunaan pendingin ruangan memerlukan solusi untuk mengurangi konsumsi energi tanpa mengorbankan kenyamanan termal penghuni. Penelitian ini mengusulkan metode sistem kontrol status hidup atau mati unit pendingin ruangan berbasis peramalan suhu dengan Long Short-Term Memory (LSTM). Model ini dirancang untuk menjaga suhu dalam rentang kenyamanan 20–22°C sambil meminimalkan penggunaan energi. Parameter input model mencakup data historis suhu ruangan dan status pendingin ruangan. Hasil penelitian menunjukkan bahwa model mampu mengurangi konsumsi energi hingga 31.27% sambil tetap mempertahankan suhu ruangan dalam rentang kenyamanan yang ditentukan.

.....Energy efficiency is a crucial step in reducing carbon emissions, particularly in the cooling sector, which accounts for up to 30% of total electricity demand in Southeast Asia. In Indonesia, the significant increase in air conditioner usage necessitates innovative solutions to reduce energy consumption without compromising occupant thermal comfort. This study proposes a control system for the on/off status of cooling units based on temperature forecasting using the Long Short-Term Memory (LSTM) method. The model is designed to maintain indoor temperature within the comfort range of 20–22°C while minimizing energy consumption. Input parameters for the model include historical room temperature data and the operational status of cooling units. The results show that the model can reduce energy consumption by up to 31.27% while keeping the room temperature within the specified comfort range.