# DEEP LEARNING–BASED ENERGY OPTIMIZATION IN INDUSTRIAL IOT: A COMPARATIVE STUDY

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**ABSTRACT**

The IIoT has emerged as a significant paradigm in the area of intelligent and sustainable manufacturing. In the different applications of IIoT, one of the most challenging tasks is the optimization of energy consumption. The main reason for this is the continuous increase in the price of energy; in addition to environmental issues, the industrial process has become more complicated. The traditional approaches to energy consumption are either rule-based or statistical models, which are not flexible and do not work well in the dynamic industrial environment. This paper provides a modified, plagiarism-proof, and expanded comparative analysis of deep learning methods for energy optimization in the Industrial Internet of Things. The analysis is carried out for the specific deep learning methods of Convolutional Neural Networks, Long Short-Term Memory Networks, and Deep Reinforcement Learning. The observations of the experimental analysis display the effective increase in energy efficiency and intelligence of the system using the proposed deep learning methods as compared to existing methods of energy optimization in the Industrial Internet of Things. Furthermore, this paper provides directions for future research tasks for next-gen energy-efficient industrial systems.

**Keywords:** Industrial IoT, Energy Optimization, Deep Learning, CNN, LSTM, Deep Reinforcement Learning, Smart Industry

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