Deep Learning-Based Study on How Temperature Affects Battery Usage in Fuel Cell Electric Bicycles

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Electric bicycles have emerged as an eco-friendly and efficient mode of transportation, particularly suited for short-distance travel. Among various environmental factors, temperature plays a significant role in influencing battery performance, directly impacting the travel range. This study aims to explore how temperature affects the energy consumption of electric bicycles.

To enhance the accuracy of simulation models, artificial intelligence algorithms—specifically Artificial Neural Network Architecture (ANA) and Genetic Algorithm (GA)—are employed. Additionally, experimental validation is performed through real-world operation of a fuel cell electric bicycle. Data Acquisition (DAQ) systems are utilized to monitor the internal temperature of the battery during operation.

Key parameters such as battery voltage, current, state of charge (SOC), and total travel distance are collected and analyzed. Based on these measurements, this research identifies the optimal temperature range for maximizing the efficiency of electric bicycle performance.

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