World Academy of Science, Engineering and Technology
International Journal of Transport and Vehicle Engineering
Vol:19, No:11, 2025

Integrating Deep Learning For Improved State Of Charge Estimation In Electric Bus

Authors : Ms. Hema Ramachandran, Dr. N. Vasudevan

Abstract : Accurate estimation of the battery State of Charge (SOC) is essential for optimizing the range and performance of modern electric vehicles. This paper focuses on analysing historical driving data from electric buses, with an emphasis on feature extraction and data preprocessing of driving conditions. By selecting relevant parameters, a set of characteristic variables tailored to specific driving scenarios is established. A battery SOC prediction model based on a combination a bidirectional long short-term memory (LSTM) architecture and a standard fully connected neural network (FCNN) is then proposed, where various hyperparameters are identified and fine-tuned to enhance prediction accuracy. The results indicate that with optimized hyperparameters, the prediction achieves a Root Mean Square Error (RMSE) of 1.98% and a Mean Absolute Error (MAE) of 1.72%. This approach is expected to improve the efficiency of battery management systems and battery utilization in electric vehicles.

Keywords : long short-term memory (lstm), battery health monitoring, data-driven models, battery charge-discharge cycles, adaptive soc estimation, voltage and current sensing
Conference Title : ICHEV 2025 : International Conference on Hybrid and Electric Vehicles
Conference Location : Singapore, Singapore
Conference Dates : November 18-19, 2025