IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.67
Volume 5, Issue 3, March 2025

Enhancing EV Charging Performance with ANN-Controlled Solar/Wind Hybrid Systems

Dr. Muni Reddy G[1], D Sai Kumar[2], G Sunanth Kumar Reddy[3], C Venkateswarlu[4], V Swapna[5], A Pavan[6]
Professor, Department of EEE[1]
UG Studenst, Department of EEE[23456]
Siddharth Institute of Engineering and Technology, Puttur, India
munireddyg@gmail.com[1], dsai817936@gmail.com[2], sunanthreddy3@gmail.com[3], venkateshvenkey1956@gmail.com[4],vetti.swapna2004@gmail.com[5], pavanreddy0095@gmail.com[6]

Abstract: *Electric vehicles (EVs) are pivotal for sustainable transportation, yet their integration into the energy grid presents challenges in ensuring efficient and eco-friendly charging solutions. This study introduces an Artificial Neural Network (ANN)-controlled solar/wind hybrid power system to enhance EV charging performance. The proposed system integrates photovoltaic panels and wind turbines to harness renewable energy efficiently under varying environmental conditions. The ANN controller optimizes energy distribution between solar, wind, and storage systems, ensuring maximum power extraction and grid stability during peak demand. MATLAB simulations demonstrate significant improvements in charging efficiency and energy utilization compared to conventional methods. Results reveal that the hybrid system reduces dependency on the grid, minimizes carbon emissions, and enhances reliability for highway-based EV charging stations. This research establishes ANN-based control as a robust solution for scaling renewable energy integration in EV infrastructures, contributing to cleaner and more sustainable transportation networks.*

Keywords: Electric vehicle charging station, Buck converter, Boost converter, Solar, Wind

DOI: 10.48175/IJARSCT-23943