

Advancements in Electric Vehicle Charging Infrastructure: Fast Charging, Wireless Charging, and Smart Grid Integration

Jordan Y. Arpilleda

Faculty, Department of Industrial Technology,
North Eastern Mindanao State University - Cantilan Campus, Cantilan, Surigao del Sur, Philippines

Abstract: *This study investigates the dynamic landscape of electric vehicle (EV) charging infrastructure, focusing on recent advancements in fast charging, wireless charging, and smart grid integration. The exponential growth of EV adoption has emphasized the urgency of efficient charging solutions. The historical context underlines the evolution of charging methods from conventional to advanced technologies. Fast charging's notable progress, with outputs exceeding 150 kW, has significantly reduced charging times, but the potential impact on battery health warrants consideration. Wireless charging introduces a paradigm shift by enhancing energy transfer efficiency and finding application in contexts where conventional connectors are impractical. Integrating EVs with the smart grid holds promise for demand response, load balancing, and renewable energy utilization. Challenges include safety concerns, standardization, and grid integration complexities. Comparing advancements with conventional methods reveals enhanced efficiency and convenience. This study contributes insights into the transformative potential of these technologies, paving the way for a sustainable and accessible future of transportation*

Keywords: EV Charging, Fast Charging, Wireless Charging, Smart Grid

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