

Editorial

The Special Issue on AI-Empowered Smart Grid Technologies and Electric Vehicles (2024) in the *Advances in Science, Technology and Engineering Systems Journal (ASTES Journal)* highlights a critical intersection of artificial intelligence, energy systems, and sustainable transportation. As global energy demands intensify and the transition toward low-carbon economies accelerates, the integration of intelligent technologies into power systems and mobility solutions has become increasingly essential. This issue brings together a collection of research contributions that explore how AI-driven innovations are transforming smart grids and electric vehicle ecosystems, enabling more efficient, resilient, and adaptive energy infrastructures.

A central focus of this issue is the application of artificial intelligence and machine learning techniques in optimizing smart grid operations. Several contributions examine predictive analytics for load forecasting, fault detection, demand-side management, and energy distribution optimization. These approaches enhance grid reliability and operational efficiency by enabling real-time monitoring and intelligent decision-making. The incorporation of AI into grid management systems also facilitates the integration of renewable energy sources, addressing challenges related to intermittency and variability while supporting a more sustainable energy mix.

Equally significant is the exploration of electric vehicle (EV) technologies and their interaction with modern power systems. The papers in this issue investigate advancements in battery technologies, charging infrastructure, and energy management strategies that support the widespread adoption of EVs. Particular attention is given to vehicle-to-grid (V2G) integration, where EVs function not only as transportation assets but also as distributed energy resources capable of supporting grid stability. This bidirectional relationship between EVs and smart grids represents a key innovation in the evolution of energy ecosystems.

The convergence of smart grid technologies and EV systems is further enriched by multidisciplinary approaches that combine electrical engineering, computer science, data analytics, and environmental science. Contributions highlight the role of IoT-enabled devices, cyber-physical systems, and intelligent communication networks in creating interconnected and responsive energy environments. These integrated systems enable enhanced coordination between energy generation, storage, and consumption, contributing to improved system resilience and sustainability.

Methodologically, the studies featured in this issue employ a diverse array of approaches, including computational modeling, simulation-based analysis, experimental validation, and real-world case studies. This diversity ensures both the rigor and applicability of the research, with many contributions offering scalable and adaptable solutions for modern energy and transportation systems. The emphasis on data-driven and AI-enabled frameworks reflects the ongoing shift toward intelligent and autonomous energy management.

The 2024 context provides a backdrop of accelerating electrification, digitalization, and environmental awareness. As governments and industries worldwide invest in renewable energy and sustainable mobility, the innovations presented in this issue align with broader efforts to reduce carbon emissions and enhance energy efficiency. The research underscores the importance of integrating advanced technologies to support the transition toward smarter and greener infrastructures.

The editorial team extends its sincere appreciation to the authors for their valuable contributions and to the reviewers for their insightful and constructive evaluations. Their collective efforts have ensured the quality and relevance of this special issue, reinforcing the journal's commitment to advancing interdisciplinary research in emerging technological domains.

This special issue offers a comprehensive exploration of how artificial intelligence is reshaping smart grid technologies and electric vehicle systems. By bringing together diverse perspectives and forward-looking research, it provides a meaningful foundation for continued innovation and collaboration in building sustainable, intelligent, and resilient energy ecosystems.

Guest Editor

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