Matrik: Jurnal Manajemen, Teknik Informatika, dan Rekayasa Komputer
Vol. 24, No. 3, July 2025, pp. 547∼556
ISSN: 2476-9843, accredited by Kemenristekdikti, Decree No: 10/C/C3/DT.05.00/2025
DOI: 10.30812/matrik.v24i3.4923

Artificial Intelligence Enhanced Direct Current Fast Charging Integration for Electric Vehicles on 20 kV Grids: A Technical and Ontological Study

Samsurizal[1,2], Arif Nur Afandi[1], Mohamad Rodhi Faiz[1]
[1]Universitas Negeri Malang, Malang, Indonesia
[2]Institut Teknologi PLN, Jakarta, Indonesia

Article Info

Article history:

Received February 26, 2025
Revised June 6, 2025
Accepted July 5, 2025

Keywords:

Artificial intelligence;
Electric vehicles;
Ontology;
Sustainability.

ABSTRACT

Ontological philosophy offers a conceptual foundation to reflect on the existence and evolution of electric vehicles (EVs) as intelligent energy entities. The transition to electric vehicles has attracted global attention, particularly regarding sustainability and energy efficiency. This paper presents a novel approach to integrating artificial intelligence (AI) with DC fast charging on a 20 kV grid, highlighting both ontological and engineering perspectives. It introduces a framework where electric vehicles are no longer passive tools but active energy entities optimized through AI for real-time energy distribution, improving efficiency and grid stability. The ontological investigation explores the essence of electric vehicles as entities that interact with electrical infrastructure while questioning their role in modern transportation systems and environmental paradigms. **The study investigates** the application of artificial intelligence in optimizing the performance and efficiency of direct current fast charging systems, addressing challenges associated with load balancing, network stability, and real-time data processing. Artificial intelligence algorithms enable intelligent decision-making for energy distribution, minimizing grid pressure while ensuring optimal charging speeds. By blending ontological philosophy with technology analysis, this paper offers insights into how artificial intelligence-driven systems are redefining the relationship between electric vehicles, high-voltage grids, and sustainable energy ecosystems. **The findings** highlight the potential of artificial intelligence to improve electric vehicle charging efficiency, grid integration, and long-term sustainability in the energy transition.

Corresponding Author:

Arif Nur Afandi, 085210225592,
Department of Electrical Engineering and Informatics, Faculty of Engineering,
Universitas Negeri Malang, Malang, Indonesia,
Email: an.afandi@um.ac.id

How to Cite:
S. Samsurizal, A. N. Afandi, and M. R. . Faiz, ”Artificial Intelligence Enhanced Direct Current Fast Charging Integration for Electric Vehicles on 20 kV Grids: A Technical and Ontological Study”, *MATRIK: Jurnal Manajemen, Teknik Informatika, dan Rekayasa Komputer*, Vol. 24, No. 3, pp. 545-554, July, 2025, doi: 10.30812/matrik.v24i3.4923.

1. INTRODUCTION

The transition to electric vehicles (EVs) has gained global attention due to growing concerns over sustainability and energy efficiency [1]. One of the critical challenges in widespread EV adoption is the efficiency of the charging infrastructure [2], particularly the limitations of charging speed, grid stability [3], and energy distribution [4]. Direct Current (DC) fast charging, especially when connected to high-voltage grids (20 kV) [5], offers a promising solution by significantly reducing charging times [6]. However, integrating high-power fast charging stations into existing energy grids presents challenges such as peak load management, grid fluctuations, and energy distribution inefficiencies [7, 8]. Artificial Intelligence (AI) has emerged as a key enabler in addressing these issues by optimizing load balancing, energy demand prediction, and real-time grid interaction [9, 10]. Despite these advancements, a deeper exploration of the ontological transformation of EVs within an AI-driven charging infrastructure is still lacking, particularly in understanding how EVs, AI, and the energy grid interact as autonomous entities within a sustainable energy ecosystem [11, 12].

Several studies have explored AI applications in EV charging and grid optimization. [13] developed an optimal dispatch strategy for EVs in V2G (Vehicle-to-Grid) applications, using the gray wolf optimization algorithm to enhance energy efficiency [13]. [14] emphasized the role of AI and socio-anthropological factors in large-scale V2G schemes [14], highlighting the potential of AI-driven incentives to improve grid interaction [15]. Meanwhile, [16] introduced an ontology-based AI system for power grid monitoring, demonstrating AI's potential in disaster resilience for energy infrastructure [16]. Lin and Riedl (2023) expanded on AI's role in co-creativity, discussing how AI entities make autonomous decisions within a complex system [17]. These studies highlight AI's transformative potential in energy systems [18], but they primarily focus on technical performance rather than the ontological implications of AI-managed energy networks [19]. This study aims to fill the gap by examining the ontological transformation of EVs within AI-optimized DC fast charging connected to a 20 kV grid. Unlike previous research that mainly addresses AI's role in optimizing power distribution, this study investigates how EVs transition from passive transportation tools to autonomous energy entities, interacting dynamically with AI, the power grid, and energy management systems [20]. By integrating ontological analysis with AI-driven energy systems [21], this research redefines the role of EVs within smart grid ecosystems, providing new insights into human-technology interactions in sustainable mobility. The key objectives are to: (1) analyze the AI-driven optimization of fast charging systems, (2) explore the ontological implications of AI autonomy in energy management, and (3) assess the broader impact of AI-integrated EVs on future smart grid infrastructure [22].

Artificial intelligence contains artificial meanings [23]. Artificial intelligence is a scientific field that studies the field of computer science that makes computers smart [24]. Intelligence is used to help complete tasks in human activities that are performed well and correctly. Electric vehicles with DC fast charging systems are significant innovations in the field of transportation and energy that function to speed up the charging process [25], allowing users to recharge vehicle batteries in a shorter time. This technology reflects a transformation in the way we think about transportation, with a growing focus on sustainability and energy efficiency [26]. From an ontological perspective, this system can be reviewed as a combination of several important elements. In addition, the ontology of DC fast charging systems also includes a deeper study of how these technologies interact with the real world, create ecological and social impacts, and redefine the concepts of mobility and energy sustainability. The application of this technology in society raises principal questions about the existence of technology to solve global environmental problems and how the technology is understood in terms of ethics, efficiency, and sustainability.

The development of electric vehicle (EV) technology has seen rapid progress in recent decades, in line with the increasing need for environmentally friendly and sustainable transportation solutions [27]. One of the main challenges in the mass adoption of electric vehicles is the limitations of charging infrastructure, especially in terms of charging speeds that are still considered less than optimal compared to fossil fuel vehicles. Solutions such as DC (direct current) fast charging connected to a 20 kV network are one of the innovations that are expected to be able to answer this challenge. From the perspective of ontological philosophy, the existence of electric vehicles with fast charging can not only be seen as a technological entity, but also as part of a structural transformation in the energy system and society. Ontology [28], which discusses "existence" and "reality", provides a foundation for us to reflect on the existence of electric vehicles in the context of human relationships with technology and its impact on the wider world order. Through the integration of artificial intelligence (AI) in the management of electric vehicle fast charging, philosophical questions arise regarding how this technology is reshaping the way we understand efficiency, sustainability, and the role of humans in controlling advanced technologies.

The integration of artificial intelligence in electric vehicle fast charging systems opens up opportunities for improved energy efficiency and smarter electric load management. AI can predict energy demand, optimize charging times, and minimize the impact on the power grid. This becomes especially relevant in the context of fast charging using DC connected to a 20 kV grid, where large-scale energy distribution requires precise management. Additionally, the application of AI also allows for increased interaction between vehicles, charging, and the power grid in real-time, creating a more dynamic and adaptive ecosystem. However, behind the efficiency and convenience offered by AI and this fast-charging technology, various ontological questions arise. What is the status of the existence of electric vehicles with the distributed and controlled energy grid by AI? Are these vehicles merely functional objects, or have they become autonomous entities that have a greater role in the global energy ecosystem? Furthermore, how does the relationship between humans, electric vehicles, and AI technology affect the way we view reality and control over an increasingly digitized world?

In recent decades, ontology has been widely adopted in fields ranging from biomedicine to finance, engineering, law, and cultural heritage. The field of ontology engineering has been strengthened by the adoption of several standards on ontology [29], by the development or expansion of ontology-building tools, and by a broader recognition of the importance of standard vocabulary and formal semantics. The ontological philosophical approach allows us to re-reflect on the concept of existence in the context of this rapid technological transformation [30]. With the widespread use of electric vehicles and artificial intelligence [30], a new paradigm has emerged regarding how technological entities, including electric vehicles and fast charging systems, are shaping our reality [31]. This article aims to explore how the integration between electric vehicles, DC fast charging, 20 kV energy grids, and AI not only brings about technical changes but also affects the ontological view of the existence of technology in human life. This article will explore how DC fast charging of electric vehicles connected to a 20 kV grid, when combined with artificial intelligence, can be viewed from an ontological perspective. The discussion will include technical aspects of fast charging, the role of artificial intelligence in optimizing energy efficiency, and philosophical reflections on the impact of this technology on the concept of reality and existence in the modern era.

2. RESEARCH METHOD

This study uses a qualitative approach with an ontological philosophy framework as the basis for analysis. This method was chosen to explore the relationship between electric vehicle technology and DC fast charging, 20 kV power grids, and artificial intelligence (AI) in the context of ontology, namely, how the existence and interaction between these entities shape technological and social reality. The process of data collection, analysis, and philosophical reflection is carried out with several main steps as follows:

1. Literature Studies of Ontological Philosophy and Technology
   The first step is to conduct an in-depth study of the literature related to the philosophy of ontology, especially that related to the concept of the existence of technology and the relationship between humans and technology. The literature includes works by philosophers such as Martin Heidegger and Gilbert Simondon, who discuss technology as part of human existence and the world. In addition, technical literature related to electric vehicles, DC fast charging, and the role of AI in energy management was also analyzed to provide a thorough understanding of the technology being discussed.
2. Technical Analysis of DC to 20 kV Grid Fast Charging
   To understand the technical aspects, an analysis was carried out on the DC fast charging system connected to the 20 kV power grid. Technical data is obtained from various research reports, scientific publications, and technical documents from electric vehicle manufacturers and charging infrastructure providers. The goal is to understand the working mechanisms, efficiency, and technical challenges in the implementation of DC fast charging, as well as how these technologies interact with high-voltage energy grids.
3. Exploration of the Role of Artificial Intelligence in Fast Charging Systems
   The research also involves a study of the application of artificial intelligence in the management and optimization of electric vehicle fast charging systems. The aspects analyzed include predictive algorithms used to manage network load, machine learning technology that enables optimization of charging times, and interactions between AI and energy systems at scale. The study is based on scientific publications and case studies related to AI in energy systems and electric vehicles.
4. Ontological Analysis of Human, Technology, and AI Relationships
   A core part of this method is ontological analysis. Based on data collected from technical studies and philosophical literature, an in-depth analysis was carried out on how the existence of electric vehicles, fast charging systems, and artificial intelligence is shaping new relationships between humans, technology, and the world. This analysis uses a hermeneutic approach to understand the meaning behind human interaction with technology, especially how AI affects human control over technology and how it becomes part of human existential reality.
5. Philosophical Reflections and Ontological Implications
   The last step is to conduct philosophical reflection on the findings obtained from technical and ontological analysis. This section focuses on the implications of the existence of electric vehicles and AI on our understanding of reality and existence in the digital age. Questions such as whether this technology creates a new form of autonomy in the energy system and how it affects the concept of control and human existence are central to this reflection.
   With this structured approach, it is hoped that this research can provide deep philosophical insights into the existence of electric

vehicle technology in an ontological context, as well as how artificial intelligence and fast charging systems are changing the way we understand the relationship between humans, technology, and the world.

3. RESULT AND ANALYSIS

From an ontological standpoint, electric vehicles are no longer just transportation tools but are evolving entities integrated into a broader energy ecosystem. EVs blur the boundaries between human needs, technology, and environmental sustainability. In this context, EVs represent a shift like transportation, moving from carbon-dependent systems to clean, data-driven electric mobility. They embody new modes of existence as they interact with smart grids, AI-driven charging systems, and large-scale power infrastructures.

3.1. Ontology Viewpoint

Ontological Perspective on Electric Vehicles (EVs), from an ontological point of view, electric vehicles are no longer just a means of transportation but are a growing entity integrated into the broader energy ecosystem. EVs blur the line between human needs, technology, and environmental sustainability. In this context, EVs represent a shift like transportation, moving from carbon-dependent systems to clean, data-driven electric mobility. They embody new modes of existence as they interact with smart networks, AI-driven charging systems, and large-scale power infrastructure. DC fast charging plays a crucial role in improving the usability and efficiency of EVs. Modern DC fast charging systems can supply high power output, significantly reducing charging time compared to conventional chargers. High-voltage (20 kV) grid integration allows for faster and more efficient energy transfer to EV batteries, enabling long-distance travel and expanding the usefulness of EVs. However, such systems also pose new challenges, such as the need for robust grid infrastructure and the management of peak load shifts that can put pressure on the power grid.

AI plays a transformative role in optimizing the charging process. By analyzing real-time data from the grid, vehicle batteries, and other infrastructure elements, AI algorithms can predict energy demand, balance grid loads, and optimize energy distribution to ensure efficient charging and minimal network disruption. For example, an AI-powered load management system can dynamically allocate power across multiple EVs to prevent overloads, reduce downtime, and improve energy use efficiency. The application of AI in EV charging introduces a new layer of autonomy and intelligence to the transportation and energy sectors. Ontologically, AI in this context symbolizes the evolution of machines into entities that can optimize themselves and make decisions in real-time. This raises questions about the relationship between humans, technology, and the environment, especially in terms of control and interdependence. The reliance on AI for energy distribution and optimization shows a shift in which humans increasingly trust intelligent systems to manage complex infrastructure, further blurring the line between human decision-making and machine autonomy.

3.2. Ontology way of thinking in Electric Vehicles

One of the metaphysical agents is ontology, which originated in Greece. The presence of something concrete is commented on in the work of Thales, Plato, and Aristotle, who are Greek authors with an ontological perspective. For example, Thales believed that water was the "innermost substance" and the root of the whole thing after contemplating the ubiquity of water. He pointed out that water is the base of all life, but what it really means to us is his belief that "it is very possible that all life begins with one material".

The ontological way of thinking in the context of Electric Vehicles (EVs) focuses on understanding the essence of the existence of electric vehicles and the elements that make up their systems. Ontology inquiries about the "what exists" or "what is the essence of reality" behind an entity, specifically EVs, including the relationships between elements that define their existence and operation. Here are some ontological ways of thinking that can be applied to EVs:

1. The Existence of EVs as a Technology Entity
   From an ontological perspective, EVs are seen as entities that have a real existence in the physical world. They are not just conventional vehicles, but a complex system consisting of batteries, electric motors, and other electronic devices. Each of these components has specific properties and functions that support the existence of EVs as a zero-carbon emission drive technology. This way of thinking encourages the study of the fundamental components that make up the existence of EVs and how they interact with each other to create functional vehicle units.
2. EV Functional Ontology
   Ontology also involves the study of the function of the entity. In this case, EVs are interpreted as a means of transportation that redefines the concept of mobility. They are not just vehicles for displacement, but they also represent the energy transition from fossil fuels to sustainable electrical energy. Ontologically, EVs are part of a new energy ecosystem, where their role is

not only limited to transportation, but also to contributing to climate change mitigation and emission reduction efforts.

3. Battery Ontology and Energy in EVs
   One of the most important elements in an EV is the battery. Ontologically, the batteries in EVs can be considered the existential essence of the electric vehicle itself. The battery is not only an energy storage device, but a core element that allows the vehicle to function as a means of transportation. This way of thinking encourages a deeper study of energy sources, charging technologies (including DC fast charging), and how that energy is channeled to support human mobility.
4. Ontologi Ekologis EV
   EVs are not only seen from a technical point of view, but also from an ecological perspective. Ecological ontology questions the essence of the existence of EVs in the context of environmental sustainability. Here, electric vehicles are understood as part of the solution to global environmental challenges, such as carbon emissions and air pollution. They represent a paradigm shift in how humans interact with nature through more environmentally friendly technologies.
5. EV Social Ontology
   In addition to technical and ecological aspects, social ontology sees EVs as part of a larger social transformation. They influence the way humans perceive mobility, energy, and interaction with technology. The mass adoption of EVs brings changes in public infrastructure, energy policy, and people's lifestyles. This ontology sees EVs not only as functional entities, but also as agents of social and economic change.

This ontology enables the construction of a knowledge graph that contains system engineering data to which we can apply reasoning. We also developed several tools to support system engineering during the design of workflows, their enactment, and artefact storage, considering versioning, querying, and reasoning on the stored data [16]. Thus, the ontological way of thinking in EVs involves a holistic analysis of the nature of the EV's existence, functionality, and interaction with social, technological, and natural ecosystems, opening up space to understand more deeply not only about its technology, but also its impact and existence in a broader global context.

3.3. Characteristics of V2G electric vehicle systems in Ontology

Vehicle-to-grid (V2G) systems enable electric vehicles (EVs) to interact bidirectionally with the electricity grid. This allows EVs to draw power to charge their batteries and return power to the grid when needed. Ontologically, V2G systems involve various entities interacting within the broader energy ecosystem. Electric vehicles, power grids, and charging infrastructure are closely linked and interdependent to ensure efficient energy management. V2G ontology describes how those entities interact logically and functionally in support of a sustainable energy system. The characteristics of V2G are ontologically presented in the form of Table 1.

Table 1. Characteristics of V2G Electric Vehicle Systems Ontology

Entitas	Description	Functional Characteristics	Relationship Between Entities
Electric Vehicles (EVs)	Vehicles that use batteries as a power source to move.	– Portable energy storage. – EV batteries can either deliver energy to the grid or receive energy from the grid.	– Connects with chargers for charging and energy supply. – Interact with the power grid through the charger.
EV Battery	Energy storage components inside EVs.	– High-capacity energy storage. – Bidirectional energy flow.	– EV batteries are directly related to the charger to receive or transmit energy to the grid.
Two-way charger	A device that regulates the two-way flow of electricity between the EV and the grid.	– Converts AC current to DC and vice versa. – Manage charging and discharging from EVs.	– Connected to EVs and power grids. – Serves as a bridge between the EV battery and the grid.

(continued on next page)

Table 1 (continued)

Entitas	Description	Functional Characteristics	Relationship Between Entities
Grid	Extensive electrical energy distribution system, which caters to a wide range of consumers.	— Receive power supply from EVs when demand is high. — Provides power when the EV needs charging.	— Interact with the charger to receive or deliver power to the EV. — Regulated by the operator
Operator Grid	Responsible party for managing network stability and distribution	— Controls the flow of energy in and out of the grid. — Automatically manage energy demand.	— Arrange communication between the grid and the charger to ensure network . stability
Power Setting Algorithm	Automated system that optimizes power flow based on grid demand	— Optimizing when EVs should charge or provide energy to the grid.	— Connect with the power grid and charger to execute automatic power setting instructions.

3.4. Grid Integration and Environmental Impact

The integration of EVs with high-voltage grids brings a new ontological dimension to energy use and sustainability. The 20 kV grid infrastructure represents a significant leap in managing large-scale electrification efforts, but it also redefines the relationship between energy consumers and producers. EVs, through bidirectional charging capabilities, can now act as energy storage units that contribute back to the grid, reshaping the traditional flow of energy and the roles of entities in the energy ecosystem. The Ontological Philosophy of Electric Vehicles with DC Fast Charging to the 20 kV Grid Using Artificial Intelligence conceptually can be seen in Figure 1.

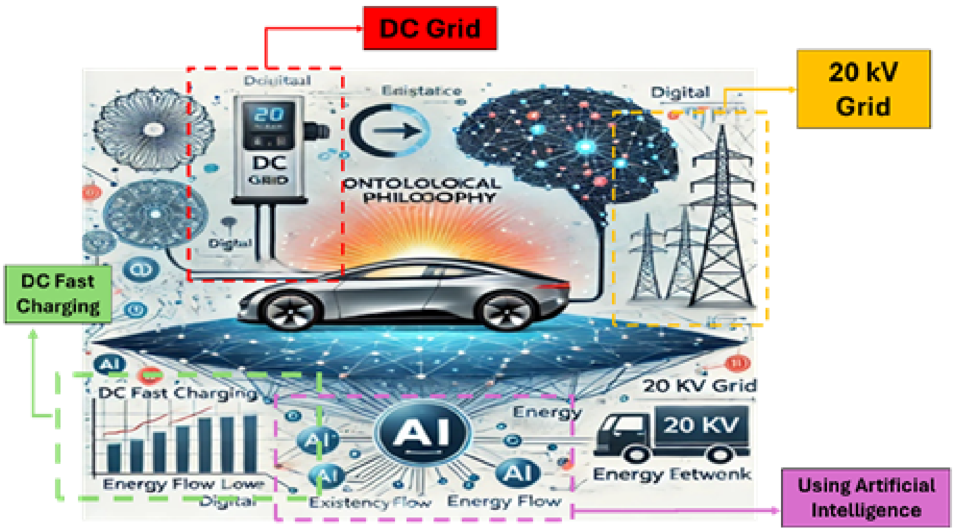

Figure 1. Ontology and V2G Concepts

Based on Figure 1 it can be explained where Ontological Philosophy is represented by abstract philosophical symbols or concepts (e.g., mind, reality, existence). Highlighting questions about the existence and interaction of humans with technology. Electric Vehicle (EV) An icon of a sleek electric car. Representing modern transportation and green technology. DC Fast Charging Visual fast charging process. The arrow shows the flow of energy from a high-powered charging station to the vehicle. Label for "20 kV Network" connected to the network infrastructure. 20 kV network: Depiction of power grid infrastructure with power lines. Connection to a charging station. Artificial Intelligence Symbols, such as the brain or neural network, indicate the role of AI. AI connects and optimizes processes between EVs, grids, and charging infrastructure. Interaction Paths: Energy pathways, data paths, and decision-making flows. Represents AI coordination between all components.

4. CONCLUSION

This study investigates the ontological transformation of electric vehicles (EVs) with AI-optimized DC fast charging on a 20 kV grid, addressing energy distribution inefficiencies and grid stability issues. Using an ontological and AI-driven approach, the study examines how EVs evolve from mere transportation tools into autonomous energy entities within a smart energy ecosystem. The findings confirm that AI significantly enhances fast charging efficiency by predicting demand, balancing grid loads, and optimizing energy distribution in real time. Compared to previous studies that primarily focused on technical performance and load management, this research introduces an ontological perspective, emphasizing the shift in EVs' role within an AI-integrated grid infrastructure. The novelty of this study lies in bridging AI-driven energy systems with ontological analysis, offering new insights into human-technology interactions and the philosophical implications of AI autonomy in energy ecosystems. While prior research has explored AI's role in V2G (Vehicle-to-Grid) optimization, this study expands the discourse by questioning the evolving existence of EVs within an autonomous, AI-managed grid.

5. ACKNOWLEDGEMENTS

The author would like to thank the promoter for his direction and input. To all parties involved in writing this article, this research is part of a dissertation at a doctoral school, so the results obtained can be presented in the form of publications.

6. DECLARATIONS

AUTHOR CONTIBUTION

Samsurizal: Conceptualization, Methodology, Software, Investigation, Data Curation, Writing - Original Draft Arif Nur Afandi: Validation, Resources, Writing - Review & Editing, Supervision Mohamad Rodhi Faiz: Validation, Writing - Review & Editing, Supervision.

FUNDING STATEMENT

This research does not use funding from anywhere.

COMPETING INTEREST

This research is the beginning of a doctoral program in the electrical engineering and informatics study program at Malang State University. They are using several sources from journals processed from the perspective of philosophy. All authors contributed to the research and writing of the articles under the authority and approval to submit the manuscript.

REFERENCES

[1] M. J. B. Kabeyi and O. A. Olanrewaju, "Sustainable Energy Transition for Renewable and Low Carbon Grid Electricity Generation and Supply," *Frontiers in Energy Research*, vol. 9, mar 2022, https://doi.org/10.3389/fenrg.2021.743114.

[2] N. Karuppiah, P. Mounica, P. K. Balachandran, and R. Muniraj, "Critical review on electric vehicles: chargers, charging techniques, and standards," in *Renewable Energy for Plug-In Electric Vehicles*. Elsevier, 2024, pp. 81–94,

[3] S. Mateen, M. Amir, A. Haque, and F. I. Bakhsh, "Ultra-fast charging of electric vehicles: A review of power electronics converter, grid stability and optimal battery consideration in multi-energy systems," *Sustainable Energy, Grids and Networks*, vol. 35, p. 101112, sep 2023, https://doi.org/10.1016/j.segan.2023.101112.

[4] A. N. Afandi, Y. Sulistyorini, G. Fujita, N. P. Khai, and N. Tutkun, "Renewable energy inclusion on economic power optimization using thunderstorm algorithm," in *2017 4th International Conference on Electrical Engineering, Computer Science and Informatics (EECSI)*. IEEE, sep 2017, pp. 1–6, https://doi.org/10.1109/EECSI.2017.8239141.

[5] R. El Helou, S. Sivaranjani, D. Kalathil, A. Schaper, and L. Xie, "The impact of heavy-duty vehicle electrification on large power grids: A synthetic Texas case study," *Advances in Applied Energy*, vol. 6, p. 100093, jun 2022, https://doi.org/10.1016/j.adapen.2022.100093.

[6] C. Zhang, J. Jiang, Y. Gao, W. Zhang, Q. Liu, and X. Hu, "Charging optimization in lithium-ion batteries based on temperature rise and charge time," *Applied Energy*, vol. 194, pp. 569–577, may 2017, https://doi.org/10.1016/j.apenergy.2016.10.059.

[7] M. Ntombela, K. Musasa, and K. Moloi, "A Comprehensive Review of the Incorporation of Electric Vehicles and Renewable Energy Distributed Generation Regarding Smart Grids," *World Electric Vehicle Journal*, vol. 14, no. 7, p. 176, jul 2023, https://doi.org/10.3390/wevj14070176.

[8] K. Ukoba, K. O. Olatunji, E. Adeoye, T.-C. Jen, and D. M. Madyira, "Optimizing renewable energy systems through artificial intelligence: Review and future prospects," *Energy & Environment*, vol. 35, no. 7, pp. 3833–3879, nov 2024, https://doi.org/10.1177/0958305X241256293.

[9] M. A. Elkasrawy, S. O. Abdellatif, G. A. Ebrahim, and H. A. Ghali, "Real-time optimization in electric vehicle stations using artificial neural networks," *Electrical Engineering*, vol. 105, no. 1, pp. 79–89, feb 2023, https://doi.org/10.1007/s00202-022-01647-9.

[10] M. Escoto, A. Guerrero, E. Ghorbani, and A. A. Juan, "Optimization Challenges in Vehicle-to-Grid (V2G) Systems and Artificial Intelligence Solving Methods," *Applied Sciences*, vol. 14, no. 12, p. 5211, jun 2024, https://doi.org/10.3390/app14125211.

[11] A. E.-S. A. Nafeh, A. E.-F. A. Omran, A. Elkholy, and H. Yousef, "Optimal economical sizing of a PV-battery grid-connected system for fast charging station of electric vehicles using modified snake optimization algorithm," *Results in Engineering*, vol. 21, p. 101965, mar 2024, https://doi.org/10.1016/j.rineng.2024.101965.

[12] A. N. Afandi, A. P. Wibawa, S. Padmantara, G. Fujita, W. Triyana, Y. Sulistyorini, H. Miyauchi, N. Tutkun, M. EL-Shimy Mahmoud, and X. Z. Gao, "Designed Operating Approach of Economic Dispatch for Java Bali Power Grid Areas Considered Wind Energy and Pollutant Emission Optimized Using Thunderstorm Algorithm Based on Forward Cloud Charge Mechanism," *International Review of Electrical Engineering (IREE)*, vol. 13, no. 1, p. 59, feb 2018, https://doi.org/10.15866/iree.v13i1.14687.

[13] A. M. Eltamaly, "Optimal Dispatch Strategy for Electric Vehicles in V2G Applications," *Smart Cities*, vol. 6, no. 6, pp. 3161–3191, nov 2023, https://doi.org/10.3390/smartcities6060141.

[14] E. Rigas, C. Akasiadis, E. Vardaki, and G. Chalkiadakis, "AI and Social Anthropology for Large-Scale Vehicle-to-Grid Schemes," in *Proceedings of the 12th Hellenic Conference on Artificial Intelligence*. New York, NY, USA: ACM, sep 2022, pp. 1–4, https://doi.org/10.1145/3549737.3549757.

[15] E. S. Rigas, S. Karapostolakis, N. Bassiliades, and S. D. Ramchurn, "EVLibSim: A tool for the simulation of electric vehicles' charging stations using the EVLib library," *Simulation Modelling Practice and Theory*, vol. 87, pp. 99–119, sep 2018, https://doi.org/10.1016/j.simpat.2018.06.007.

[16] J. Phengsuwan, T. Shah, R. Sun, P. James, D. Thakker, and R. Ranjan, "An ontology-based system for discovering landslide-induced emergencies in electrical grid," *Transactions on Emerging Telecommunications Technologies*, vol. 33, no. 3, mar 2022, https://doi.org/10.1002/ett.3899.

[17] D. Buschek, L. Mecke, F. Lehmann, and H. Dang, "Nine Potential Pitfalls when Designing Human-AI Co-Creative Systems," apr 2021, https://doi.org/https://doi.org/10.48550/arXiv.2104.00358.

[18] M. R. Khalid, I. A. Khan, S. Hameed, M. S. J. Asghar, and J. Ro, "A Comprehensive Review on Structural Topologies, Power Levels, Energy Storage Systems, and Standards for Electric Vehicle Charging Stations and Their Impacts on Grid," *IEEE Access*, vol. 9, pp. 128 069–128 094, September, 2021, https://doi.org/10.1109/ACCESS.2021.3112189.

[19] A. Gaggioli, S. Bartolotta, A. Ubaldi, K. Gerardini, E. D. Sarcinella, and A. Chirico, "Extended Creativity: A Conceptual Framework for Understanding Human-AI Creative Relations," jun 2025.

[20] P. Patil, K. Kazemzadeh, and P. Bansal, "Integration of charging behavior into infrastructure planning and management of electric vehicles: A systematic review and framework," *Sustainable Cities and Society*, vol. 88, p. 104265, jan 2023, https://doi.org/10.1016/j.scs.2022.104265.

[21] T. Ahmad, R. Madonski, D. Zhang, C. Huang, and A. Mujeeb, "Data-driven probabilistic machine learning in sustainable smart energy/smart energy systems: Key developments, challenges, and future research opportunities in the context of smart grid paradigm," *Renewable and Sustainable Energy Reviews*, vol. 160, p. 112128, may 2022, https://doi.org/10.1016/j.rser.2022.112128.

[22] A. R. Singh, P. Vishnuram, S. Alagarsamy, M. Bajaj, V. Blazek, I. Damaj, R. S. Rathore, F. N. Al-Wesabi, and K. M. Othman, "Electric vehicle charging technologies, infrastructure expansion, grid integration strategies, and their role in promoting sustainable e-mobility," *Alexandria Engineering Journal*, vol. 105, pp. 300–330, oct 2024, https://doi.org/10.1016/j.aej.2024.06.093.

[23] B. Karpatschof, "Artificial intelligence or artificial signification?" *Journal of Pragmatics*, vol. 6, no. 3-4, pp. 293–304, aug 1982, https://doi.org/10.1016/0378-2166(82)90005-4.

[24] S. L. Goldenberg, G. Nir, and S. E. Salcudean, "A new era: artificial intelligence and machine learning in prostate cancer," *Nature Reviews Urology*, vol. 16, no. 7, pp. 391–403, jul 2019, https://doi.org/10.1038/s41585-019-0193-3.

[25] Y. Ding, X. Li, and S. Jian, "Modeling the impact of vehicle-to-grid discharge technology on transport and power systems," *Transportation Research Part D: Transport and Environment*, vol. 105, p. 103220, apr 2022, https://doi.org/10.1016/j.trd.2022.103220.

[26] K. Zhang, M. Chen, R. Zhu, F. Zhang, T. Zhong, J. Lin, L. You, G. Lü, and J. Yan, "Integrating photovoltaic noise barriers and electric vehicle charging stations for sustainable city transportation," *Sustainable Cities and Society*, vol. 100, p. 104996, jan 2024, https://doi.org/10.1016/j.scs.2023.104996.

[27] M. A. Shaheen, Z. Ullah, H. M. Hasanien, M. Tostado-Véliz, H. Ji, M. H. Qais, S. Alghuwainem, and F. Jurado, "Enhanced transient search optimization algorithm-based optimal reactive power dispatch including electric vehicles," *Energy*, vol. 277, p. 127711, aug 2023, https://doi.org/10.1016/j.energy.2023.127711.

[28] Y. He, J. Chen, H. Dong, I. Horrocks, C. Allocca, T. Kim, and B. Sapkota, "DeepOnto: A Python package for ontology engineering with deep learning," *Semantic Web*, vol. 15, no. 5, pp. 1991–2004, oct 2024, https://doi.org/10.3233/SW-243568.

[29] D. Spoladore and E. Pessot, "Collaborative Ontology Engineering Methodologies for the Development of Decision Support Systems: Case Studies in the Healthcare Domain," *Electronics*, vol. 10, no. 9, p. 1060, apr 2021, https://doi.org/10.3390/electronics10091060.

[30] V. Sumanasena, L. Gunasekara, S. Kahawala, N. Mills, D. De Silva, M. Jalili, S. Sierla, and A. Jennings, "Artificial Intelligence for Electric Vehicle Infrastructure: Demand Profiling, Data Augmentation, Demand Forecasting, Demand Explainability and Charge Optimisation," *Energies*, vol. 16, no. 5, p. 2245, feb 2023, https://doi.org/10.3390/en16052245.

[31] K. Singh, M. Mishra, and E. S. Singh, "Content-based Recommender System Using Cosine Similarity," *International Journal for Research in Applied Science and Engineering Technology*, vol. 12, no. 5, pp. 2541–2548, may 2024, https://doi.org/10.22214/ijraset.2024.61835.

[This page intentionally left blank.]