Chapter 14
Integrating Intelligence and Trust:
A Comprehensive Review of Artificial Intelligence and Blockchain Technologies in Electric Vehicles

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ABSTRACT

With an emphasis on their transformational potential in solving the issues with EV charging infrastructure, the chapter investigates the integration of artificial intelligence and blockchain technology in the electric vehicle (EV) charging industry. This emphasizes the growing electric vehicle (EV) industry and the rising need for advanced and effective charging options. The significance of AI in predictive analysis, optimizing charging schedules, demand forecasting, and intelligent energy distribution is emphasized. AI-driven solutions improve the efficiency and reliability of EV charging stations. The promise of blockchain technology is examined in terms of its ability to manage payment processes, include renewable energy sources, and provide an immutable platform for energy trade. The possibility of combining AI and blockchain is examined to create sophisticated, secure, and user-friendly EV charging systems. The chpater showcases realistic implementations and case studies of AI and blockchain in EV charging systems, offering tangible insights into their viability and efficacy.

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INTRODUCTION

Electric vehicles (EVs) have been more popular in recent years as an environmentally friendly and sustainable means of transportation. With the increasing proliferation of electric vehicles (EVs), there is an escalating need for a highly efficient and dependable EV charging infrastructure (Teimoori & Yassine, 2022). The present condition of electric vehicle (EV) charging systems may be characterized as a combination of advancements and obstacles. There has been a swift and widespread installation of charging stations in several nations, particularly in metropolitan regions and along main routes. The extensive accessibility of charging infrastructure has undeniably played a role in the growing acceptance of electric vehicles. Nevertheless, there are notable deficiencies in the electric vehicle charging infrastructure that need attention. An important obstacle is the absence of uniformity in charging techniques and connections. Various electric vehicle manufacturers use distinct charging protocols, hence posing a challenge for electric vehicle owners in locating suitable charging stations. The lack of compatibility often causes confusion and difficulty for electric vehicle (EV) drivers and hampers the efficiency of the charging process (Hildebrand et al., 2023). An further obstacle is the restricted rate of charging. Level 2 charging stations, with power outputs ranging from 3.3 kW to 22 kW, are well-suited for overnight charging at home or work. However, they are not optimal for long-distance travel or short charging sessions. In response to this issue, several nations and corporations are allocating resources towards the development of robust charging infrastructure, including Level 3 DC fast chargers capable of delivering charging rates of up to 350 kW. These rapid chargers have the capability to substantially decrease the amount of time it takes to charge electric vehicles, allowing for extended travel distances (Jabbar et al., 2022). The accessibility of EV charging systems differs across various locations. While several nations have made substantial allocations towards the development of charging infrastructure, others are falling behind. This discrepancy might impede the widespread adoption of electric vehicles in regions where the availability or placement of charging stations is limited or cumbersome (Mollah et al., 2020). In order to address these difficulties, several entities such as governments, utility companies, manufacturers, and charging network operators are collaborating to enhance and broaden the electric vehicle (EV) charging infrastructure. Initiatives are underway to establish uniform charging methods, provide compatible connections, and expand the quantity of charging stations. Furthermore, researchers are investigating technological breakthroughs, such as wireless charging and vehicle-to-grid connectivity, to improve the overall efficiency and ease of electric car charging. Ultimately, the present condition of electric vehicle (EV) charging systems might be characterized as a blend of advancements and obstacles (Kumar et al., 2023). Despite a notable increase in the availability of charging infrastructure, there are still unresolved concerns around standardization, charging speed, and accessibility. Sustained cooperation and ingenuity are essential for advancing the EV charging infrastructure and expediting the shift towards electric vehicles.

Efficiency, Security and User Trust for Using EV Charging

The need for improved efficiency, security, and user trust.

As the adoption of electric vehicles (EVs) continues to rise, there is a growing need for improved efficiency, security, and user trust in EV charging systems. These aspects play a crucial role in ensuring the smooth operation and widespread acceptance of EV charging infrastructure. Addressing the needs for improved efficiency, security, and user trust in EV charging systems is crucial for the sustainable growth