Chapter 8
Artificial Intelligence and Blockchain Technologies for Revolutionizing Electric Vehicles and Charging Infrastructure

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ABSTRACT

The distribution of electricity system will be impacted by the growing number of electric vehicles (EVs). As a result, an infrastructure must be developed to help charging station owners efficiently handle EV customers' charging needs and guarantee that their demands are met without going over the electricity grid's limits. EV users will have issues within a few decades because charging sites will not be available, and the grid will get crowded as a lot of EVs try to charge at the same time. Thus, EV charging trends could be coordinated with the help of artificial intelligence (AI) and blockchain, and charging stations can be connected to the grid. AI is capable of identifying the best times and routes for charging electric vehicles based on the current price of energy. While distributing demand throughout the grid to prevent power spikes, blockchain technology can validate transactions at charging stations. They allow optimised management of energy, decentralised electrical networks, sustainable integration, and future charging infrastructure to expedite the resilient energy systems.

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1. INTRODUCTION

AI can optimise the utilisation of energy by analysing massive volumes of data from sensors and internet-connected devices. Better demand forecasting, asset maintenance, and operational efficiency are made possible by machine learning algorithms' increased ability to recognise trends and anticipate energy use. Artificial Intelligence (AI) has been found to play a transformative role in changing the energy sector. This detailed investigation examines AI and energy grid optimisation. Artificial Intelligence (AI) improves grid regulation, flawlessly unifies renewable energy sources, and lays path for a viable energy future through real-time data analysis and predictive maintenance. The path towards a greenish and more potent energy world is led by successful case studies and a peek into the future of AI-driven energy systems (Danish & Senjyu, 2023). Energy grid optimisation has become increasingly important in a time when environmental sustainability and energy efficiency are major concerns. The use of artificial intelligence (AI) to optimise energy grids is a ray of hope in the face of mounting global energy demands and an increasing urgency to incorporate renewable energy sources. This in-depth study delves into the deep integration of artificial intelligence and energy grids, addressing the ways in which this partnership is reshaping the energy landscape to be more efficient and environmentally friendly.

As a consumer of an electric car, I need to charge my car anytime. However, due to limited local line capacity and a lack of building infrastructure capacity to accommodate the expanding number of EVs, not all EVs can charge simultaneously. Technical limitations may prevent the installation of a supercharger for each customer. Grid worker cannot resolve this issuance because landlord owns the infrastructure. Aside from their reluctance to make investment in charger framework, the physical limitations on what is achievable constitute a severe impediment. Wall boxes to charge car is inexpensive, but the power line with powerful circuit breaker (32A) back of each charger is too costly. Service companies, including Vattenfall, experience transient surges in regional energy consumption, such as when a significant number of vehicles return home at night or when everyone commences brewing coffee in the morning. Utility businesses have to spend a lot of money to get ready for these peaks, which costs them a lot of money. Climate change has become extremely unacceptable and we need to change how we treat the Earth right away. People want to change the way they get around by utilising more electric cars. To attain the change, we need better passage to charging facilities right away.

2. UNDERSTANDING AI'S ROLE

Following description explains the role and significance of AI which provides powerful impact on the Charging infrastructure.

a) The Importance of Optimising the Energy Grid

Adding intermittent renewable energy sources to the conventional grids which is spine of our power source for a long time is a task that has never been seen before. Energy from renewable areas (solar panels and wind turbines) is variable and subject into weather-related variations, which conventional power systems cannot reliably manage. The urgent need to be flexible and strong has led to a rise in the demand for improving the energy grid.