Chapter 10
A Study on AI and Blockchain–Powered Smart Parking Models for Urban Mobility

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ABSTRACT

Urban problems like traffic jams and a lack of parking spaces can be solved in an innovative way with the help of smart parking models powered by AI and blockchain technology. These models enhance user experience, optimise space allocation, and shorten search times. Predictive analytics and real-time data from IoT sensors direct drivers to available parking spaces, minimising traffic and environmental impact. By protecting user privacy, controlling access, and securing transactions, blockchain technology improves AI. Users are empowered by blockchain-based decentralised digital identities, which also guarantee data privacy and transparent business dealings. With less traffic, more user happiness, and significant cost savings, this combination produces user-centric, environmentally friendly, and cost-effective smart parking solutions. The cost-benefit analysis for AI and blockchain-powered smart parking demonstrates a favourable return on investment, paving the way for smarter, greener cities and more interconnected urban settings.

INTRODUCTION

Global urbanisation is an inexorable trend. Urban areas are growing more crowded as more people move to cities in search of greater opportunities, and managing urban mobility is becoming an increasingly difficult task. For city dwellers, parking shortages and traffic congestion have become defining problems that require creative solutions (Ibrahim et al., 2022a). We travel into the future of urban mobility in this chapter, where cutting-edge technology like Artificial Intelligence (AI) and Blockchain come together to solve the critical issue of parking in our cities. The combination of AI and Blockchain technology has the potential to completely change how we think about smart parking solutions, providing previously unheard-of options to relieve traffic, lessen environmental impact, improve user experience, and secure parking transactions (Xiao et al., 2020).

The investigation starts by looking at the crucial part that smart parking plays in contemporary urban environments. We'll examine the difficulties brought on by increased urbanisation, the terrible effects of traffic jams, and the general requirement for better, more effective parking options. We'll also discuss the new technologies that are revolutionising parking and paving the way for the AI and Blockchain eras (Sathya, 2022).

Understanding the core ideas behind AI and Blockchain, as well as how each is changing smart parking, forms the basis of this chapter. We'll explain how AI can optimise parking spot distribution and traffic management by leveraging the power of machine learning and real-time information, making our cities more flexible and adaptable. In parallel, we'll look at how Blockchain, a technology known for its security and transparency, could revolutionise parking transactions by promoting trust and accountability (Haritha & Anitha, 2023).

We'll research the incorporation of AI and Blockchain in smart parking systems based on this information. We'll look at AI parking optimization algorithms and talk about how Blockchain can secure parking data, speed up payments, and enforce smart contracts. Examples from real-life case studies will show how this integration is being implemented in cities all around the world (Shukla et al., 2020).

From theory to practise, we'll give a thorough overview of our experimental design. We'll go over the procedures used for gathering data, preparing it, and creating AI models. Additionally, we'll clarify the intricate aspects of our testbed setup and demystify the challenges of implementing Blockchain technology (Dubey et al., 2022).

The outcomes and learnings from our studies form the core of this chapter. In this presentation, we'll describe the concrete effects on user experience, traffic management, and cost-benefit analysis of our AI-Blockchain smart parking models. The practical consequences of these novel ideas will be clarified through the sharing of real-world comments and observations (Bale et al., 2023).

But like with any technological advance, difficulties lie ahead. Concerns about privacy and security, scalability, and the complex web of regulatory and legal factors must all be taken into account. We'll analyse these difficulties and provide possible solutions in the upcoming chapters. Additionally, we'll examine upcoming developments and trends in the dynamic field of AI-powered smart parking (Rabah & others, 2018).

This chapter will wrap up with a summary of the major findings and a discussion of the consequences for urban mobility, along with a vision for a better, more sustainable future for our cities. With the help of smart parking solutions that combine AI and Blockchain, legislators, urban planners, technologists, and all other stakeholders hope to change urban transportation.

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