Chapter 4
AI-Powered Intelligent Transportation Technologies to Improve Accessibility and Mobility for Individuals With Disabilities

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ABSTRACT

This chapter examines how artificial intelligence (AI) can revolutionize the development of intelligent and inclusive transportation solutions that improve accessibility for impaired people. The chapter begins by exploring the difficulties that these various groups of disabled people face when using public transit. It then highlights AI-based technologies that are redesigning transportation, from natural language processing (NLP) and machine learning (ML) to Internet of Things (IoT) enabled real-time monitoring and computer vision (CV). It then discusses the exceptional needs of several disabilities that are met by AI applications, such as communication assistance, adaptive urban design, smart navigation, and autonomous vehicles. The chapter finally explains the associated challenges for the implementation of such

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advanced technologies including regulatory, ethical, and technical concerns, while presenting insights into policy recommendations and future trends for creating inclusive, AI-powered transportation networks in smart cities.

INTRODUCTION: OVERVIEW OF INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

ITS have appeared as a transformative force in the rapidly advancing domain of smart transportation, profoundly reforming how goods and people are transported. By incorporating modern technologies, communication networks, and data analytics, it considerably boosts the safety, efficiency, and environmental sustainability of transportation infrastructures (Papageorgiou et al., 2003). It addresses various transportation challenges by leveraging innovative information and communication technologies to control traffic, manage vehicle operations, and optimize public transit systems. By examining real-time data from cameras, traffic sensors, and historical trends, artificial intelligence (AI) can improve traffic flow and lessen congestion. To increase overall transportation efficiency, this data aids in traffic pattern prediction, signal timing optimization, and alternate route suggestion (Bharadiya et al., 2023). Additionally, the number of single-passenger automobiles on certain roadways is decreased through the use of congestion charging, tolls, and encouraging the use of high-occupancy vehicles. By incorporating a digital traffic rules monitoring system, which penalizes drivers who break traffic laws, ITS not only reduces traffic but also provides creative ways to improve road safety. Besides, integrated pedestrian crossings and emergency vehicle-only lanes are two examples of features that greatly reduce accidents and help those in dire need (Khalil et al., 2024). The essential components of ITS are On-Board Units (OBUs), Road-Side Units (RSUs), and registration procedures. OBUs are the devices that are installed in each automobile as a transmitter to communicate with every vehicle, whereas RSUs are positioned along the route with networking technology. RSUs are used to connect to the infrastructure and contain the dedicated short-range communication (DSRC) network devices (Karabulut et al., 2023). The interaction of ITS components are shown in Figure 1. While technical architecture is critical, it is important to also highlight that ITS deployment mandates governance structures, policy coordination among cities, regulatory certainty on data sharing, privacy and cyber security. Without these social and institutional enablers, even the most sophisticated ITS programs can encounter resistance, unequal access, or ethical challenges. The next section deals with the AI importance in traditional systems of transportation.