


Chapter 14


Policy, Standards, and Regulations for Sustainable Internet of Vehicles: Navigating the Future of Smart Mobility

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ABSTRACT

The Internet of Vehicles (IoV) represents a transformative shift in smart mobility, integrating connected and autonomous vehicles with intelligent infrastructure. However, achieving a sustainable IoV ecosystem necessitates robust policies,

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standards, and regulations to address ethical, and legal challenges. This chapter explores the regulatory frameworks governing IoV sustainability, including emission controls, energy efficiency mandates, and circular economy principles. It examines ethical and legal dimensions, such as liability in autonomous systems, data protection laws, and cybersecurity protocols. Additionally, it highlights international standardization efforts and policy strategies to balance technological innovation with socio-economic and environmental sustainability. By analyzing existing regulatory gaps, the chapter provides actionable insights for policymakers and researchers. A harmonized regulatory approach is critical to fostering sustainable, efficient, and ethically responsible IoV ecosystem, ensuring long-term resilience and equitable access to smart mobility.

INTRODUCTION

The advancement of the digitalization, connectivity and mobility has given rise to new technology named ‘Internet of Vehicles (IoV)’. It is an interconnected network of vehicles, infrastructure and data sets that are designed to enhance and promote the transportation facilities, safety and sustainability in the present technology driven world (Kosmas, et al., 2021). IoV are very different from the traditional vehicular model. The IoVs are considered to be an integration of the advanced technology that include usage of Artificial Intelligence (AI), Machine Learning Models, cloud technology and the Internet of Things (IoTs) systems’ (Andas, 2020; Joshi et al., 2024). The interconnected form of a vehicular model enables the real-time data exchange, predictive maintenance, intelligent traffic management system and numerous forms of automated technological aids. It is a unique way of revolutionizing the traditional practice usage, design and implementation of the mobility solutions (Revathy et al., 2020). This form of technology is also useful in promoting efficient transportation solutions that reduces the burden and impact on the environment along with the improved usage of user experience (AlGanem and Abdallah, 2022). It allows the seamless vehicle to vehicle communication, along with access between the vehicles and infrastructure, vehicles and pedestrians and in between the vehicles and networks. The integration of such technology in a smart and innovative manner leads efficient decision-making, process traffic optimization, prevent accidents and improve energy efficiency. For enhancing functionality of the transportation system several components are encompassed around the IoV technique that involve edge computing, autonomous vehicles, digital twins and connected vehicular technology that work in unique way (Ortiz et al., 2021). The IoV utilization expands to rural and urban areas that focuses the issues of carbon emission, congestion and road

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