

Chapter 10

Blockchain Technology: A Study Applied on Intelligent Transport System

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ABSTRACT

Intelligent internet of vehicles is an emerging technology and has an impact on all smart vehicles on the road due to rapid development in satellite communication integrated with internet technology and enables the integration of smart vehicles with system components like inbuilt vehicle sensors and internet, surrounding vehicles, and smart devices. This integration creates a safe and better platform for vehicles to travel on the road and at the same time be connected to the surrounding environment and vehicles for better performance. Integrating blockchain technology with vehicular communication and smart vehicles is the latest emerging concept. In this chapter, the authors present the survey and latest advancement in block chain technology for intelligent transport systems. This chapter's main highlight is on the application scenario of the internet of vehicles using block chain after a decent review of the literature survey. Also, the authors focus on key challenges and explore further research paths in the intelligent internet of vehicles using block chain technology.

INTRODUCTION

The Internet of Vehicles (IoV) heralds a transformative era, interweaving vehicles with connectivity, data, and automation. IoV empowers seamless communication between automobiles, infrastructure, and the environment, enhancing safety, efficiency, and sustainability. By integrating sensors, Artificial

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Intelligence (AI), and real-time data exchange, vehicles navigate smarter, foreseeing traffic patterns, optimizing routes, and preventing accidents. IoV fosters eco-friendly practices through traffic management and reduced emissions. This interconnected ecosystem engenders novel services like autonomous driving, predictive maintenance, and personalized experiences. However, concerns persist regarding data security, privacy, and infrastructure readiness. Despite challenges, IoV holds the promise of revolutionizing mobility, reshaping transportation landscapes for a connected, efficient future (Singh, Madhusudan et. al (2018)).

AI represents the development of computer systems capable of performing tasks that typically require human intelligence. It encompasses various approaches, including machine learning, neural networks, and natural language processing, among others. AI applications range from autonomous vehicles to personalized recommendations in streaming services, revolutionizing industries like healthcare, finance, and education. Its capacity to analyze vast amounts of data enables predictive insights and decision-making, optimizing processes and enhancing efficiency. Ethical considerations surrounding AI's impact on employment, privacy, and biases continue to evolve. As AI advances, the balance between innovation and responsible deployment remains crucial in shaping a future where technology augments human capabilities.

Block chain technology is a collection of information, typically structured in a table format and a very specific kind of database, mainly stores the data in the form of block that are chained together, these datasets contains huge data or information which can be accessed by hundreds and thousands. Blockchain technology is a rapidly evolving in vehicular environment due to its capability of achieving a decentralized, clear and authentic-resistant system. Intelligent Internet of Vehicles are the part of smart cities and has the capability to solve traffic problems, along with secure transmission, fast and accurate recording of data. All the traffic related, V2V, V2I and V2X communication problems issues can be managed and solved by Blockchain technology (Peng, Chunrong, et al(2020)).

The challenges in Existing Intelligent Internet of vehicles they don't collaborate with multiple entities at one time and achieving communication between V2V, V2I and V2X is done at a time (Nayana Hegde et. al (2019)). In vehicular communication it is difficult to have the efficient collaboration communication between multiple entities belonging to different owner due to privacy and management issues. These issues can be solved by Blockchain technology which provide peer-t-peer network without interference of the third party. Blockchain has brought a new way of identifying the solution to the problems of intelligent transport system . The main advantage of Blockchain Technology are:

- **Decentralization:** Provides the distributed system without central controller, by using cryptograph technique.
- **Irrevocability and Traceability:** Blockchain Technology enables unchangeable records for all transaction which is Irrevocability. And by providing all the blocks to all the participants in the network and able to provide traceability.
- **Fault tolerance:** Blockchain can achieve and enable better tolerance to fault nodes in network which are under attack or disaster without being need for centralized authority (Hammoud, Ahmad, et al(2020)). Fig1. Shows the scenario for Intelligent Transport System on road consisting of V2V, V2I, V2C along with road side units. With forms the vehicular communication to monitor and improve traffic related issues (Kamble, Shridevi Jeevan. Et.al 2018).

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