West Science Interdisciplinary Studies
Vol. 03, No. 08, August and 2025: pp. 1417-1426

Connected Vehicles and IoT: A Global Bibliometric Analysis of Intelligent Transport Systems and Communication Protocols

Loso Judijanto
IPOSS Jakarta, Indonesia and losojudijantobumn@gmail.com

ABSTRACT

The convergence of connected vehicles and the Internet of Things (IoT) has significantly transformed the development of intelligent transport systems (ITS), enabling real-time communication, automation, and enhanced mobility solutions. This study conducts a global bibliometric analysis using VOSviewer to map the scientific landscape of this rapidly evolving field, with a specific focus on communication protocols such as vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), and 5G systems. A dataset of 1,132 Scopus-indexed publications (2010–2025) was analyzed to identify key research themes, collaboration networks, and temporal trends. The co-occurrence network reveals a central concentration around intelligent systems, IoT, and vehicular communication, while overlay and density visualizations show a thematic progression toward information management, smart cities, and 5G infrastructure. Co-authorship analysis indicates a cluster of influential researchers, with India emerging as a central hub in international collaborations. Despite robust technological development, gaps remain in policy, governance, and interdisciplinary research. This study offers strategic insights for academics, industry stakeholders, and policymakers aiming to contribute to the sustainable evolution of smart mobility ecosystems.

Keywords: *Connected Vehicles, Internet of Things (IoT), Intelligent Transport Systems (ITS), Vehicle-to-Vehicle (V2V) Communication, Bibliometric Analysis*

1. INTRODUCTION

The evolution of transportation technologies has entered a new era with the emergence of connected vehicles and Internet of Things (IoT) integration, creating what is now referred to as Intelligent Transport Systems (ITS). These systems are transforming how vehicles communicate with one another, with infrastructure, and with users. The core concept behind connected vehicles is to enhance road safety, reduce congestion, and increase overall traffic efficiency by allowing real-time information sharing through advanced communication protocols [1]–[3]. This transformation is not just about cars talking to each other; it's about building a data-driven ecosystem that fosters safer, smarter, and more sustainable mobility.

In parallel, the Internet of Things has become a fundamental enabler for this shift. By embedding sensors, communication modules, and control mechanisms into vehicles and road infrastructure, the IoT facilitates a high degree of connectivity and automation. According to [4], the convergence of IoT and vehicular networks has laid the groundwork for a "connected mobility" framework that supports applications ranging from autonomous driving to predictive maintenance. In this sense, IoT is no longer a supplementary feature but a structural necessity in the design and deployment of modern transport systems.

Globally, governments and private sectors are investing heavily in developing vehicle-to-everything (V2X) communication, which includes vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), vehicle-to-pedestrian (V2P), and vehicle-to-network (V2N) interactions. These technologies, underpinned by protocols such as Dedicated Short Range Communication (DSRC) and Cellular-V2X (C-V2X), are integral to the realization of fully autonomous and cooperative driving ecosystems [5],

[6]. The continued development and refinement of these communication protocols are critical to ensuring scalability, interoperability, and low latency performance — factors that are vital for safety-critical scenarios.

Moreover, the interdisciplinary nature of intelligent transport systems — involving computer science, electrical engineering, automotive technology, data analytics, and urban planning — has made the research domain exceptionally dynamic. A noticeable surge in academic interest has been recorded in recent years, with numerous studies exploring aspects like security challenges, protocol efficiency, standardization, and policy frameworks for ITS and connected vehicle technologies [7], [8]. Despite this growth, the research landscape remains fragmented, with different research clusters focusing on disparate elements of the technology stack or regional implementations.

Given the breadth and complexity of this field, a systematic understanding of the global research trends, hotspots, and collaboration networks becomes crucial. Bibliometric analysis offers a powerful tool to map and quantify scholarly output, identify influential publications, and uncover evolving themes within this multidisciplinary domain. Studies such as those by [9]–[11] have demonstrated the effectiveness of bibliometric methods in highlighting the intellectual structure of emerging technological fields, especially when navigating large bodies of literature. Such an approach is particularly relevant for the connected vehicles and IoT space, where innovation is moving at a rapid pace, and policymakers, industry leaders, and researchers must stay informed about key developments.

Despite the evident progress in connected vehicle research, several challenges persist. One critical gap lies in the lack of comprehensive global mapping of research output concerning communication protocols within ITS and IoT-enabled transport systems. While many individual studies have addressed specific technical or regional issues, there is a scarcity of integrated assessments that evaluate the macro-level patterns of publication activity, collaboration intensity, and thematic evolution in the field. Furthermore, the role of emerging economies in shaping the research discourse remains underexplored, especially in relation to how global research networks are formed and maintained.

In the context of rapid technological growth in connected vehicles and IoT applications in transportation, there remains a significant knowledge fragmentation across research communities. While the domain has produced a high volume of publications, these outputs are often siloed in specific disciplinary or geographical clusters, lacking integrative insights. There is also insufficient analysis of how communication protocols are addressed in scholarly work. Without a clear bibliometric overview, stakeholders may struggle to identify key contributors, emerging trends, or underrepresented areas, thereby impeding coordinated innovation and policy development. This study aims to conduct a global bibliometric analysis of research on connected vehicles and IoT within intelligent transport systems, with a particular emphasis on communication protocols such as V2X, DSRC, and C-V2X.

2. METHODS

This study adopts a quantitative bibliometric approach to systematically map and analyze the global research landscape related to connected vehicles, IoT, and intelligent transport systems with a focus on communication protocols such as V2X, DSRC, and C-V2X. Bibliometric analysis enables the identification of publication trends, influential journals, key contributing authors, collaborative networks, and emerging research hotspots. To ensure comprehensive coverage, the Scopus database was chosen as the primary source due to its broad indexing of peer-reviewed scientific literature across engineering, computer science, transportation, and technology-related disciplines. The dataset was extracted in CSV formats, capturing metadata fields such as titles, authors, affiliations, publication year, keywords, source titles, abstracts, and citations.

The search strategy involved combining keywords using Boolean operators, such as ("connected vehicle" OR "V2X" OR "DSRC" OR "C-V2X") AND ("IoT" OR "Internet of Things") AND ("intelligent transportation" OR "ITS"), refined to the publication years 2010 to 2025. Only peer-reviewed journal articles, conference proceedings, and reviews were included to maintain academic rigor. Duplicate entries, editorials, and non-English publications were excluded. A total of 1,132 relevant documents were retrieved as of July 2025. The data were then cleaned and normalized using Microsoft Excel and OpenRefine, ensuring consistency in author names, keyword variants, and institutional affiliations before performing network and statistical analyses.

The analysis was conducted in several stages. First, co-authorship analysis was performed to identify key contributors and collaboration patterns among authors and countries. Second, co-occurrence analysis of keywords was used to reveal dominant themes and emerging topics within the field. Third, citation analysis was applied to determine the most influential publications. VOSviewer's clustering algorithm helped categorize the data into thematic groups, represented through color-coded network visualizations.

3. RESULTS AND DISCUSSION

3.1 Network Visualization

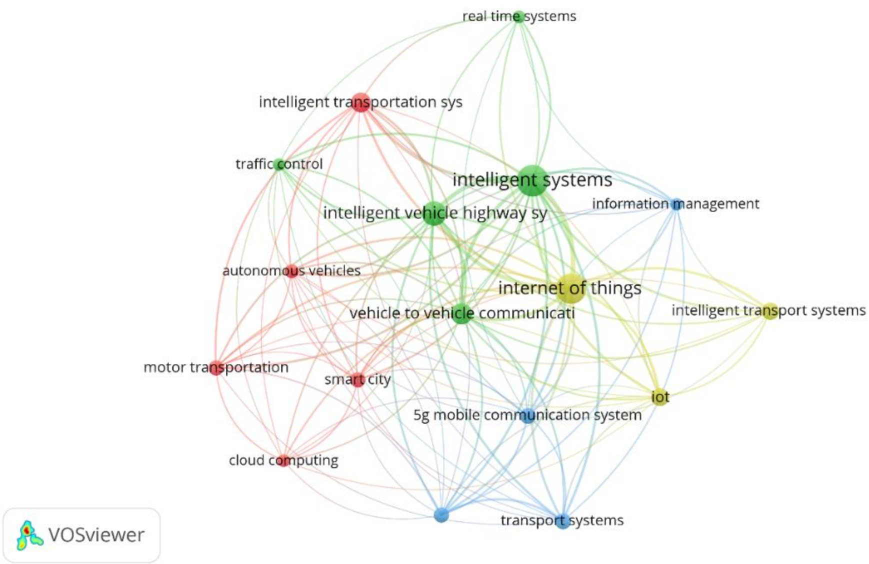

Figure 1. Network Visualization
Source: Data Analysis Result, 2025

Figure 1 reveals **five distinct thematic clusters** related to connected vehicles and IoT in intelligent transport systems, each represented by a different color. The green cluster is centrally positioned and includes dominant terms such as *"intelligent systems"*, *"intelligent vehicle highway systems"*, and *"real-time systems"*. This cluster reflects the technological backbone of intelligent transportation, focusing on the integration of real-time processing and system intelligence within vehicles and traffic infrastructure. The close interlinkages suggest that real-time data processing is essential for decision-making in connected vehicle environments. The red cluster, located on the left side of the map, comprises keywords like *"traffic control"*, *"motor transportation"*, *"autonomous* *vehicles"*, *"smart city"*, and *"cloud computing"*. These terms represent research on urban mobility, automation, and infrastructure management. The strong links between *autonomous vehicles* and *traffic control* indicate growing interest in how autonomous systems interact with urban transport frameworks. Moreover, the connection to *smart city* and *cloud computing* points to the role of urban digitalization and cloud-based data processing in enabling large-scale vehicular coordination.

The yellow cluster, anchored by the keyword *"internet of things"* (IoT) and *"intelligent transport systems"*, emphasizes the role of IoT as an enabler of interconnected transport infrastructure. This cluster also includes the keyword *"vehicle to vehicle communication"*, reinforcing the idea that IoT is central to vehicular communication technologies such as V2V and V2X. The placement of *IoT* at the intersection of multiple clusters underscores its cross-cutting role that bridges system intelligence, communication protocols, and digital infrastructure. Meanwhile, the blue cluster appears more technical in focus and includes terms such as *"5G mobile communication system"*, *"transport systems"*, and *"information management"*. These keywords suggest a line of research concentrated on network architecture, connectivity standards, and data handling. The inclusion of *5G* in this group is particularly noteworthy, as it highlights the growing reliance on next-generation communication technologies to support high-speed, low-latency data exchange among connected vehicles and infrastructure. The central position of key terms such as *"internet of things"*, *"intelligent systems"*, and *"vehicle to vehicle communication"* suggests that these concepts are high-frequency and highly connected nodes within the literature. Their location at the heart of the map indicates that they serve as conceptual anchors that link multiple subfields, from smart cities and automation to real-time systems and mobile networks.

3.2 Overlay Visualization

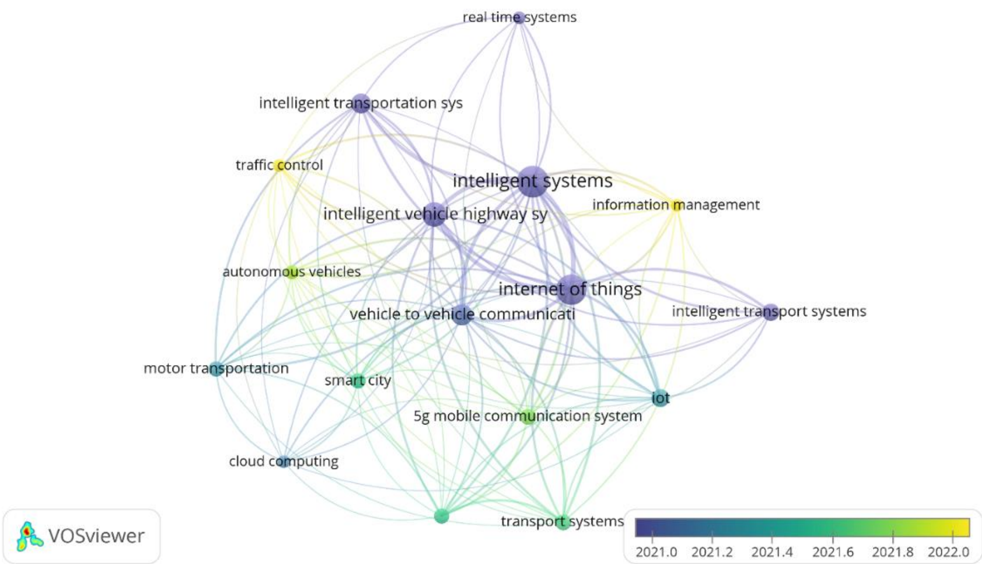

Figure 2. Overlay Visualization

Source: Data Analysis Result, 2025

Figure 2 presents a temporal perspective on how research themes have evolved over time within the domain of connected vehicles, IoT, and intelligent transport systems. The color gradient from dark blue (early 2021) to yellow (late 2022) represents the average publication year of documents associated with each keyword. Core terms such as *"intelligent systems"*, *"intelligent vehicle highway systems"*, and *"vehicle to vehicle communication"* appear in dark blue and purple shades, indicating that these were foundational topics explored earlier in the research timeline. Their central positioning and early occurrence suggest that they have formed the conceptual bedrock of the field.

In contrast, yellow-shaded terms such as *"information management"*, *"traffic control"*, and *"intelligent transport systems"* indicate newer areas of focus, emerging more prominently in recent years (late 2021 to 2022). These keywords reflect a growing interest in how connected vehicle data is processed, secured, and utilized within broader transportation infrastructures. The rise of *information management* especially points to the increasing complexity of data governance and the demand for reliable communication protocols in real-world deployment scenarios. Furthermore, the green-to-blue-shaded terms like *"5G mobile communication system"*, *"cloud computing"*, *"smart city"*, and *"transport systems"* suggest a sustained but slightly delayed engagement with enabling technologies. These topics gained traction after the initial research on vehicle connectivity and have since remained critical to discussions on network infrastructure, latency reduction, and urban integration. This temporal layering implies a progression from system design and communication protocols toward more applied and policy-relevant concerns such as urban planning, data orchestration, and system interoperability.

3.3 Citation Analysis

Table 1. The Most Impactful Literatures

Citations	Authors and year	Title
434	[12]	Future smart cities requirements, emerging technologies, applications, challenges, and future aspects
178	[13]	A Blockchain-SDN-Enabled Internet of Vehicles Environment for Fog Computing and 5G Networks
127	[14]	A novel digital twin-centric approach for driver intention prediction and traffic congestion avoidance
87	[15]	Blockchain for the internet of vehicles: A decentralized IoT solution for vehicles communication using ethereum
81	[16]	Integrating connected vehicles in Internet of Things ecosystems: Challenges and solutions
65	[17]	Overview of Spintronic Sensors with Internet of Things for Smart Living
53	[18]	6G Connected Vehicle Framework to Support Intelligent Road Maintenance Using Deep Learning Data Fusion
45	[19]	Aveiro Tech City Living Lab: A Communication, Sensing, and Computing Platform for City Environments
38	[20]	Cooperative Intelligent Transport Systems: Choreography-Based Urban Traffic Coordination
35	[21]v	Internet of Vehicles (IoV) Requirements, Attacks and Countermeasures

Source: Scopus, 2025

3.4 Density Visualization

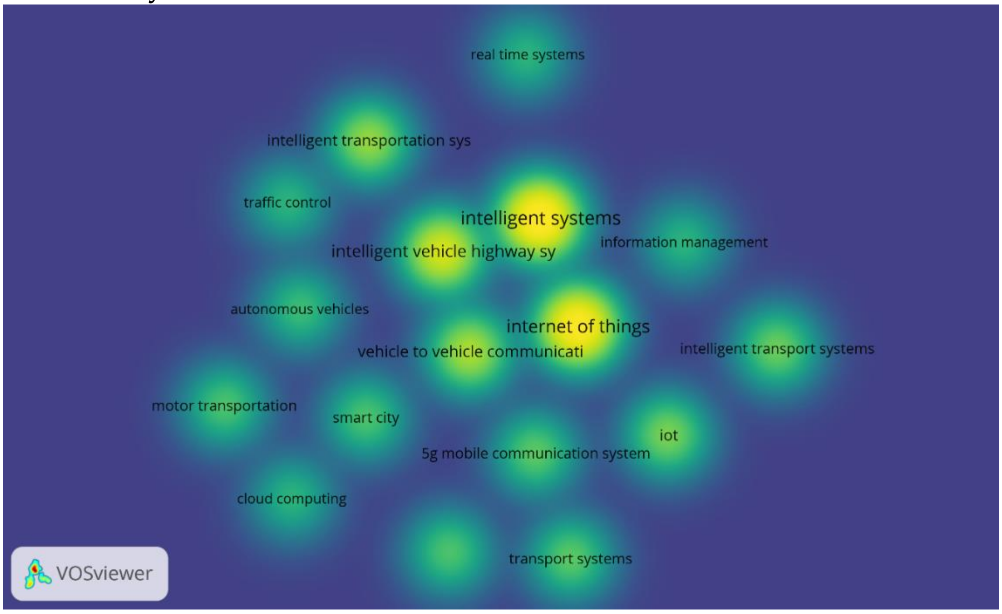

Figure 3. Density Visualization
Source: Data Analysis Result, 2025

Figure 3 highlights the most frequently occurring keywords in the dataset using a heatmap color scale, with bright yellow areas indicating high-density usage and blue to green shades indicating lower frequencies. Notably, the keywords *"intelligent systems"*, *"internet of things"*, *"vehicle to vehicle communication"*, and *"intelligent vehicle highway systems"* are located in the brightest zones. This suggests that these terms are central pillars of research in this domain, receiving the most attention across publications. Their close proximity indicates a strong thematic interconnection and frequent co-occurrence, reflecting a research focus on the integration of intelligent computational frameworks with IoT and communication protocols in transport environments. Meanwhile, surrounding terms like *"5G mobile communication system"*, *"smart city"*, *"cloud computing"*, *"transport systems"*, and *"information management"* appear in moderately bright zones, signifying growing but less dominant attention. The relatively dimmer visibility of terms such as *"real-time systems"* and *"motor transportation"* suggests these are more specialized or niche topics, or perhaps emerging areas yet to receive widespread focus.

3.5 Co-Authorship Network

Figure 4. Author Visualization
Source: Data Analysis Result, 2025

Figure 4 highlights distinct clusters of collaborative researchers in the field of connected vehicles and IoT-based intelligent transport systems. The central cluster, dominated by prolific authors such as Zhang L., Wang Y., and Javed A.R., appears densely interconnected, indicating a strong pattern of internal collaboration and high publication volume. Surrounding this core are other researchers like Taniguchi E., Bonnet C., and Li, who maintain links with the central cluster, suggesting occasional or thematic collaborations. Notably, Chen L. and Auti M. form a separate green cluster on the right, connected to the central network via weaker co-authorship links. This spatial separation suggests that while their work aligns topically with the core group, they likely operate within a different institutional or regional network.

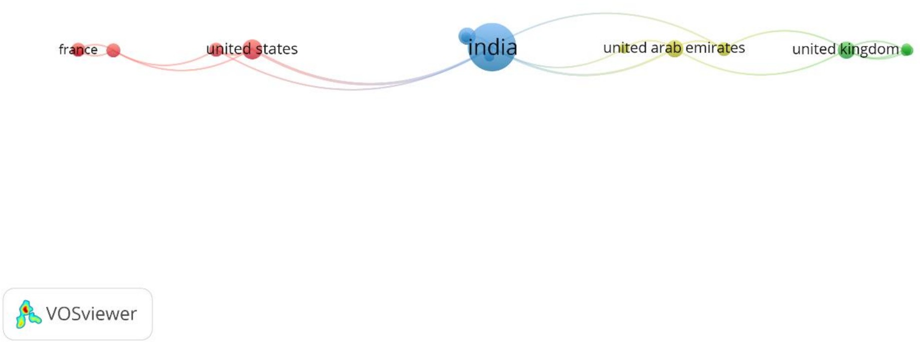

Figure 5. Country Visualization
Source: Data Analysis Result, 2025

Figure 5 illustrates the international research partnerships in the domain of connected vehicles and IoT-based intelligent transport systems. India stands out as the most central and active contributor, forming strong collaborative ties with both western countries (such as the United States and France) and regional partners like the United Arab Emirates and the United Kingdom. The large node size for India indicates a high volume of publications, while the dense interlinkages reflect its pivotal role in fostering cross-border research. The United Arab Emirates acts as a geographical and thematic bridge, connecting India to the UK, showing growing Gulf-region involvement in smart mobility research. Meanwhile, France and the United States are connected more closely to each other and secondarily to India, suggesting a shared research agenda possibly driven by technical and engineering collaboration.

Discussion

The integration of Connected Vehicles (CV) and the Internet of Things (IoT) into modern transportation infrastructure represents one of the most transformative trends in mobility and urban planning. The findings of this bibliometric analysis, based on a comprehensive review of Scopus-indexed literature between 2010 and 2025, reveal a rapidly evolving knowledge domain where communication protocols, system intelligence, and data interoperability converge. Through the application of VOSviewer, this study uncovered not only the dominant research themes but also the temporal evolution and density patterns of scholarly interest in this interdisciplinary space.

The co-occurrence network visualization clearly identifies the most central and frequently associated keywords in the field. Notably, *"intelligent systems"*, *"internet of things"*, and *"vehicle to vehicle communication"* emerged as core concepts that form the conceptual foundation of this research domain. Their high degree of interlinkage with terms such as *"intelligent vehicle highway systems"*, *"intelligent transport systems"*, and *"real-time systems"* reflects a sustained interest in embedding intelligence across both vehicles and infrastructure to optimize performance, safety, and decision-making. This aligns with prior research asserting that the effectiveness of CV and IoT deployment hinges upon real-time data processing and seamless inter-device communication [22], [23].

Moreover, the red cluster in the network map revealed complementary areas of inquiry, including *"autonomous vehicles"*, *"traffic control"*, and *"smart city"*. This cluster underscores a growing body of literature linking connected vehicle technologies to broader urban management systems. The prominence of *"cloud computing"* and *"smart city"* in this cluster also suggests a shift toward platform-based architectures and centralized data infrastructures to support vehicle-to-everything (V2X) interactions. As supported by [9], the future of intelligent mobility requires not only sophisticated onboard systems but also a robust digital environment within cities themselves.

The overlay visualization provides temporal insights into how research interests have developed over time. Early studies, indicated by darker hues such as blue and purple, concentrated heavily on establishing the technological feasibility and architectural design of intelligent transport systems. Keywords such as *"intelligent systems"*, *"intelligent vehicle highway systems"*, and *"real-time systems"* were predominantly explored between 2020 and early 2021. These foundational works were critical in defining communication models, latency thresholds, and system interoperability requirements necessary for CV and IoT integration. The presence of *"vehicle to vehicle communication"* as an early and persistent theme further affirms its role as a core component of V2X frameworks. Interestingly, more recent research trajectories, as shown by yellow-shaded terms, have moved toward *"traffic control"*, *"information management"*, and *"intelligent transport systems"* in the overlay map. This shift highlights a transition from design and development to deployment and governance. Scholars are increasingly concerned with how data generated by connected vehicles is managed, analyzed, and translated into actionable intelligence for urban traffic systems. This evolution mirrors broader societal concerns around data privacy, system security, and ethical use of transportation analytics, especially as cities adopt smart mobility solutions.

The density visualization offers further validation of these findings by identifying the most saturated areas of research attention. The bright yellow zones surrounding *"intelligent systems"*, *"internet of things"*, and *"vehicle to vehicle communication"* confirm that these areas dominate the academic discourse. This suggests that despite the breadth of topics within the field, research continues to concentrate around a relatively stable core. Meanwhile, the moderate to low-density presence of keywords such as *"5G mobile communication system"*, *"cloud computing"*, and *"transport systems"* points to emerging subfields that are gaining relevance but have not yet reached saturation. The growing inclusion of *5G* and *IoT* in keyword networks also reflects a technological push towards higher bandwidth, lower latency communication infrastructures, critical for the practical deployment of autonomous and semi-autonomous vehicles [10].

Despite these insights, several research gaps and challenges remain evident. First, the field appears to be heavily skewed towards technological innovation, with relatively limited exploration of socio-technical and regulatory dimensions. For example, terms like *"policy"*, *"standardization"*, or *"governance"* are notably absent or underrepresented in the co-occurrence maps. Yet these aspects are crucial in ensuring interoperability across manufacturers, legal compliance, and user trust. Second, while the overlay map shows progression in research focus, the average publication year across many foundational terms is clustered between 2020 and 2021. This suggests a potential plateau or gap in recent contributions, particularly in integrating newer paradigms such as edge computing, blockchain-based vehicle identity, or AI-driven predictive mobility models. Furthermore, there is a marked geographical bias in publication patterns, which is not immediately visible in keyword maps but commonly reported in bibliometric literature. [11] note that high-income countries such as the United States, Germany, and China dominate the production of research in smart mobility and ITS. This concentration raises concerns about the transferability of solutions developed in these contexts to lower-income countries where infrastructure, regulatory frameworks, and digital readiness may differ significantly. Another critical issue is the lack of cross-sectoral integration. The research still tends to be siloed into technical and engineering disciplines, whereas real-world deployment of connected vehicles and ITS requires collaboration with urban planners, sociologists, public administrators, and legal experts. Without such interdisciplinary collaboration, there is a risk that technologies may be misaligned with societal needs or fail during large-scale implementation. Future bibliometric reviews should consider adding dimensions of cross-disciplinary citations and thematic overlaps to assess integration quality.

CONCLUSION

Based on the comprehensive bibliometric analysis of connected vehicles and IoT within intelligent transport systems, this study concludes that the field is characterized by a strong technological core centered on intelligent systems, vehicle-to-vehicle communication, and IoT integration. VOSviewer visualizations revealed that research has evolved from foundational system design and communication protocols toward newer themes such as information management, traffic control, and 5G-enabled mobility. The co-authorship and country collaboration maps further highlight the dominance of certain key authors and the central role of India in global research partnerships, serving as a critical hub between Western and Gulf-region scholars. Despite the growing volume of research, thematic gaps remain in areas such as governance, data ethics, and interdisciplinary integration. These findings emphasize the need for continued innovation, cross-sector collaboration, and a broader policy-research alignment to ensure the sustainable development and deployment of intelligent transport ecosystems.

REFERENCES

[1] A. Festag, "Cooperative intelligent transport systems standards in Europe," *IEEE Commun. Mag.*, vol. 52, no. 12, pp. 166–172, 2014.

[2] M. Alam, J. Ferreira, and J. Fonseca, "Intelligent transportation systems," *Stud. Syst. Decis. Control*, vol. 52, 2016.

[3] A. Maimaris and G. Papageorgiou, "A review of intelligent transportation systems from a communications technology perspective," in *2016 IEEE 19th International Conference on Intelligent Transportation Systems (ITSC)*, IEEE, 2016, pp. 54–59.

[4] M. Picone, S. Busanelli, M. Amoretti, F. Zanichelli, and G. Ferrari, "Advanced technologies for intelligent transportation systems," 2015.

[5] M. Alam, J. Ferreira, and J. Fonseca, "Introduction to intelligent transportation systems," in *Intelligent transportation systems: Dependable vehicular communications for improved road safety*, Springer, 2016, pp. 1–17.

[6] R. I. Meneguette, R. De Grande, and A. A. Loureiro, "Intelligent transport system in smart cities," *Cham Springer Int. Publ.*, vol. 1, p. 182, 2018.

[7] H. Zhang and X. Lu, "Vehicle communication network in intelligent transportation system based on Internet of Things," *Comput. Commun.*, vol. 160, pp. 799–806, 2020.

[8] S. Sousa *et al.*, "A new approach on communications architectures for intelligent transportation systems," *Procedia Comput. Sci.*, vol. 110, pp. 320–327, 2017.

[9] P. Pagano, *Intelligent transportation systems: From good practices to standards*. CRC Press, 2016.

[10] K. Sjoberg, P. Andres, T. Buburuzan, and A. Brakemeier, "Cooperative intelligent transport systems in Europe: Current deployment status and outlook," *IEEE Veh. Technol. Mag.*, vol. 12, no. 2, pp. 89–97, 2017.

[11] G. Giannopoulos, E. Mitsakis, J. M. Salanova, P. Dilara, P. Bonnel, and V. Punzo, "Overview of Intelligent Transport Systems (ITS) developments in and across transport modes," *JRC Sci. policy reports*, vol. 1, 2012.

[12] A. R. Javed *et al.*, "Future smart cities: Requirements, emerging technologies, applications, challenges, and future aspects," *Cities*, vol. 129, p. 103794, 2022.

[13] J. Gao *et al.*, "A blockchain-SDN-enabled Internet of vehicles environment for fog computing and 5G networks," *IEEE Internet Things J.*, vol. 7, no. 5, pp. 4278–4291, 2019.

[14] S. A. P. Kumar, R. Madhumathi, P. R. Chelliah, L. Tao, and S. Wang, "A novel digital twin-centric approach for driver intention prediction and traffic congestion avoidance," *J. Reliab. Intell. Environ.*, vol. 4, no. 4, pp. 199–209, 2018.

[15] R. Jabbar, M. Kharbeche, K. Al-Khalifa, M. Krichen, and K. Barkaoui, "Blockchain for the internet of vehicles: A decentralized iot solution for vehicles communication using ethereum," *Sensors*, vol. 20, no. 14, p. 3928, 2020.

[16] S. K. Datta, R. P. F. Da Costa, J. Härri, and C. Bonnet, "Integrating connected vehicles in Internet of Things ecosystems: Challenges and solutions," in *2016 IEEE 17th international symposium on a world of wireless, mobile and multimedia networks (WoWMoM)*, IEEE, 2016, pp. 1–6.

[17] X. Liu *et al.*, "Overview of spintronic sensors with internet of things for smart living," *IEEE Trans. Magn.*, vol. 55, no. 11, pp. 1–22, 2019.

[18] M. Hijji *et al.*, "6G connected vehicle framework to support intelligent road maintenance using deep learning data fusion," *IEEE Trans. Intell. Transp. Syst.*, vol. 24, no. 7, pp. 7726–7735, 2023.

[19] P. Rito *et al.*, "Aveiro tech city living lab: A communication, sensing, and computing platform for city environments," *IEEE Internet Things J.*, vol. 10, no. 15, pp. 13489–13510, 2023.

[20] M. Autili, L. Chen, C. Englund, C. Pompilio, and M. Tivoli, "Cooperative intelligent transport systems: Choreography-based urban traffic coordination," *IEEE Trans. Intell. Transp. Syst.*, vol. 22, no. 4, pp. 2088–2099, 2021.

[21] A. Samad, S. Alam, S. Mohammed, and M. Bhukhari, "Internet of vehicles (IoV) requirements, attacks and countermeasures," in *Proceedings of 12th INDIACom; INDIACom-2018; 5th international conference on "computing for sustainable global development" IEEE conference, New Delhi*, 2018, pp. 1–4.

[22] M. A. Javed, E. Ben Hamida, and W. Znaidi, "Security in intelligent transport systems for smart cities: From theory to practice," *Sensors*, vol. 16, no. 6, p. 879, 2016.

[23] J. Vogt, "A comprehensive overview of the protocols associated with Intelligent Transportation Systems," *arXiv Prepr. arXiv2407.12799*, 2024.