Scientometric Analysis of Green Vehicular Communications: A Comparative Study Based on Scopus and Web of Science

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***Abstract*: In this article, the status of published scientific literature in the field of "trends in green vehicular communications" is investigated using scientometric analysis. For this purpose, two reliable scientific citation databases, Scopus and Web of Science, were used for analysis, comparison, and evaluation from 2007 to 2023. The results indicate that there are a total of 3,150 published research works, with 2414 and 736 documents belonging to the Scopus and Web of Science databases, respectively. Tools such as Bibexcel and VOSviewer are employed for scientific evaluation and analysis. According to the statistical results obtained from the Scopus and WoS databases, China, the United States and India are the most active countries in this field of study. Additionally, topics such as vehicular communications, energy efficiency, energy utilization, VANETs, and connected cars are among the most commonly researched subjects. The Beijing University of Posts and Telecommunications and Chongqing University are recognized as leading institutions in this field with the highest number of publications. An exponential increase in scientific output in the Scopus database has been observed since 2014, whereas an upward trend began in the WoS in 2007. In both the Scopus and Web of Science databases, the field of engineering plays a major role in this research area, accounting for 33% and 30% of scientific production, respectively. IEEE Access and IEEE Transactions on Intelligent Transportation Systems are the leading journals with the highest number of related publications. SUMO and NS-2 are the most commonly used simulators in this field.**

***Index Terms*—Scientometrics, Vehicular Communications, Green communications, VOSviewer**

I. Introduction

It is predicted that the number of self-driving cars will grow rapidly due to urbanization, rising living standards, and technological advances. The need for global connectivity in vehicular communications has led to increased interest in the Internet of Vehicles (IoV). The surge in demand for vehicular communications has resulted in high energy consumption in IoV infrastructures and transportation networks [1]. The number of autonomous and connected cars is expected to rise dramatically due to urbanization, improved living standards, and technological advancement [2]. Future vehicular networks may face stringent requirements to achieve green vehicle communications that enable energy conservation, reduce greenhouse gas emissions, and minimize environmental pollution [3].

One of the most important factors in creating green communications in the automotive sector is the sustainable use of natural resources related to transportation. In [4], the methods of using existing energy sources in this field were examined, including transmission methods such as piezoelectric, triboelectric, electromagnetic, and photovoltaic systems. The proposed models for these purposes are also presented. In [5], another method of energy management in the realm of green vehicle communication involved using a power source with high efficiency and longevity. This article introduces an ultra-capacitor (UC)/battery hybrid power source (HPS) that enhances energy management for vehicles. Many manufacturers are entering this field to achieve sustainable and more efficient green vehicle communications by exploring optimization methods for these resources.

Another critical focus in the realm of green automotive communication is the adoption of electric vehicles, which can play an essential role in reducing fuel consumption and addressing environmental concerns. Additionally, methods such as vehicle acceleration control and regenerative braking can further contribute to these goals. In [6]-[7], energy efficiency methods were explored, along with the development of an intelligent communication network that connects vehicles to their surroundings.

Traffic management and control methods aim to establish green automobile communication, particularly through the handover process and related methods based on data loading, according to the services and applications being used [8].

Sixth-generation (6G) communication network technologies are currently being proposed for automobile communication to collect and process data. One such technology involves developing routing protocols for self-driving cars in green communications. However, the unpredictability of the environment and delays in data transmission pose significant challenges to ensuring the quality of the service.

The authors of [9] concentrated on routing algorithm optimisation in order to improve energy efficiency.

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Additionally, a method to guarantee security in this kind of automobile communication was put forth to boost this field's dependability.

The IoV has revolutionized transportation by fostering pervasive connectivity and automation. However, the country's reliance on traditional infrastructure and technologies raises significant environmental concerns. Green IoV (GIoV), an emerging paradigm, aims to address these issues by promoting environmentally sustainable practices throughout the IoV ecosystem. This paper employs scientometric to quantitatively study scientific research and provides a comprehensive analysis of GIoV research from 2007 to 2023. Our objective is to present the current landscape in this field, identify key research areas, and forecast the future trajectory. Scientometrics is a powerful tool for examining the evolution and intellectual structure of emerging fields like GIoV. By analyzing publication trends, authorship patterns, citation networks, and co-word analyses, scientometric can illuminate the most impactful research areas, leading researchers and institutions, and potential avenues for future exploration [10].

The motivation to develop GIoV solutions is clear. The transportation sector is a significant contributor to greenhouse gas emissions, accounting for 23% of global CO2 emissions in 2020 [11]. Although IoV technologies enhance efficiency and safety, their dependence on conventional energy sources can intensify environmental issues.

GIoV presents a critical path toward achieving sustainable transportation goals outlined in international agreements like the Paris Agreement [12]. Despite its immense potential, research into GIoVs remains in its early stages. Established IoV research areas, such as vehicle-to-everything (V2X) communications and autonomous driving, have garnered significant scholarly attention [13]-[14].

Callon and colleagues underscored the significance of scientometric methodologies in delineating the knowledge foundation of nascent scientific domains. This facilitates the identification of research lacunae and the monitoring of the emergence of novel fields of inquiry [15].

A comprehensive understanding of the GIoV landscape, core research themes, and its position within the broader IoV research domain is still lacking. A scientometric analysis can bridge this gap by systematically examining IoV research areas, as demonstrated by Glänzel and Thijs in their work on scientific knowledge production [16].

This study makes a significant contribution to the field in several ways. First, it provides a detailed overview of GIoV research activity published from 2007 to 2023, analyzing publication trends, publication types (e.g., journal articles, conference proceedings), and the geographical distribution of research efforts. Second, it identifies prominent authors, institutions, and collaborating entities in the field, revealing potential knowledge networks and areas of international research collaboration. Collaboration networks can be particularly insightful, as demonstrated by Waltman et al. in their analysis of social networks in scientific fields [17].

Third, it delves into the thematic structure of GIoV research through citation network analysis, uncovering core research areas and their interrelationships. Fourth, through co-word analysis, the study extracts emerging research topics and their connections within IoV research areas. Co-word analysis is a valuable technique for identifying emerging research trends, as demonstrated by Cobo et al. [18].

Finally, based on these findings, the study proposes future research directions and identifies potential areas for further exploration. By employing a systematic and data-driven scientometric approach, this study sheds light on the current state of GIoV research and paves the way for future advancements. Uncovering the intellectual landscape of this burgeoning field will help guide researchers, policymakers, and industry leaders toward achieving a more sustainable future for connected and intelligent transportation systems. Recent advancements in GIoV technologies have offered promising solutions to mitigate the environmental impact of transportation systems.

Electric vehicles (EVs) powered by renewable energy sources are central to this approach, and they significantly reduce emissions. In addition, connected and autonomous vehicles can optimize traffic flow, minimize congestion, and improve overall transportation efficiency. Furthermore, research on GIoVs extends beyond vehicles, encompassing smart grids for seamless integration of renewable energy sources and intelligent infrastructure that facilitates energy-efficient routing and charging for EVs.

By leveraging big data analytics and machine learning, GIoV can contribute to a holistic transformation of the transportation landscape, promoting not only environmental sustainability but also economic growth and improving public health by reducing air pollution. However, challenges remain in developing efficient and cost-effective charging infrastructures, ensuring the security and privacy of data collected by IoV systems, and fostering international collaboration to establish standardized protocols for the widespread adoption of GIoV technologies.

The remainder of this paper is organized as follows: in Section II, the research background is provided. In Section III, the methodology adopted to conduct this research is described. Section IV presents the significant findings of this study. The conclusions and future work of this paper are provided in Section V.

II. RESEARCH BACKGROUND

In this section, we review key work related to green automotive communications through the lens of scientometric. In [19], vehicular communications were examined in accordance with the IEEE 802.11p standard. This study utilized scientometric and the Scopus database to analyze the Internet of Vehicles (IoV) from 2009 to 2020.

During this period, India, China, and the United States emerged as the leading countries, contributing 1,406, 1,176, and 650 published research documents, respectively. The highest number of articles in this field was published in 2018, with 949 articles. In terms of citations, the most cited research documents were published in 2011 with a total of 9,801 citations.

"Bidirectionally coupled network and road simulation for improved IVC analysis," written by Sommer C. et al. and published in IEEE Transactions on Mobile Computing in 2011, is the most referenced publication in this topic. With 55, 50, and 45 publications, respectively, Gerla M., Boukerche A., and Mahgoub I. are the leading contributors to this field of study."Bidirectionally coupled network and road simulation for improved IVC analysis," written by Sommer C. et al. and published in IEEE Transactions on Mobile Computing in 2011, is the most referenced publication in this topic. With 55, 50, and 45 publications, respectively, Gerla M., Boukerche A., and Mahgoub I. are the leading contributors to this field of study.

In [20], 36 prestigious SCI journals focusing on vehicular communications were analyzed from 2001 to 2020. The results indicate that the most documents published in this field were in 2019, comprising 2,628 research articles. The leading countries were the USA, China, and Canada. IEEE Transactions on Vehicular Technology is noted as the leading journal with 4,951 published research articles.

Research in [21] analyzed cutting-edge technologies related to smart connected cars. A total of 3,933 articles published in SCIE and SSCI between 2000 and 2019 were examined, revealing that 2019 had the highest output, with 1,273 publications. The leading countries in this domain were the United States, China, and South Korea, with 1,301, 834, and 258 published documents, respectively. Among the research institutions, Tsinghua University (China), Massachusetts Institute of Technology (USA), and the University of Michigan (USA) reported 87, 66, and 59 published documents, respectively. IEEE Transactions on Intelligent Transportation Systems was the top journal, with 271 articles published in this field.

In [22], the use of edge computing in connected cars was investigated using scientometric, employing the Web of Science (WoS) database from 2005 to 2020. The findings indicate that 2019 had the highest scientific output, with over 900 publications. The countries with the highest numbers were China, the United States, and Italy. The top institutions in this area were Beijing University of Posts and Telecommunications, Vidian University, and China University of Electronic Science and Technology, with 115, 52, and 41 published documents, respectively.

Another study analyzed long-range communication technologies in vehicular communications using Scopus and ScienceDirect, covering the period from 2010 to 2021. The results indicate that computer science and engineering were the dominant disciplines in this field. The countries with the highest number of research documents were China, Italy, and India (237, 174, and 163 research documents, respectively. The most effective journal in this area was Transportation Research Part C: Emerging Technologies, which published over 172 research documents.

Studies in [23] looked at traffic lights using information gathered from linked cars or smartphones. Using the Scopus database, this analysis produced over 698 published research documents between 1968 and 2023, with 2019 seeing the highest number. With 151, 123, and 56 publications each, the USA, China, and Germany were the top three contributors in this field. The three most well-known writers are K. L. Head, Y. Wang, and B. Park.

Considering the growth of scientific output in the automotive ad hoc network field from 2009 onwards, research in this field was also investigated. According to evidence presented in [24], 434 published research documents were extracted from the Scopus database from 2010 to 2019. The highest output was in 2019, with 71 publications. India, China, and the United States contributed 87, 72, and 66 documents, respectively. Most publications were conference articles, comprising 60.78% of the total literature in 2019. The University of California (USA) led the field with 459 published documents, followed by the University of Ottawa (Canada) with 293 publications. Gerla from the University of California has emerged as a significant author in this field.

In [25], traffic management in smart transportation systems and smart cities was explored using the Web of Science platform from 1982 to 2021. The peak scientific output occurred in 2021, with 241 published documents. The top author in this field was Serge P. Hoogendoorn, who contributed 22 contributions. The countries with the highest number of publications were the United States, China, and England, with 925, 633, and 198 documents, respectively. The Delft University of Technology, Tongji University, and the University of Florida were the leading institutions with 136, 72, and 55 publications, respectively. The key keywords in this research area are traffic management, modeling, and optimization. Additionally, research on transportation management aims to improve mobility and reduce accidents in smart cities by drawing from a collection of 100 highly cited published articles and patents published from 1997 to 2018. The Internet of Things (IoT) was identified as the most influential technology in the field in 2018. The countries with the highest number of publications were the USA, China, and South Korea, with 667, 538, and 332 documents, respectively. The leading universities in this domain were Beijing University of Posts and Telecommunications, Beijing Jiao Tong University and Politècnica de Valencia, with 66, 60 and 39 published articles, respectively. The synonym network results indicated that V2V, V2I, and VANET were key trending terms in this research area [26-27].

III. RESEARCH METHODOLOGY

The results presented in this article include a review of documents (such as articles published in journals, conference papers, books, reports, etc.) published worldwide in the field of green communications, using scientometric tools. Therefore, it is essential to extract documents published in this field and conduct relevant analyses. In the first step, a search of the Scopus citation database was performed as follows:

("Vanet*" OR "Internet of Vehicles" OR "Vehicle-To-Everything" OR "Vehicle to Vehicle" OR "Vehicle-to-Infrastructure" OR "connected car" OR "v2x" OR "v2v" OR "v2i" OR "iov" OR "connected vehicles") AND ("Green" OR "low power" OR "low energy" OR "ENERGY EFFICIENT"

OR "ENERGY AWARE" OR "ENERGY MANAGEMENT" OR "Energy efficiency" OR "Power aware")

As of March 1, 2024, the number of results obtained from Scopus and WoS (including articles, books, etc.) is as follows:

- ✓ The number of research papers published in Scopus between 2007 and 2023 was 2,414.
- ✓ The number of research papers published in WoS between 2008 and 2023 is 736.

IV. RESEARCH FINDINGS

The global number of published documents in this field and the trends are illustrated in Fig. 1. According to Fig. 1, scientific growth in this field began in 2007 and 2008, with three published research documents in Scopus and one in the WoS database. By 2023, the Scopus citation database had recorded 508 published research documents, whereas WoS contained 152 published research documents. Based on the results, the proportion of published documents presented at conferences in this field was notably high in Scopus, which indexes significantly more conferences than WoS. As a result, there has been a marked increase in the growth rate of indexed articles within Scopus over the last three years. It is noteworthy that, generally, articles indexed in WoS primarily focus on documents published in journals, whereas a substantial proportion of documents indexed in Scopus are conference proceedings.

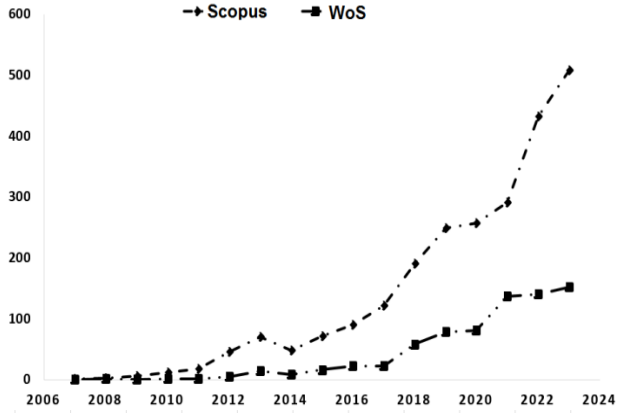

Fig. 1. Trend of published documents worldwide in the field of green vehicular communications

The types of research areas with respect to the percentage of interest in green vehicular communications in both Scopus and WoS databases are shown in Fig. 2. The data indicates that, in the Scopus database, engineering, computer science, and mathematics fields account for the highest proportion of publications 33%, 30%, and 9%, respectively. According to the WoS database, engineering, telecommunications, and computer science dominate the ranking 30%, 19%, and 16%, respectively.

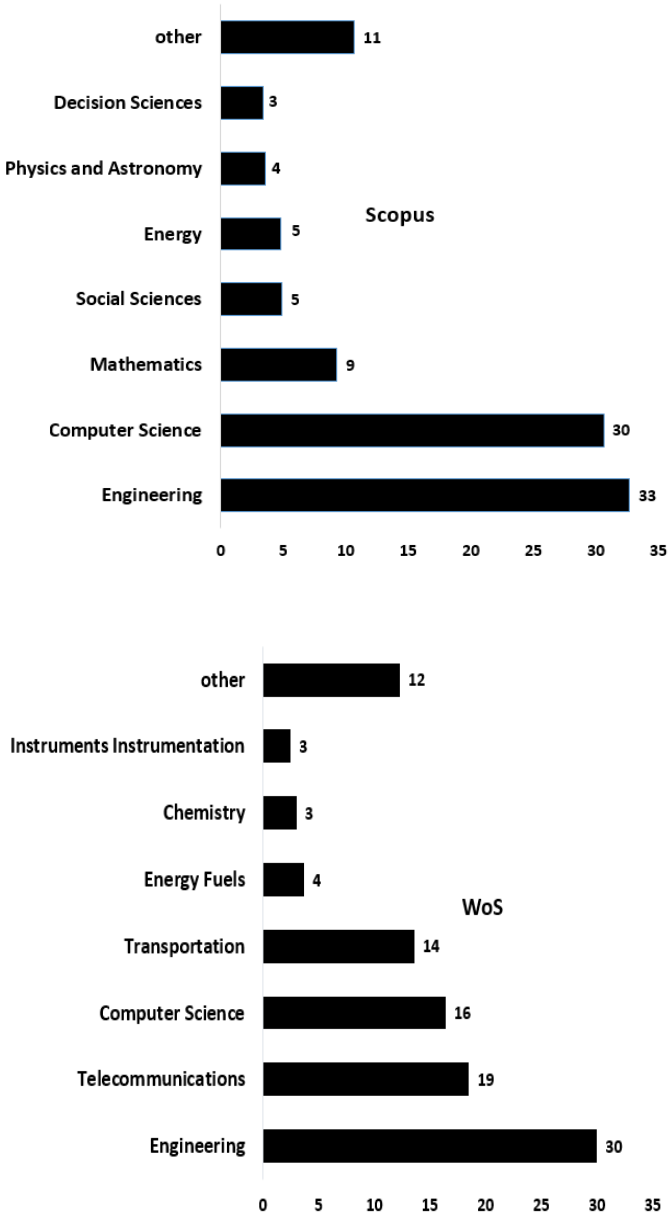

Fig. 2. Percentages of major productions in the field of green vehicular communications

The top authors in this research field based on the number of published papers are detailed in Fig. 3. F.H. Abbas leads the Scopus database with 17 published research documents, while Y. Wang leads the WoS database with 11 published research documents.

The leading organizations with the highest number of published documents in this field are presented in Fig. 4. In the Scopus database, Beijing University of Posts and Telecommunications holds the top position, whereas Chongoing University leads the WoS.

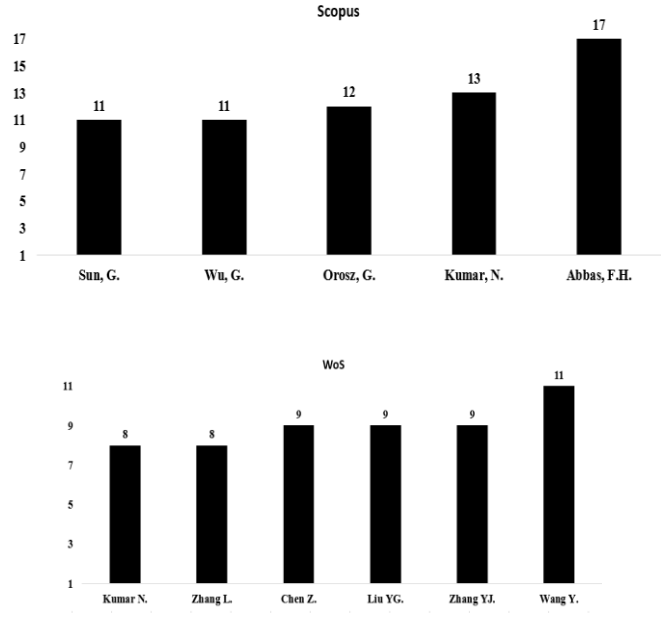

Fig. 3. Top authors in the field of green vehicular communications

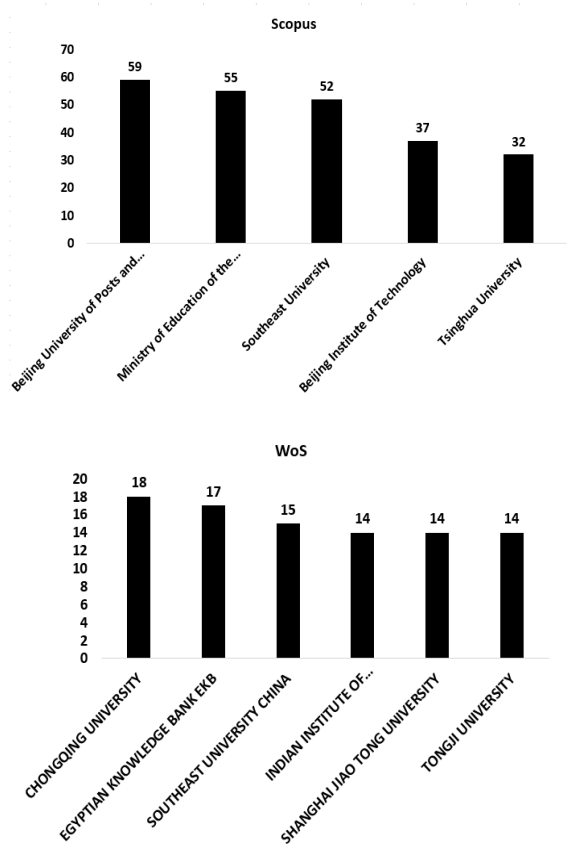

Fig. 4. Leading institutions in the field of green vehicular communications

Table I lists the leading journals with the most scientific publications in this field according to Scopus and WoS. As shown in Table I, IEEE Access has published 83 research documents according to Scopus, and IEEE Transactions on Intelligent Transportation Systems has published 71.

TABLE I
Top Journals in the Field of Green Vehicular Communications

Scopus	
Journal title	**Publications count**
IEEE Access	83
IEEE Transactions on Intelligent Transportation Systems	83
IEEE Transactions on Vehicular Technology	81
IEEE Internet of Things Journal	44
SAE technical papers	44
WoS	
Journal title	**Publications count**
IEEE Transactions on Intelligent Transportation Systems	71
IEEE Access	48
IEEE Transactions on Vehicular Technology	48
Sensors	32
IEEE Internet of Things Journal	21

The ranking status of countries with the highest number of published documents globally is shown in Fig.5. Observations indicate that China, the United States, and India are at the top of this ranking according to Scopus and WoS.

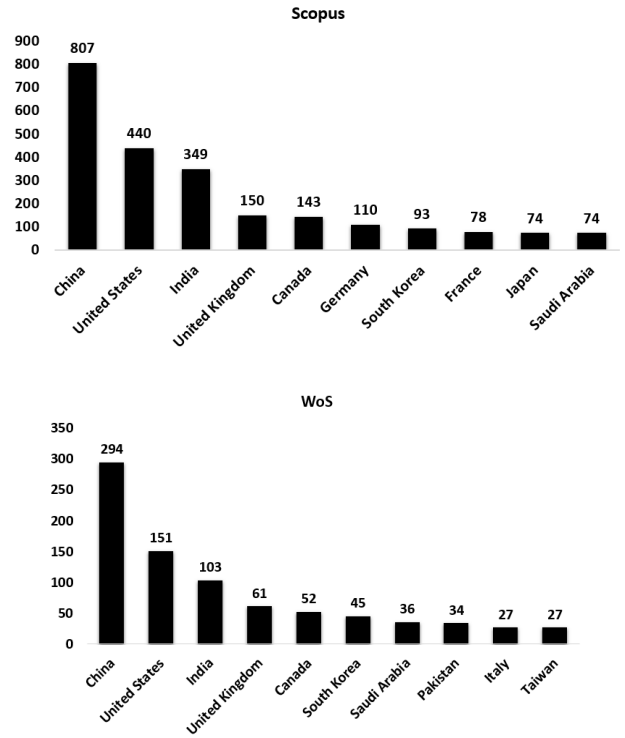

Fig. 5. Leading countries in the field of green vehicular communications

Table II lists the highly cited articles in this field for Scopus and WoS. The article titled "Survey of Important Issues in UAV Communication Networks" has received the highest citations. To illustrate the knowledge structure of this field globally, we first used outputs from both the Scopus and WoS databases, and we applied BibExcel software to analyze related terms in the documents. This process involves selecting key terms for the network display and effectively removing less significant terms to focus on more relevant terminology. The subsequent outputs from BibExcel were imported into VOSviewer to construct the structure. The initial output from the software is shown in Fig.

6. Size of circles in Fig. 6 indicates the frequency of each word's occurrence. Notably, the terms "V2V," "energy efficiency," and "energy use" appeared 1,261, 1,193, and 510 times, respectively, in the Scopus database. Similarly, in the WoS database, "VANET," "energy efficiency," and "connected vehicles" had the highest frequencies, recording 140, 116, and 114 repetitions, respectively. In this type of map, each color represents a topic cluster; in Scopus, keywords are categorized into five clusters, and in WoS, they are categorized into nine clusters.

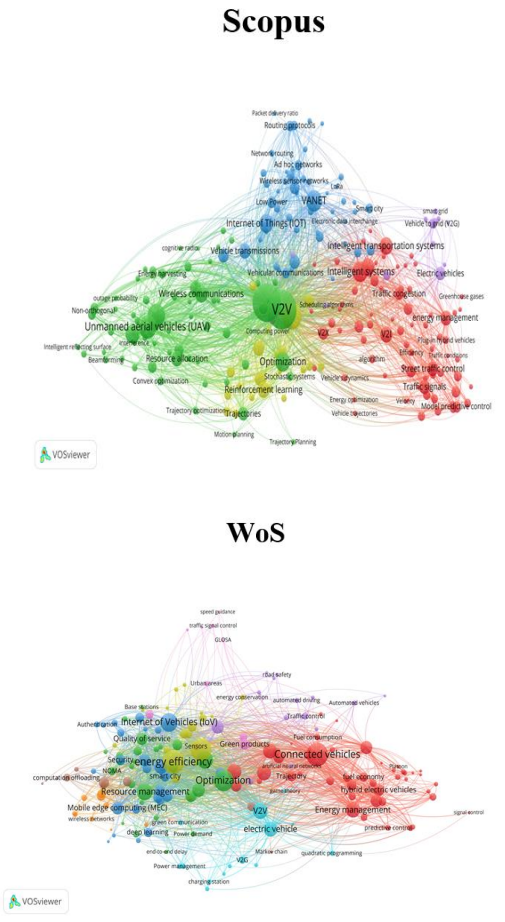

Fig. 6. Synonymous network in the field of green vehicular communications

The density and dispersion of vocabulary in this area are illustrated in Fig. 7. The highest density of words within the network is represented in red in both Scopus and WoS databases, while yellow, green, and blue areas also indicate less densities. Additionally, words proximity is significant; closer words are used together in many documents, while greater distances indicate less frequent co-occurrence.

Table III summarizes the five subject clusters extracted from Scopus and the nine subject clusters extracted from WoS. Each column represents the central topic of each cluster along with the research topics in the respective subsets. It is evident from the macro cluster topics in the Scopus database that subjects such as intelligent automotive communications, wireless communications, vehicle control methods, intelligent algorithms in automotive communications, and research on green automotive communications is given priority.

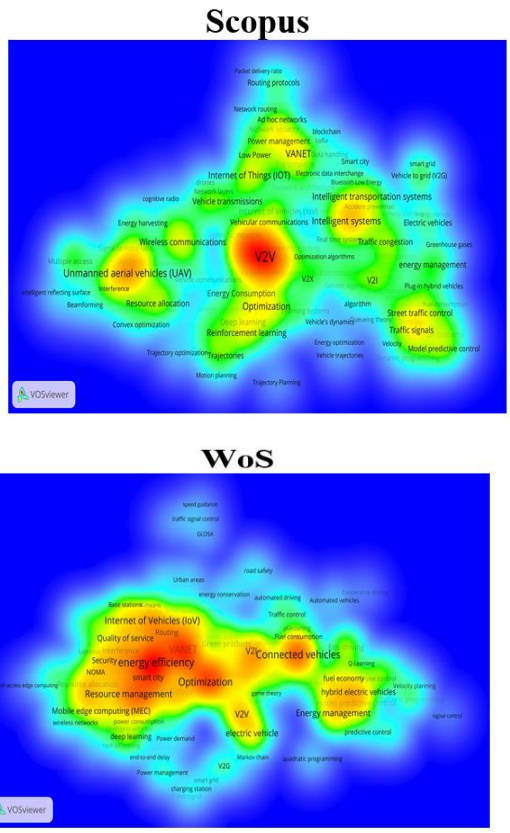

Fig. 7. State of density and dispersion of words of the same vocabulary network in the field of green vehicular communications

The WoS database, on the other hand, emphasises subjects like resource management, edge computing in automotive communications, automotive communication management, power management techniques, wireless communications, vehicular communication routing techniques, intelligent automotive communications, green automotive communications, and vehicle control techniques. The state of communication and international scientific cooperation among countries in green vehicular communications, according to Scopus and WoS databases, are also displayed in Fig. 8. The figure shows that China, the United States, and India have the highest levels of cooperation. In the Scopus database, 85 countries are involved in the network of international scientific cooperation, with significant contributions from China, the United States, Canada, and India. In the WoS database, 57 countries are documented to have scientific cooperation, with key contributions from China, the United States, the United Kingdom, India, and Pakistan. The capabilities provided in vehicular communications must be tested and validated before practical application. Simulators serve as valuable testing tools, allowing for low-cost assessments without sacrificing user safety. The earliest examples of simulations in automotive communications were published in 2010. To achieve accurate results from simulations, precise models must be developed; however, the complexities of vehicular communications infrastructure present challenges. Generally, simulators in the field of automotive communication are categorized into two groups: mobile simulators and network simulators [28].

VANET simulation includes aspects such as road topology generation, vehicle generation, traffic generation, signal management, driver behavior modeling, acceleration, deceleration, and pedestrian behavior [29]-[30]. There are two types of VANET simulators:

- ✓ Motion simulators: These simulate vehicle movement patterns that are influenced by specific factors.
- ✓ Network simulators: This simulates message exchange between connected nodes.

TABLE II
Highly Cited Articles in the Field of Green Vehicular Communications

Authors	Title	Year	Source title	Number of Citations
Scopus				
Gupta L.; Jain R.; Vaszkun G.	Survey of Important Issues in UAV Communication Networks	2016	IEEE Communications Surveys and Tutorials	1534
Zeng Y.; Xu J.; Zhang R.	Energy Minimization for Wireless Communication with Rotary-Wing UAV	2019	IEEE Transactions on Wireless Communications	938
Jia D.; Lu K.; Wang J.; Zhang X.; Shen X.	A Survey on Platoon-based Vehicular Cyber-Physical Systems	2016	IEEE Communications Surveys and Tutorials	603
Martinez C.M.; Hu X.; Cao D.; Velenis E.; Gao B.; Wellers M.	Energy Management in Plug-in Hybrid Electric Vehicles: Recent Progress and a Connected Vehicles Perspective	2017	IEEE Transactions on Vehicular Technology	555
Guanetti J.; Kim Y.; Borrelli F.	Control of Connected and Automated Vehicles: State of the Art and Future Challenges	2018	Annual Reviews in Control	383
WOS				
Gupta, Lav; Jain, Raj; Vaszkun, Gabor	Survey of Important Issues in UAV Communication Networks	2016	IEEE Communications Surveys and Tutorials	1141
Jia, Dongyao; Lu, Kejie; Wang, Jianping; Zhang, Xiang; Shen, Xuemin	A Survey on Platoon-Based Vehicular Cyber-Physical Systems	2016	IEEE Communications Surveys and Tutorials	492
Martinez, Clara Marina; Hu, Xiaosong; Cao, Dongpu; Velenis, Efstathios; Gao, Bo; Wellers, Matthias	Energy Management in Plug-in Hybrid Electric Vehicles: Recent Progress and a Connected Vehicles Perspective	2017	IEEE Transactions on Vehicular Technology	473
Guler, S. Ilgin; Menendez, Monica; Meier, Linus	Using Connected Vehicle Technology to Improve the Efficiency of Intersections	2014	Transaction Research part C-Emerging Technologies	313
Vahidi, Ardalan; Sciarretta, Antonio	Energy Saving Potentials of Connected and Automated Vehicles	2018	Transportation Research part C-Emerging Technologies	246

TABLE III
Classification of Existing Clusters in Green Vehicular Communication (Based On Fig. 6)

Scopus		
Subtopics related to the cluster center topic	**Macro topic (cluster center)**	**Number of clusters**
Intelligent transportation systems, Intelligent highway transportation systems and Intelligent vehicle highway systems	Intelligent vehicular communications	1
Vehicle to vehicle communication, Wireless communication and Cooperative communication	Wireless communications	2
Clustering algorithms, information management and Routing	Vehicle control methods	3
Deep learning, learning system and Markov processes	Intelligent algorithms in vehicular communications	4
Electric vehicle, Electric power transmission networks and Secondary batteries	Green vehicular communications	5
WoS		
Subtopics related to the cluster center topic	**Macro topic (cluster center)**	**Number of clusters**
Energy management, Optimal control and Cruise control	Vehicular communication management	1
Power control, Power allocation and Power consumption	Power management methods	2
Wireless sensor networks, Fifth generation mobile communications and Wireless communications	Wireless communications	3
Routing, Routing protocol and Clustering	Routing in vehicular communications	4
Intelligent transportation systems, Fuzzy logic and Artificial neural networks	Intelligent vehicular communications	5
Electric vehicle, Charging station and Electric vehicle charging	Green vehicular communications	6
Spectral efficiency, Channel estimation and Resource allocation	Resource management	7
Computational offloading, Multiple access edge computing and Vehicular edge computing	Edge computing in vehicular communications	8
Traffic signal control, Adaptive traffic signal control and Speed control	Vehicle control methods	9

TABLE IV
Comparison Between the Adopted Simulators Used in Vehicular Communications

Simulator	Type of simulator	Number of articles in Scopus	Number of articles in WoS
"SUMO"	Mobility	55	21
"NS-2" OR "NS2"	Network	47	15
"NS-3" OR "NS3"	Network	14	5
"OMNeT++"	Network	14	3
"OPNET"	Network	7	2

Table IV examines the simulators used in vehicular communications across major published research documents in Scopus and WoS. As shown in Table IV, the most widely adopted simulator in this field is SUMO, with 55 applications in the Scopus database and 21 in the WoS database.

Fig. 8. International scientific cooperation in green vehicular communications

V. CONCLUSION

Scientometric analysis has illuminated the growing landscape of GIoV research. By analyzing recent publications from 2007 to 2023, we identified key trends, prominent research areas, and potential avenues for future exploration. The GIoV presents a critical pathway toward sustainable transportation, offering solutions to mitigate the environmental impact of traditional transportation systems. Significant research activities have been conducted in areas such as electric vehicles powered by renewable energy sources and connected and autonomous vehicles capable of optimizing traffic flow. In addition, the exploration of smart grids and intelligent infrastructure for EVs demonstrates a holistic approach to GIoV development. However, challenges remain in developing cost-effective and widely accessible charging infrastructures, ensuring data security and privacy in IoV systems, and fostering international collaboration for standardized GIoV protocols. By addressing these challenges and pursuing promising research directions, the GIoV landscape can potentially transform our transportation systems. Collaboration among researchers, policymakers, industry leaders, and international stakeholders is essential to overcome these obstacles and achieve widespread adoption of GIoV technologies. Ultimately, this collaborative effort can pave the way for a more sustainable future for transportation, characterized by reduced environmental impact, increased efficiency and improved public health. Based on our research, the majority of published studies imply that the United States, China, and India have been in the forefront of vehicular communications. Furthermore, automotive communication is at the vanguard of disciplines like mathematics, computer science, and engineering. Five primary trend clusters were identified by our scientometric research in the Scopus database: vehicle control methods, intelligent algorithms in vehicular communications, intelligent vehicular communications, wireless vehicular communications, and green vehicular communications. Additionally, the state of scientific production in this field in Iran has been briefly reviewed. According to results extracted from the Scopus database, Iran ranks 26th globally, with 26 published documents. Results from the WoS database indicate that Iran ranks 20th worldwide with 19 documents. The largest amount of scientific output in this field originates from Islamic Azad University (across all units). Furthermore, the highest level of collaboration among Iranian authors in Scopus and Web of Science databases is with Australia, Canada, and India. The classification of trends from the Web of Science database reveals nine categories: vehicular communication management, power management methods, wireless communications, routing in vehicular communications, intelligent vehicular communications, green vehicular communications, resource management, edge computing in vehicular communications, and vehicle control methods. The leading journals with the highest number of related publications are IEEE Access, IEEE Transactions on Intelligent Transportation Systems, and IEEE Transactions on Vehicular Technology. SUMO and NS-2 are the most widely adopted simulators in this field . Future investigations could delve deeper into specific scientometric analyses of areas such as battery technology advancements, the integration of renewable energy sources, and cybersecurity and privacy considerations.

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