Blockchain Technology for Securing Internet of Vehicle: Issues and Challenges

Akshay Kumaran V,
School of Computer Science and
Engineering, Vellore Institute of
Technology, Chennai, 600127,
Tamilnadu, India
akshaykumaran.v2020@vitstudent.ac.
in,

Amit Kumar Tyagi
School of Computer Science and
Engineering,
Vellore Institute of Technology,
Chennai, 600127, Tamilnadu, India.
amitkrtyagi025@gmail.com

Dr. S.Pradeep Kumar
Department of Computer Science &
Engineering, Saveetha School of
Engineering, Saveetha Institute of
Medical and Technical Sciences
(SIMATS) Chennai, Tamil Nadu,
INDIA
spradeepkumar272@gmail.com

Abstract— **Blockchain technology enables safe communication among users in a network of linked automobiles. Intelligent vehicle is a blockchain empowered vehicle, generally alluded to as a self-driving vehicle. This correspondence climate isn't secure and has a few issues and challenges. The significant issues on the Internet of Vehicles (IoVs) correspondence are reliability, exactness, and security. In this article, we acquaint blockchain innovation with assembling trust and dependability in shared organizations with geographies like IoVs. Further, we propose a blockchain-innovation empowered IoV use case. Blockchain innovation is utilized to fabricate a safe, confided-in climate for IoVs. This believed climate gives a protected, dispersed, and decentralized instrument for correspondence between IoVs, without sharing their data in the canny transportation framework. The omnipresence of interfacing advances in shrewd vehicles and the gradual mechanization of its functionalities guarantee critical advantages, remembering a huge decrease in blockage and street fatalities. Here we have also discuss the constraints given in the relevant literature, including the issues of blockchain technology and how they impact its incorporation into the IoV.**

Keywords— Blockchain, Self-Driving Vehicle, Robotization, VANET, Internet of Vehicles

I. INTRODUCTION

With the improvement of expectations for everyday comforts, gridlock turns out to be increasingly more genuine with the increment of vehicles. With the rise of the fifth Generation, Bluetooth, sensor innovation, distributed computing, enormous information, and other new advancements, the field of keen transportation has gained extraordinary headway. On the Internet of Vehicles framework, vehicles see the encompassing street condition natural data through the on-board unit and impart to the side of the road units and different vehicles in the organization through the vehicle correspondence module so the vehicle proprietor can acquire street condition data and route data, decreasing traffic hazards. Since the Internet of Vehicles framework is a complicated framework made out of vehicles, individuals, and other organization offices and it imparts through the remote organization, the framework faces genuine security issues. In this manner, how to ensure client protection while offering types of assistance is a critical issue to be tackled.

The framework utilizes blockchain and cryptographic calculations to plan productive two-way confirmation and key trade methodologies to decrease correspondence costs. Simultaneously, vehicles in the framework can discuss namelessly with area specialist co-ops through blockchain, keeping away from area specialist organizations from taking vehicle security. In rundown, the Blockchain-Based Internet of Vehicles Privacy Protection System proposed in this paper is lower in cost, higher in security, and simpler to keep up with than the customary Internet of Vehicles plot.

II. LITERATURE WORK

Today blockchain technology is closely linked to cryptocurrencies, it also has various other potential applications in areas such as energy and sustainability, smart cities, the Internet of Things (IoT), smart transportation, etc [1]. In the IoV idea, blockchain can provide security for Electric Vehicle (EV) transactions, allowing power trade to be done in a secure manner transparent, and decentralized.

Peer to Peer (P2P) energy trading allows locally distributed energy generators to sell their power at the desired price to users willing to pay that price amongst Distributed Energy Resources (DERs), including EVs [2]. Blockchain has emerged as a breakthrough technology in the context of smart grids, allowing reliable and safe P2P energy trading. Because of the nature of decentralized blockchain, an open and robust record for all transactions and data linked to consumption and energy generation may be built [3]. Furthermore, smart contracts on the IoV can enable immutable and transparent transactions while also encouraging linkages between charging stations, EVs, and RSU in a fault-tolerant and decentralized ecosystem [4]. As a result, a solution like a blockchain, that would not rely on a central trust authority to assure energy transfers in the IoV [5], is critical for establishing a highly privacy-protected secure, and accessible environment. In addition, blockchain can provide a large number of unique solutions for most IoV applications. The vast majority of such apps are mobile as well as real-time, sharing and producing massive amounts of data with each other. Blockchain integration with IoV improves automation and system efficiency while reliability, privacy, and boosting security [6,7]. IoV, which is based on blockchain, does have the potential to create a new ecosystem for the automobile and transportation sectors, wherein value could be managed and exchanged in an efficient manner, transparent, secure, immutable. Furthermore, incorporating

blockchain into the existing IoV can result in significant gains in terms of information delivery, safety, and efficiency.

For Electric Vehicles, Chaudhary et al. [8] developed Blockchain-enabled secure energy trade. The blockchain was used in this framework to validate EV requests in a distributed manner, ensuring resilience against single-point failure. Iqbal [9] and colleagues created a characterization of the vehicle virus and security architecture to safeguard the vehicle from it. To minimize the attack service, this design used numerous computer platforms and a virtualization strategy. Li et al. [10] introduced Fog Computing-based Secure Demand Response (FSDR) for the Internet of Energy (IoE) that is based on Access Control Encryption and consensus to prevent collusion attacks.

Salem et al devised use of a private blockchain-based solution to addressing challenges of authenticity, integrity, and secrecy where they propose use of in-vehicle networking, which includes a central gateway and switches, was taken into consideration for practical use cases [11]. Sharma et al created a fresh vehicular information framework utilising Blockchain innovation that maintain a contract among conveyed expert co-ops to guarantee car verification, information honesty, consistent access control and security protecting [12].

III. THE CHALLENGES ASSOCIATED WITH BLOCKCHAIN

Blockchain is an assortment of squares, where the squares stores exchanges, records, and scripts, and all squares are connected to fabricate a chain dependent on some cryptographic procedures. The recently produced blocks are ceaselessly attached to the chain in an advanced record, and the record is kept up with by all members of the organization. Consequently, blockchain is additionally called a disseminated record innovation (DLT). The Blockchain empowers a stage to do confided in assignments and exchanges in an untrusted climate without requiring a confided-in substance. Since blockchain innovation doesn't answer on any confided-in substance, agreement instruments are utilized to build up trust among the untrusted elements. The point of these systems is to empower elements to concur on a solitary adaptation of substantial square to guarantee a straightforward and reliable standpoint, which eventually addresses forks and clashes inside the organization. Various agreement components have been proposed and executed in various blockchain applications. Every instrument has novel guidelines and calculations which structure the necessity to be trailed by the substances/hubs to incorporate new squares to the chain.

IV. THE CHALLENGES ASSOCIATED WITH IoV

The improvements in the IoVs field are quicker than ever, because of the progressions of Internet innovations furthermore, vehicle gear. Fundamentally, this promising IoVs field is imagined to enhance the vehicular administrations, transportation frameworks, and individuals' way of life, simultaneously, upgrade drivers' wellbeing sooner rather than later. A gigantic measure of information will be acquainted and re-appropriated with the cloud and edge stockpiles from the vehicles just as the vehicular administrations which will be developed for IoVs. The future vehicles will likewise have excellent computational and

capacity assets. They would also offer a wide scope of use benefits; these information and assets will be shared with one another. Especially, for man-made consciousness (v) related applications, the vehicles answer on cloud and edge figuring hubs to offload the undertakings, as well as interaction errands locally by imparting the assets to one another to diminish the idleness and transfer speed. Be that as it may, the joining with existing Internet advancements to help IoVs worldview opens up many difficulties [12-15], counting security [16-18], protection, trust [19-21], straightforwardness, availability, and execution [22-25]. The difficulties related to it will be expanded with the development of IoVs availability. In such a manner, large numbers of difficulties are related to ITS. Truth be told, the IoVs biological system represents various attributes, furthermore, more explicitly, among these some are exceptional thoughts about other IoT applications. Subsequently, the IoVs environment may bring several novel difficulties. In the accompanying, such extraordinary parts of IoVs biological system are depicted intricately. Dissimilar to other IoT brilliant gadgets, in IoV situations, both driver-controlled and independent vehicles are considered as exceptionally moving items which as a rule run along the streets. Additionally, the running rates of the vehicles might differ from each other which presents assorted versatility especially for physically driving vehicles.

A. Internet of Vehicles

Be that as it may, the IoVs bring new advances into vehicular organizations and plans to conquer the limits of VANETs. VANETs and IoVs from various angles, featuring the benefits of the IoVs as far as to plan and improvement. To accomplish constant correspondence among vehicles, side-of-the-road units (RSUs) are additionally conveyed. Then, at that point, the issues of traffic security and productivity can be tended to by VANETs at a lower cost. Notwithstanding, because of the commercialization constraints of VANETs gadgets, for example, low unwavering quality of Internet administration, and contrariness with gadgets, the IoVs show up and advance. Contrasted with the VANET, the correspondence design of the IoVs incorporates RSUs, yet in addition other complex and market-situated specialized gadgets. The IoVs center around a lot wiser correspondences among vehicles, side of the road frameworks, individual gadgets, and sensors.

V. ISSUES OF BLOCKCHAIN

Like the vehicle and the web, Blockchain offers the two provokes and freedoms to totally change the world in which we live.
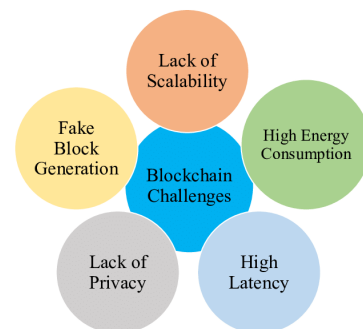

Figure 1 Issues of Blockchain Technology

The figure 1 shows the issues of blockchain and they may predict the six Modules. Following are the six models:

A. Smart contracts

Other than customary monetary exchanges, the idea of keen agreements coded into the exchange has more prompt potential. Envision, somebody consents to purchase 100 gadgets from a provider as long as the swapping scale stays inside a given reach. The actual exchange would realize that and, if the swapping scale dropped out of reach, responsibility for gadgets would return to the provider with no intervention. The openings for smart contracts are practically boundless. Envision if your ERP framework could designate financial plans to divisions where the allotment and spending rules were incorporated into the "cash." Audits or sitting tight for endorsements would at this point don't be important since the portion couldn't be spent inaccurately. Also, a store you paid on an enormous buy would quickly be returned or relinquished forthcoming endorsement or termination of an arrangement with no intervention. As you can see, fabulous freedoms exist to insert business runs straightforwardly into exchanges, so when conditions are met, they can execute themselves.

B. IoT and miniature exchanges

Quite possibly the most astonishing opportunity is the means by which the innovation can be applied to the IoT. Gartner figures that 30.9 billion associated things will be being used worldwide by 2025. Dealing with these gadgets (things) will be extreme: as confirmed as of late by utilizing IoT webcams to make a DDOS botnet. As these gadgets keep on multiplying, brought together administration will turn out to be totally impossible. At its center, overseeing IoT is an issue of scale, something blockchain is acceptable at settling. Blockchain presents an extraordinary arrangement of capacities to permit gadgets to "oversee" themselves. Organizations could distribute guidelines, updates, or setup data on a blockchain, then, at that point, gadgets would independently peruse and check to execute the new instructions. Typically, in business, we talk about B2C or B2B: Business to Consumer or Business to Business kinds of exchanges. With the expansion of independent gadgets, we currently need to see how to deal with Machine-to-Machine exchanges or M2M. Micro exchanges have for quite some time been the Holy Grail of adaptation of the web. Practically all "free" administrations on the web are driven by promoting income, alongside the related security suggestions that accompany gathering individual data.

While miniature exchanges have for some time been considered as a way of empowering "pay more only as costs arise" sorts of administrations, the expense of the exchange commonly offsets the worth of the actual exchange. With M2M exchanges there is no close-to-home data, or even an individual to get ads.

Nonetheless, blockchain, with its much lower (and decentralized) exchange costs, alongside its capacity to package or hold exchanges retained until a base is met, presents numerous chances for a make way forward to adapt IoT, while additionally giving genuinely necessary security and gadget the board.

C. Computerizing Vehicle Maintenance

The vehicles that currently use blockchain innovation incorporate progressed onboard PCs, similar to the EDU (Engine Control Unit). EDU incorporates blunder logs that can be utilized by the help experts to rapidly fix and even analyze vehicles. Upkeep status is followed like a flash, and you don't need to visit the auto mechanics shop to do this. Subsequently, you can even set aside cash since you don't wind up in an undesirable circumstance wherein the vehicle is towed.

D. Independent Vehicles

Many don't have the foggiest idea about this, however blockchain innovation was really significant in the improvement of independent vehicles. This is valid. The autopilot modes permit the vehicle to effectively leave itself or perform different undertakings. The computerized PC of the vehicle can be told to play out various undertakings with the utilization of voice orders. The capacity is conceivable on account of blockchain innovation.

E. Proprietorship Transfer

This is the place where blockchain innovation can make the cycle amazingly straightforward, perhaps eliminating the need to manage specialists. Most extreme straightforwardness is offered, so it is exceptionally easy to handle vehicle proprietorship changes. Likewise, shrewd agreements can be utilized to ensure purchasers and vendors effectively manage the selling system. The way that the broker can be dispensed with is the greatest conceivable benefit of the shrewd agreement, as long as it is feasible to make the exchange lawfully restricting. This isn't yet genuine in light of the absence of laws from around the world, however, changes are occurring.

F. Blockchain and Transportation

One of the principal reasons Connected and automated vehicle (CAV) innovations have not been completely embraced is a basic security concern. Notwithstanding, simultaneously, many would concur that the riskiest and unsteady components of transportation are the human drivers. While not yet awesome, CAVs can possibly make up for the inadequacies of people and completely forestall mishaps. While examining CAVs, there are a few levels to consider: level 0, which has no robotization, level 1, which has specific computerization when required for specific quite certain and segregated capacities, level 2, which has mechanization on account of a few diverse conveying capacities, level 3, which has fundamentally restricted, yet at the same time useful, self-driving capacities that might require some client info, and level 4, which has the total capacity to work and drive without help from anyone else. Eventually, it is normal and wanted that level 4 CAVs will be grown, at the same time, up to that point, the attention has been on upgrading the abilities of past levels, except for level 0. Regardless of a general decrease in mishaps, there have still been many noted driving disappointments including CAVs.

However large numbers of the elements that cause such imperfections and expected spaces of progress are notable, strategies that diagram how arrangements can be carried out may not be as clear. A few instances of all around concentrated on issues in CAV innovation are guaranteeing

the capacities to both keep up with and secure specific information, as a physical and geographic area of vehicles, permit adequate activity space for vehicles and control traffic stream, permitting and getting correspondence among vehicles and each other just as other organization associated gadgets, giving impact cautioning and avoidance methods, giving protection from assaults from malignant elements and defective programming or equipment, and offering protected and solid accessibility of updates when required. The prospects that are opened by CAV innovation are too tremendous to be in any way overlooked, with wide applications to different fields to further develop activity and client accommodation. As noted, CAV innovation fits use in transport-based monetary exchanges, similar to public transportation frameworks.

Utilizing new innovations, for example, blockchain, the Internet of things, man-made reasoning, many organizations are creating digital actual frameworks that change the serious climate. The essential job of coordination and transport administrations is to make monetary, ecological, and social qualities. Blockchain innovation in the future could change inventory network activities. With the developing armada of associated vehicles and the dramatic extension of the market for online taxi booking administrations, the requirement for a protected, continuous and solid trade of data between vehicles of auto organizations is developing. This analyzed an illustration of the use of IoV and proposed a security system for the foundation of administrations of associated independent vehicles utilizing blockchain innovation, which takes into consideration secrecy and straightforwardness among clients and cabbies, by following and recording in the blockchain each activity of items comparative with vehicles or IoT gadgets.

The quick development of Internet Vehicles (IoV) has prompted gigantic challenges in the capacity of a lot of information, the clever administration and insurance of data for the whole framework, particularly while reacting in ongoing. Since blockchain is a successful innovation for decentralized dispersed stockpiling and security the executives enjoy currently showed extraordinary benefits, Blockchain innovation can further be extended for use in transport organizations, particularly thinking about conveyed and secure capacity of large information. The creators performed hypothetical demonstrating and execution investigation of vehicle network frameworks, because of which this article might be utilized as an aide for reading blockchain innovations for IoV. As interest in electric vehicles is developing, the creators of logical investigations commit their work to utilize blockchain in charging frameworks.

To test the adequacy of the proposed arrangement, the creators contrast it and existing ones demonstrate that examination identified with Electric Vehicles (EV) is chiefly centered around equipment, for example, the battery charging strategy, and there is as yet insufficient programming research, like a charging framework, that should be created. The creators propose a wise agreement blockchain for the safe charging of electric vehicles. Initially, we consider a blockchain framework coordinated with EV and CS (charging framework) Furthermore, a calculation is introduced to accomplish agreement for the effective trade of

energy in the blockchain. Thirdly, many terms of the agreement are investigated to fulfill the singular energy utilization inclinations of electric vehicles and augment the utility of administrators. The use of electric vehicle charging framework, by utilizing a model based on blockchain innovation while charging electric vehicles. The paper shows the idea of a model where utilizing chains of squares it is feasible to ascertain the deal and buy of power in the charger. This innovation can permit fractional or full decentralization of the interaction, full robotization without including halfway gadgets. Such tasks can be done naturally also, without management, which permits the utilization of recently settled standards, rules, and presumptions in view of keen agreements. The utilization of blockchain innovation for displaying the power metering framework during the charging measure, just as the chance of partaking in the market of foundation under development, goes past the monetary utilization of the innovation. Viewpoints for which the blockchain can turn into a factor in changing plans of action that are, most importantly, more productive and secure applications, disposal of pointless mediators, or various advancements. The joint vehicle use by travelers diminishes travel time, fossil fuel byproducts, and blockage. In any case, since travelers regularly search for drivers through a cloud server, this prompts superfluous correspondence overhead and an increment accordingly inertness. The coming of hazy figuring for nearby handling of information with low idleness has caused security and privacy issues since when clients share it, individual data of clients can be unveiled. The creators accept that the consortium blockchain could give a potential arrangement if the diverse transporter organizations cooperate to serve clients, and client protection just as organization secrecy will likewise be considered here.

VI. Utilization of Blockchain in Collective Decision

Prior to their full organization, independent vehicles should have both individual and bunch tasks that are guaranteed to be secure. All things considered, most of the mishaps that happen require more than one party, so there should be a way of taking into consideration independent vehicles to choose what moves to make with different gatherings in nearness to stay away from mishaps. While numerous arrangements have been represented, all with their benefits and disadvantages, blockchain has been applied rather broadly around here through an assortment of utilizations, featuring its capacity to permit the protected and reliable activity of an assortment of related gatherings inside a gathering. There are very few techniques for guaranteeing all-around planned, got correspondence between particular gadgets working together, as referenced already.

Numerous analysts have noticed that while gadgets might work satisfactorily while working alone, the fusing of the bunch is a substantially more troublesome theme, as a lot of the principles hidden in their activity depending on human signs that are not promptly perceived by machines. As a potential answer for such gathering-based activity issues, blockchain has arisen and been utilized in like manner bunch-based activities to test its capacity to oversee such associations. For instance, an investigation that joined its utilization into a Public Goods game showed that its utilization of Smart Agreements permitted working elements

to comprehend and pursue open doors that yielded better outcomes. Under various standard sets, this intelligent activity could be applied to vehicle frameworks too, permitting them to stay away from crashes and work ideally on the street, getting the security of all gathering elements and their travelers. Agreeable dynamic is crucial for a wide range of frameworks, including swarm advanced mechanics, in which blockchain has as of now been very effectively applied.

The solid and predictable control of these independent gadgets was one of the principal highlights holding it back, yet, with the utilization of blockchain innovation in the field, a significant number of the hidden issues were defeated due to a great extent to the security, adaptability, and adaptability of blockchain, just as its low asset use when utilizing its calculation. Through an examination carrying out it into the dynamic measure, it was displayed to dominate around here, taking into consideration various gatherings in the multitude to impart consistently, and in this way abstain from impacting and permit work in a canny way. Essentially, this utilization of blockchain to support collaboration inside a framework is kept up with my studies. Beginning by illustrating the historical backdrop of blockchain, today's more normal uses, and its anticipated development, their paper examines the potential effect it will have on other gathering-focused applications. Through past employments of blockchain, it is clear that, as it keeps on being executed into such issues, it will enormously add to elements' capacity to impart rapidly and safely over an organization, settling on it a promising decision in ongoing investigations in regards to AV bunch activity. This assumption is because of its qualities in permitting swarm-based applications to flourish, notwithstanding it reliably giving clients anticipated security and protection needs. Figure 2 shows a blockchain provides a secured paradigm to achieve consensus using a distributed and peer-to-peer network in which no trusted central party is required. As a result, it has the potential to resolve many challenges that are faced with current centralized controllers in globally distributed applications.
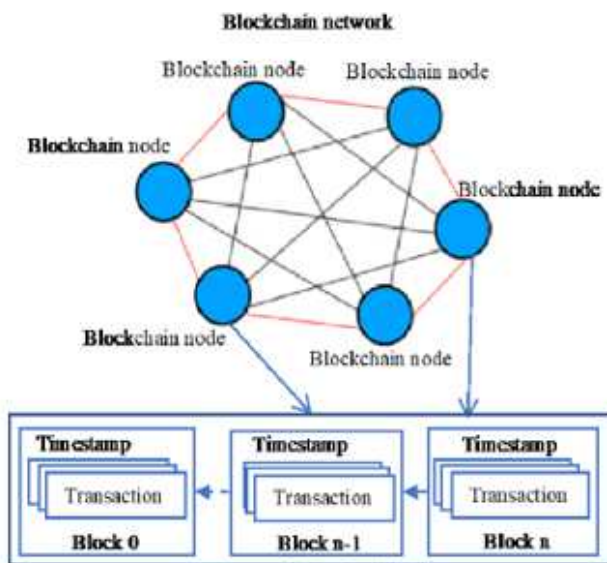

Fig. 2: Blockchain Databases

Blockchain, by its actual nature, fits use in guaranteeing the participation of independent substances, as underscored by analysts. Their review, which started with the objective of tracking down a proficient, versatile, and viable way of permitting the control of enormous gatherings of mechanical substances, come to the end result that blockchain would fill in as a powerful implies. This end was reached because of the known advantages blockchain has above comparative strategies in protection, security, and decentralized organization consolidation. Through its joining, it is sensible to expect that its fuse may likewise acquire such advantages into AVs, which would be a critical stage forward towards their wide-scale execution and acknowledgment.

VII. Future Directions

Blockchain advancement contributes many advantages to coordinate designing like flexibility, security, and customer prosperity which results in vivaciously being considered for future applications in CAVs structures. From its start, blockchain advancement was arranged thinking about a couple of key parts: got and stayed aware of trades, the usage of a decentralized association, and customer data security, which could all be incredibly helpful to future CAVs improvement in a collection of ways. CAVs systems may not adequately guarantee against threatening customer impedance, inciting different accidents that may bring about the loss of life. Thusly, it really saves work to absolutely acknowledge the CAVs development by open organizations, similar to planners, humankind's analysts, legitimate scholarly individuals, social specialists, additionally, moral philosophers. We need to push ahead to intertwine novel developments, for instance, blockchain, to decrease these concerns, as shown through tests, outlines, moreover, extended expert interest in the idea. For the reasons that are inspected above, the normal associations among blockchain and CAVs development ought to be focused on further progress further improvement in the two fields. By using a reliable, trusted in development to fill in as a spine for future CAVs structures, specialists could be all the more sure in the prosperity and security of their things, as could customers.

VIII. Conclusion

People have experienced some beautiful wonderful utilization of blockchain innovation and can say with conviction that numerous parts of the auto business are going to change. Be that as it may, trendsetters are truly just barely starting to start to expose blockchain applications in the auto area, so we're currently toward the start of a lengthy, difficult experience of interruptions. Currently, we have only discovered a drop in the ocean when it comes to technologies like blockchain. Still, we have seen remarkable applications of blockchain technology well within the automotive industry. It does lead to a future that is safer as well as simple for the end-user in the car market.

With initiatives like MOBI, more and more manufacturers will join the blockchain revolution and streamline their data using this advanced tech. Although there may be some doubters along the road, blockchain ensures a tamper-free and transparent data-sharing process that will be of utmost value to automakers in the near future. Thus, while the possibilities seem endless, technology is still very much at an early phase of development when it comes to cars. With the difference in related vehicles into the Internet of Vehicles

(IoV), presently is the ideal chance prepared for preparing for the exceptional period of related vehicles with novel applications and inventive security endeavors. The related vehicles are experiencing prenominal improvement in the car business, yet are at this point studded with various security and assurance shortcomings. The present IoV applications are fundamental for computerized genuine correspondence structures that accumulate accommodating information from a huge number of canny sensors related to the related vehicles. The advancement movement has arranged for related vehicles to split basic information between drivers, carmakers, mishap inclusion associations, and practical and upkeep expert communities for various applications.

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