Analysis and Application of Vehicular Ad hoc Network as Intelligent Transportation System

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Abstract Intelligent transportation systems (ITSs) play a major role to manage traffic in cities. This is used to keep control and manage traffic and re-route traffic based on different parameters which has been discussed in this paper in a detailed manner. Vehicular ad hoc network is one way of implementation of ITS and mostly used setting to manage traffic and progressing quickly with time. Individuals are doing research these days for the most part in the field of media transmission. VANET is the most developing exploration region in remote correspondence. Most VANET applications are based upon the information push correspondence model, where data is scattered to a lot of vehicles. The decent variety of the VANET applications and their potential correspondence conventions needs a precise writing review. In perspective on previously mentioned, in this paper, we have contemplated and examined the attributes and difficulties of different research works identified with the applications, conventions and security in VANET. In addition to the subsequent current works, this paper is concerned about to explore different issues related to VANET. The conceivable work found the advantages and disadvantages for the future research. At last, an unthinkable examination of the considerable number of conventions is given.

Keywords Intelligent transportation system · VANET · Convolutional neural network (CNN)

1 Introduction

An intelligent transportation system (ITS) is an innovative system which plays a major role to manage transportation using innovative services and facilitate safe, smarter and better coordination among users. Vehicular ad hoc network (VANET) is a mostly used and successful ITS setting which is adopted by most of the country to

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manage traffic. VANET uses different settings to communicate such as the vehicle to vehicle and road-side unit (RSU) to automobile in a short range. The main aim of deploying VANET is to overcome the accident issues. It has a large variety of application for drivers to drive well on the roads in the urban region. The rate of accidents is increased day by day by increasing the population of vehicles as well; therefore, it is vital for the vehicles to impart the VANET system. Vehicular specially appointed systems have invigorated enthusiasm for both scholastic and industry settings in light of the fact that, once sent, they would carry another driving experience to drivers. The security and protection is a genuine test where one node communicates with another node in open environment and influence the message passing in VANETs. This paper starts with providing summaries of the existing research works and later on classifying gaps identified in the pre-existing works. On the other hand, privacy safeguarding strategies are checked on, and the exchange off among security and protection is talked about. This paper concerned a point of view toward how to recognize and repudiate malevolent hubs all the more productively and difficulties that have yet been unrevealed. The benefits of such a system extend on operations, management, planning and monitoring.

Management strategies for traffic incidents have become a promising area of research because it has pronounced prospective to mend automobile and road security and transportation efficiency. Recent research works have put great emphasis on VANETs. Also, we have seen different technologies like fog computing and crowdsensing in social Internet of vehicles to provide a timely response for device-to-device-enabled real-time traffic management. At long last, we present a portion of the exploration challenges that still should be tended to for across the board selection of adaptable, dependable, hearty and secure car crash the executive's models, conventions, advancements and services.

The complete paper is further divided into different sections. Section 2 covers a detailed review of intelligent Transport Systems. The comparative study is laid down in Sect. 3. The research challenges are explained in Sect. 4. Section 5 is conclusive section.

2 Related Works

Al-Mayouf et al. [1] presented an accident management system utilizing specially appointed vehicle systems combined with open transport cell innovation. All ambulances and vehicles were accepted to have an installed route instrument and the capacity to utilize remote correspondence. In this framework, a multi-hop ideal sending calculation was utilized by the continuous course intending to diminish traffic blockage. The outcome presumed that this framework gave the best course among source and goal.

Wu et al. [2] proposed a vehicle-to-roadside (V2R) arrangement based distributed clustering which is accomplished by conditional game. Here, the author uses matrices-based fuzzy algorithm to generate a cluster of vehicles. A virtualization

plot for multi-bounce information conveyance was incorporated with the steering convention to guarantee high throughput and low postponement in multi-jump misfortune vehicular conditions.

Bichiou and Rakha [3] propose a optimal solution for the possible situation faced by moving Vehicle. The proposed calculation beats the other convergence control techniques by creating lower the fuel consumption and decrease in carbon dioxide emission.

Ke et al. [4] proposed a financially savvy strategy for the discovery of traffic state status and accomplished exact identification of moving articles in a dynamic video with convolutional neural system classifier. The test results demonstrated that the proposed strategy beats other cutting-edge strategies regarding exactness.

Liu et al. [5] proposed two intelligent transportation regulator using fog computing which conspires by expecting the traffic lights as haze gadgets that can oppose the assaults from malevolent vehicles and can keep away from the issue of single-point disappointment in vehicular system. They utilized cryptography-based security algorithm to control the vehicle fraudulent messages and to protect traffic light. The exploratory outcomes demonstrated that the proposed technique beats other cutting-edge strategies regarding accuracy.

Rausch et al. [6] proposed a self-composed traffic management technique to regulate traffic inflow in already congested road. It manages the inflow of vehicles by changing traffic lights to bypass blocked regions by updating the driver's course decision. In this way, they inspected four unmistakable episode situations in a lattice and genuine size street organize and thought about automated traffic light controls.

Wang et al. [7] give an outline of a few promising exploration territories for a crowdsensing-based structure to give an auspicious reaction to gadget to gadget empowered ongoing traffic board in varied SIoV. The member vehicles dependent on D2D interchanges coordinate direction and topology data to powerfully manage their social practices as indicated by system conditions. A genuine taxi direction examination-based execution assessment was given to show the viability of the planned structure.

An et al. [8] proposed a vigorous and productive system parceling calculation which can instinctively settle on the quantity of segments dependent on the system availability and traffic blockage designs. The proposed methodology is tried on the local arranging system of the USA. Numerical investigation on lambda decision and calculation affectability with respect to various information missing proportions was likewise performed and expounded.

Hussain et al. [9] foreseen dependable, effective, strong and safe shrewd transportation frameworks (ITS) by the coordination of VANET-based mists with Named Data Networking (NDN) as a result of the constraints and weaknesses of the current IP-based systems' administration and the requirement for productive substance conveyance. They went for the design and succinct naming instrument for NDN-VC.

Huang et al. [10] proposed a plan named meet-cloud dependent on meet-table (records the vehicles it experiences) and distributed computing to safely and precisely

disperse negative messages (snippets of data that characterize the negative characteristics of vehicles) in VANET. The calculation for disseminating and redistributing negative messages was structured.

Manuar et al. [11] presents the idea of UAVs that can be helpful to implement transportation rules and also support traffic police, which can be enabled with DSRC interface. There were also some limitations like low battery life. For future purpose, fuel cells can be used to increase the efficiency of the UAVs.

Allan de Souza et al. [12] have introduced their vision on improving the traffic productivity. Here, traffic management system (TMS) accumulates data from heterogeneous sources which enhance the effectiveness of TMS. The TMS control traffic is based on three activities: data gathering, data procedure and administration conveyance. This helped in improving the efficiency of TMS and achieving the desired level of accuracy in TMS.

Gnoni and Saleh [13] give key thoughts and refreshed survey of NMS. It proposes fundamental well-being standards received in chance administration. The principle point of NMS is to distinguish the best method to beat the close to miss creating component. The aftereffect of NMS is that close to miss information can be translated considering well-being standards violated. At last, it was reasoned that NMS is one of the mainstays of execution of top to bottom perceptibility, and in the future, it will use various sources that will integrate data to improve the efficiency.

Osman et al. [14] described a smart transportation regulatory system which takes 12 min to ample one cycle and also reduces waiting time of a vehicle.

Daely et al. [15] designed a central Web server interface which receives data from LED streetlights and easy to use for all the users. This streetlight creates a psychological effect which increases the alertness in the user.

Raiyn [16] introduced a new scheme of traffic management (SUA) which has three unique stages: find the most suitable way, refresh it to automobile and allocate it to vehicle.

Thomas and Vidal [17] focused on machine learning technique to detect traffic accidents by collecting available data from sources. The result concluded that the amount of traffic affects the precision of machine learning. The future will concentrate on improving the data-collecting ability while using real-world data.

Uchida et.al [18]. introduced Markov chain algorithm based-traffic accident prevention system which identifies the dangerous conditions based on radio signals and wireless signals from multiple sensors of mobile devices. The future study of this paper includes additional decision progress based on the Markov chain model.

Maaloul et.al [19]. proposed a novel vision-based street mishap calculation in thruways and turnpikes, and it depends on versatile traffic movement stream demonstrating procedure utilizing measurement heuristic technique for mishap discovery. The methodology depended on OF estimation and heuristic calculation for versatile limits. After experimentation, the productivity and common sense of the proposed calculation was by utilizing just 240 casings for traffic movement demonstrating.

Christian et al. [20]. proposed intelligent driving diagnosis using accident risk map analysis. Experimental tests have also been done for intelligent driving systems. The first test confirms the associate execution, while the subsequent test depends on

approving the client execution when the right hand is utilized and not utilized; both the tests are performed to decide the productivity of driving collaborator. The outcome presumed that the proposed framework demonstrated better execution than 90% of right alarms on every street, and also, the accidents along the road decreased by an average of 10%.

Qi et al. [21] presented emergency warning light strategies. A traffic light control system is used (deterministic and stochastic PNs) for the intersection dealing with accidents. Petri nets-based dynamic model is used to indicate the blockage of traffic flows. The traffic cannot just be controlled yet additionally thusly control different offices including loop detectors and cautioning lights. Their work will help in management of real-time traffic accidents at urban roads.

Wang et al. [22] presented radio frequency identification (RFID) sensor, Neverstop, which uses fuzzy control strategies and hereditary calculations in enormous information insightful transportation framework. Neverstop is built with devices that will automatically control traffic lights at intersections. It helps to reduce the waiting time.

de Souza et al. [23] introduced ICARUS an alarming and re-steering framework which aides in diminishing the blockage of vehicles utilizing a vehicular system. It receives notification about congestion of vehicles; then, it calculates new routes by using inter-vehicle communication. The result demonstrated that the proposed solution will reduce CO emissions, fuel consumption and travel time.

Liu et al. [24] presented many technologies that have potential to alleviate traffic congestion like 5G wireless networks, SDN VANETs and MEC cloud server. Software Defining Network (SDN) technologies can give high-data transmission and low inactivity correspondence benefits alongside programmability. Mobile Edge Computing (MEC) cloud server gives a constant or close to ongoing reaction speed for basic missions. Deep learning-based forecast calculations with elite figuring power and ultra-huge extra room are provided by RCCS technology.The result demonstrated that these technologies will help in decreasing traffic congestion and will help in improving the ability to manage urban traffic.

Chaolong et al. [25] presented real-time graphic visualization technique that helps to enhance the usefulness and precision of graphical analysis of huge traffic data, improving the human–computer interaction. It will collect real-time data and process through traffic monitoring system and provide graphs on road congestion to traffic control department for dealing with accidents.

de Souza and Villas [26] proposed a traffic management system (TMS) to enhance efficacy of transportation and reduce traffic congestion problems. This system will gather traffic-related data, recognize jamming and will recommend substitute paths. They also introduce FASTER, a fully distributed TMS that does not overload the communication channel and improve overall vehicle traffic efficiency.

Li and Song [27] proposed ART scheme for vehicular ad hoc network (VANET) which is capable to discover and handle the malicious attack. It evaluates trustworthiness of both mobile nodes and data in VANETs.

Sundar et al. [28] presents an intelligent traffic management system to smoothen the traffic for emergency services. In this system, the vehicles are deployed with

RFID tags and these tags are used to route the vehicle. The same tag information is used to identify the vehicles. Based on these RFID, the traffic light goes to green or red, so the traffic officer can move.

El Mouna Zhioua et al. [29] presented a unique calculation dependent on fluffy rationale for portal determination. This new approach uses standardized methodology which uses the CH as a default passage. Two bunching and CH choice calculations are considered, and re-enactment outcomes indicate that convention achieves superior and brings about terms of postponement and bundle misfortune than the deterministic methodology for the two calculations. Also, recreations show that an efficient CH political race calculation is essential to guarantee great exhibitions; with C-DRIVE, there is higher parcel misfortune midpoints saw than with center calculation.

Wang et al. [30] built up a half breed VANET-upgraded constant way making arrangements for vehicles to maintain a strategic distance from blockage in an ITS. We first propose a crossover VANET-upgraded ITS casing work with functionalities of constant traffic data assortment, including both V2V and V2R correspondence sin VANETs and cell interchanges in open transportation framework. At that point, an all-around ideal constant way arranging calculation is intended to improve generally spatial usage and diminish normal vehicle travel cost by methods for Lyapunov streamlining.

Lv et al. [31] proposed a novel approach with a SAE prototypical for traffic flow. The anticipated strategy can effectively find the dormant traffic flow highlight portrayal, for example, the nonlinear spatial and worldly relationships from the traffic information and applied the avaricious layer savvy solo learning calculation to retrain the profound system, and afterward, the fine-tuning procedure is used to refresh the prototype constraints to improve the forecast exhibition. The given technique is better than the contemporary strategies.

Pillay et al. [32] exhibited a hypothetical structure that deals with mishap causation and security. The twenty articles looked into recommend that, in the high risk ventures, for example, development, mining and human services, some level of advances is being made in understanding the causation of mishaps and how they could be avoided. There is additionally some proof that a portion of the methodologies being used is intelligent of the advancing idea of securing the board over various periods. It is recognized the hypothetical structure has been applied to an exceptionally modest number of papers, and further work is required to test its adequacy.

Cheng et al. [33] proposed and actualized a PSO approach for the two-path position issue for half and half VANET-sensor systems. An ILP model for the two-path issue is set up first. At that point, a Center PSO approach for the issue is proposed, and a hypothetical examination for the Center PSO is inferred. Vehicular specially appointed systems (VANETs) help improve traffic well-being and reduce traffic clog.

Yu et al. [34] describes direct conventions of VANET for storing, sharing and searching data. Three classifications such as unicast, geo-cast and communicate have been used here, acknowledged both innovative and financial difficulties in acquiring genuine world testbeds. This incorporates the customary VANET as well as a much sizable and heterogeneous system structure.

Feteiha et al. [35] proposed advanced vehicular relaying technique to enhance connectivity in crowded areas. This paper contributes by reducing error rate expression, diversity gain and outage expressions, and to benchmark to assess our analysis.

3 Comparative Analysis

Table 1 shows the detailed comparative analysis of different techniques with pros and cons.

4 Research Challenges

- Accumulation of data for preparing a dataset to support VANETs [1].
- Optimize performance of the cluster-based algorithm for dynamic VANETs [2].
- Lower delays when contrasted with other convergence control methodologies [3].
- CNN for legitimately start to finish discovery of the diverse traffic objects from the street can be improved.
- Quantitative assessment of the performance of the self-healing strategy is required.
- Challenges.
- Deep analysis of network model.
- Specific metrics for data trust evaluation.
- Flexible network infrastructure.
- Future explore is expected to align such an edge by thinking about the system homogeneity and usage contemplations concerning various leveled traffic organize control.
- Content replication and scalability.
- To decrease data transfer capacity and capacity necessities of the cloud administration and to move the processing prerequisites from cloud to the edge.
- Has very low efficiency which causes reduction in flight time.
- Complex integration of data, big data management issues and also hard to show alternative route guidance.
- The system does not know how to avoid overloading of data.
- It uses predefined thresholds and also works on single server.
- Only the big data issues are there.
- The proposed system requires complex and wide information.
- Data refining is not there.
- The decision process is not very good.
- This system can investigate the motor vehicles up to 3.5 tons only.
- The intelligent driving assistant requires more improvement.
- System has very low coverage which led to high delay.
- To reduce high cost and increase the coverage of system.

Table 1 Detailed comparative analysis

Citation	System/method	Technique	Merits	Demerits
Al-Mayouf et al. [1]	Vehicular ad hoc network	Multi-hop reliable transmission algorithm based on optimal selection and forwarding in wireless sensor network (WSN)	• Manage accidents makes real-time communication between vehicles • Enables ambulances to avoid congested road segments	• Server overload can happen due to the chaotic behavior of traffic • Lack of data availability
Wu et al. [2]	Coalitional game theory-based protocol	Multi-hop data delivery, fuzzy logic algorithm and Q-learning algorithm (a reinforcement learning approach)	• Improved the MAC layer contention efficiency for V2R communications • Better performance evaluation of multi-hop routes by employing reinforcement learning	• Performance issues due to vehicle movement, route span, wireless link quality for route selection and cluster maintenance overhead
Bichiou and Rakha [3]	Intersection management solution founded from optimal control theory	Intersection control strategy	• Lower delays • Reduced carbon dioxide emission	• The high computational cost associated with finding the optimum solution • Impractical for real-time implementation
Ke et al. [4]	Traffic congestion detection utilizing fusion of visual highlights and CNN	Convolutional neural network	• Foreground objects detection • Multidimensional congestion detection	• Learning rate of the model is slow • Average computational time is high resulting in the processing of low frames per second
Liu et al. [5]	Canny traffic light control in VANET utilizing mist figuring	VANET and fog computing	• VANET and system architecture • Secure and fog device friendly	–

(continued)

Table 1 (continued)

Citation	System/method	Technique	Merits	Demerits
Rausch et al. [6]	Self-organized traffic management strategy	Event-oriented route choice (orienteering)	• Purely decentralized • Exhibits self-organized nature • Reduces the impact of incidents • Scales immediately and tackles the disruption at exact time and location	• It does unequivocally not target streamlining traffic stream conveyance in the upset system • Queue length estimation on every road segment is a critical issue
Wang et al. [7]	Mobile crowdsensing in SIoV	Intelligent transportation system (ITS), Social Internet of Vehicles (SIoV)	• Provides opportune reaction in heterogeneous SIoV for traffic management • Makes a reasonable situational choice between traffic stacks in cell systems and transmission delay brought about by roadside units transferring	• Transmission delay brought about by the separation in a geological directing plan should be additionally researched • Building a precise model by extricating system parameters from genuine world datasets is important
An et al. [8]	Network partitioning algorithm	Macroscopic fundamental diagram	• It does not require a pre-characterized number of sub-networks as a displaying input	• Future look into is expected to adjust such a limit by thinking about the system homogeneity and usage contemplations with respect to progressive traffic organize control

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Table 1 (continued)

Citation	System/method	Technique	Merits	Demerits
Hussain et al. [9]	Named data networking	VANET-based clouds with NDN	• Greatly improves the entire philosophy of future associated vehicles • Concise naming mechanism for communicating nodes	• Scalability • Unpredictable availability of content for replication • Lack of multiple interfaces for connectivity • Federated mobility
Huang et al. [10]	Negative message	VANET and cloud computing	• Accomplishes great inclusion rate and great precise inclusion rate • Secure and works appropriately beneath a few assaults	• High cloud bandwidth cost • Large storage requirements
Manuar et al. [11]	UAV-enabled systems using ITS	ITS technologies used with latest research and also used DSRC interface	• Enforces traffic rules • Supports traffic police	• Low efficiency • Limited flight time
de Souza et al. [12]	Traffic management systems	Gathers information from heterogeneous sources	• More accuracy • Good efficiency	• Heterogeneous data integration • Big data issues • Alternative route guidance
Gnoni and Saleh [13]	Near miss management systems	Near miss data can be interpreted by safety principles	• Works on many safety principles • NMS is one of the pillars of implementation	• Does not know how to avoid information overload
Osman et al. [14]	Computer vision	By the help of computer vision can detect which road needs to be cleared	• Low processing cost • Reduces waiting time	• Runs on a single server • Uses predefined thresholds

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Table 1 (continued)

Citation	System/method	Technique	Merits	Demerits
Daely et al. [15]	LED streetlight using Web-based system	Zigbee-based system	• Provides flexible interface • LEDs decrease rate of accident	• Big data management issues could be there
Raiyn [16]	Using the SUA approach	Has three different phases for allocating the road to the vehicle	• Reduces processing time • Have features like autonomy and negotiation	• Requires system-wide information which is very complex
Thomas and Vidal [17]	Using GPS location	Machine learning can detect traffic accidents	• Collects data via machine learning	• Does not refine the data
Uchida et.al [18]	Using Markov chain algorithm	Mobile chain algorithm senses the dangerous conditions	• Efficiently identifies dangerous conditions	• Poor decision process
Maaloul et.al [19]	Adaptive video-based algorithm	Vision-based approach for adaptive threshold	• Higher efficiency	• It can only investigate motor up to 3.5 tons
Christian et.al [20]	Risk map analysis	Intelligent driving systems for safe driving	• Showed correct alerts on each road	• There could be improvement in intelligent driving assistant
Qi et al. [21]	Petri nets-based traffic light control system	• Deadlock recovery and live-lock prevention and conflict resolution strategies are developed • ITS technology	• Designed a crisis traffic light control framework for crossing points furnishing crisis reaction to manage mishaps • Decreases fuel utilization, mishap term, optional mishaps and roads turned parking lots	• High cost

(continued)

Table 1 (continued)

Citation	System/method	Technique	Merits	Demerits
Wang et al. [22]	Uses genetic algorithms and fuzzy control method	• RFID sensor helps in big data intelligent transportation system	• Controls the traffic lights at intersection automatically • Helps in reducing the average waiting time for vehicles	• The impediment depends on a functioning system between focal servers and every terminal gadget • If association is lost, Neverstop could lose a few capacities that rely upon organize running condition
de souza et al. [23]	Improvement of traffic condition through an alerting and re-routing system	• It will use inter-vehicle communications	• Reduces travel time, fuel consumption, CO emissions of vehicles • Reduces broadcast storm problem	• Low coverage • High delay
Liu et al. [24]	SDN-based heterogeneous network and 5G network technology	• Data collection • High definition cameras and high-performance sensors • Deep learning-based prediction algorithms	• Decreases traffic congestion • Improves ability to manage urban traffic • Shortens rescue time	• High cloud bandwidth cost
Chaolong et al. [25]	Real-time graphic visualization technology	• Networking front-end data acquisition • Video surveillance	• Reduces the deaths of malignant traffic accident • Reduces the accident rate • Decrease traffic congestion	• Low coverage • High cost
de Souza and Villas [26]	Faster	• Gather traffic-related data in central entity	• Improves traffic efficiency • Improves traffic congestion • Does not overload communication channel	• High cost • Network issues

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Table 1 (continued)

Citation	System/method	Technique	Merits	Demerits
Li and Song [27]	Attack-resistant trust management scheme	• VANETs	• Detects malicious attack • Evaluates the trustworthiness of data as well as nodes in VANETs	• Some RFID systems will only work within the range inches or centimeters
Sundar et al. [28]	Chip mechanism at safe place	• Chip makes it available to traffic controller to know about the traffic and ambulance location	• Designed to make way for ambulance to go quickly • Helps in finding the stolen vehicles	• The CH probably will not be the ideal portal to the framework
El Mouna Zhioua et al. [29]	Ad hoc networks	• Uses algorithms and fuzzy control method and intelligent transportation	• Provides information to drivers and prevents accidents	• Individual way arranging may prompt new clog whenever performed clumsily • The start to finish transmission delay cannot be disregarded in certain situations
Wang et al. [30]	A hybrid-VANET-upgraded ITS	• Utilizes both vehicular specially appointed systems (VANETs) and cell frameworks of the open transportation system	• Collected ongoing traffic data can be used for turnpike traffic flow management	• Shallow traffic models are still to some degree uninspiring
Lv et al. [31]	A stacked autoencoder model	• The proposed technique for traffic flow forecast has predominant performance	• Deep learning calculations can speak to traffic highlights without earlier knowledge	• With socio-specialized systems being used as the fundamental methodology

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Table 1 (continued)

Citation	System/method	Technique	Merits	Demerits
Pillay et al. [32]	Rules and guidelines suggestive of the mechanical age	• Safety management initiatives were dependent on behavior-based safety and human mistakes management controls	• Strategies being used are intelligent of the developing idea of well-being executives over the distinctive eras	• Need to consider moving vehicles and a general complex management system
Cheng et al. [33]	Vehicular ad hoc networks	• Vehicular ad hoc network (VANET) originated from mobile ad hoc network (MANET)	• Developed applications, steering conventions and recreation instruments • This gives a point by point depiction of the existing conventions in VANET	• The individual lumps are not expected to remain reserved in the system for exceptionally long on the grounds that the in-organize capacity size might be restricted
Yu et al. [34]	Hierarchical bloom-filter routing (HBFR), to handle mobility	• VANET will give different administrations, for example, correspondence, stockpiling, and figuring for a scope of utilizations from safe route	• The proactive substance steering may decrease the measure of traffic if the notice overhead is minimized • This causes execution debasement as far as expanded mistake likelihood	• This causes performance degradation in terms of increased error probability
Feteiha et al. [35]	Cooperative RVC-Net	• Cooperative RVC-Net as fundamental part of the Long-Term Evolution-Advanced (LTE-A); LTE	• Devising a powerful precoding transmission conspire and a hand-off choice strategy that significantly increments decent variety gains and decreases blunder rates	–

- To reduce network issues and the cost of system.
- Need to develop error-prone transmission media and system to increase security of VANETs.

5 Conclusion

Intelligent transportation systems (ITS) are innovative idea to enhance safe communication and coordination among users using ICT smart services. The vehicular ad hoc networks (VANETs) are the most upcoming remote arrange condition under intelligent transportation systems (ITSs) and are progressing quickly with time. The decent variety of the VANET applications and their potential correspondence conventions needs a precise writing review. In perspective on previously mentioned, in this paper, we have contemplated and examined the attributes and difficulties of different research works identified with the applications, conventions and security in VANET. In addition, subsequent to checking on the current works, we have discussed them, feature multilayer difficulties concerning the exhibition of the VANETs, the as of now proposed arrangements, and the conceivable future work found the advantages and disadvantages for the future research. At last, an unthinkable examination of the considerable number of conventions is given. In this paper, we have laid down summaries of latest research works in recent years and later on classifying gaps identified in the pre-existing works that challenge the existing technologies. In the future, we will use this literature to identify research problem in same domain.

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