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"IMPROVEMENT IN QUALITY OF SERVICES FOR COMMUNICATION IN VEHICULAR AD-HOC NETWORK"

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ABSTRACT

VANET refers to a network created in an ad-hoc manner where different moving vehicles and other connecting devices come in contact over a wireless medium and exchange useful information to one another. A small network is created at the same moment with the vehicles and other devices behaving as nodes in the network. Whatever information the nodes possess is transferred to all other nodes. Similarly, all the nodes after transferring their set of data receive the data being transmitted by other nodes. In this paper we used the network simulator tool for the simulation of the proposed methods, which is supports Linux operating system, here we also used some other tools like simulation for urban mobility for the vehicle node simulation and also used the network animator for the vehicle positioning in the network. After the successful implementation of the vehicle node, we count or measure the performance of our proposed work compare with the existing work, here the performance of the network is measured with some parameters like hello message generation, neighbor error rate and, packet delivery ratio.

Key Words: *Intelligent transportation system, Vehicular ad-hoc network, Quality of services, Routing protocol, Vehicle node.*

I. INTRODUCTION

Vehicular Ad Hoc Networks (VANETs) is a subclass of Mobile Ad Hoc Networks (MANETs) and the general characteristics of VANETs are typically inherited from MANETs in terms of lack of infrastructure, self-management and shared transmission media. However, VANETs exhibit plenty of unique characteristics and operate in a challenging communications environment, which create diverse considerable challenges to develop efficient vehicular communication protocols. For instance, the high speed of the vehicles and the large scale of the network lead to dynamic topology. Consequently, the rapid and continuous changing topology causes frequent disconnections of the communication links, which results in an increased overhead of the communication protocols. From another perspective, the future movements of the vehicles in VANETs are predictable due to the constraints of urban layout, road geometry, and traffic conditions. Hence, accurate prediction of the vehicles future movements could play a crucial role for both building efficient vehicular communication protocols and enhancing the vehicular transportation systems. Predicting the vehicles future movements is defined as the estimation of their future locations, trajectories and the time required reaching their destinations, which requires precise analysis of their mobility characteristics [5].

The life of VANET lies in the communication that takes place between different vehicles. The data being gathered and exchanged by the vehicles requires some protocols or rules through which transmission can take place in a systematic and organized way. The data exchange between nodes in a VANET happens via routing protocols. These protocols

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define how a packet of data will be distributed among different nodes [17].

A route between source and destination is composed of several consecutive communication links between intermediate vehicles. Due to the highly dynamic nature of VANETs, existing communication links are repeatedly broken and new links are repeatedly established. A fundamental aim of the routing protocols is to select the most stable routes in order to increase the overall performance of the network and mitigate the necessity of reconstructing new routes frequently. Therefore, predicting the future state of the network is introduced as an effective mechanism to enhance various routing strategies in VANETs [5]. On the other hand, the position-based routing is introduced as a suitable solution for a highly dynamic environment such as VANETs, because it is a pathless routing and it maintains only the geographical location information of the neighbours instead of maintaining routing entries for the destinations. Based on the exchanged geographical information, a vehicle selects the relay vehicle that is the closest to the destination among all its neighbours. A significant subset of the predictive protocols aims to predict the accurate positions, velocities, and moving directions of the vehicles to enhance the performance of the position-based routing [5].

II. CLASSIFICATION OF ROUTING PROTOCOL IN VANET

On the basis of senders and receivers involved, three types of protocols are defined for VANET communication which is briefed as:

- Unicast: Such protocols aim to deliver or transmit data from one source to one destination over a wireless medium. There are two ways to transmit packets; one is via multi-hop transmission where information of packet in transmitted further and further via hopping of packet to neighbouring vehicle. Second one is carry and forward technique where a packet is carried by the vehicle as long as possible and then transmitted to reduce congestion or rebroadcast of packet. Third is trajectory based where nodes calculate various paths of data transmission and then transmit data by keeping in notice that minimum rebroadcast of packet happen [17].
- Broadcast: Broadcasting protocols aim to deliver and communicate to as many nodes as possible. In situations like, road blocks, traffic jams, places with high traffic density or emergency situations, broadcasting protocols are a must. They transmit data packet to more than one node at a time. On the counter side, broadcasting protocols also increase the chances of packet rebroadcast or storm problem [17].

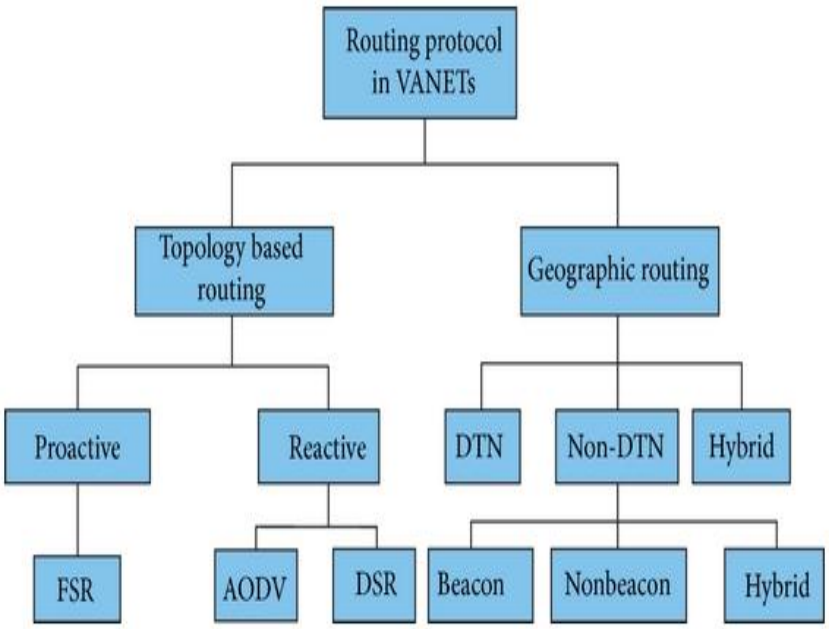

Fig 1: Routing Protocol in VANET.

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- Topology-based protocols-This type of protocols find the links information between nodes and place them in neighbouring table for further sending of data. Topology based protocols can be further classified into proactive, reactive and hybrid protocols. Proactive routing also known as table-driven primarily relies of the shortest path algorithm. Although this class of topology-based routing do not have discovery delay, but it suffers from high overhead due to its periodic topology updates. Destination-sequenced distance vector (DSDV), Global state routing protocol (GSPR), Fish eye state routing (FSR) and Optimized link state routing (OLSR) are different kinds of proactive routing.
- Position-based protocols-This type of protocols utilize geographic positioning information in order to find the successive forwarding nodes, thus, there is no requirement to establish and keep a route between source and destination as all nodes in these routing protocols are aware of locations of their own and their neighbours. This study deeply concentrates on position-based routing protocols by dividing them into two chief categories under V2V and V2I. Therefore, in subsequent section we propose taxonomy for position-based routing protocols and discuss on each of them in extensive details.
- Geocast-based protocols-This type of protocols sends packets to a group of vehicles in a specific geographical area called zone of relevance (ZOR) thus nodes that are located outside the ZOR are not received any packet. This type of routing protocols is position based multicast routing employed to send packet to all the nodes in a stationary topological area. Identification of the forwarding zone leads to reduction in message overhead and network congestion. However, the disadvantage of this kind of routing protocols is separation of network and the presence of undesirable neighbours that may discard the forwarding packets.
- Cluster-based protocols- In this type of protocols, the vehicles which are in vicinity of each other try to create cluster of nodes and choose on vehicle as the cluster header which has the responsibility to manage the cluster by using the intra/inter cluster communications. Scalability is the advantage of cluster based protocols, while, high overhead and delay are their disadvantages in high mobility networks like VANETs. Cluster based routing (CBR), Cluster-based directional routing protocol (CBDRP), Location routing algorithm with cluster-based flooding (LORA-CBF), Clustering.
- Broadcast-based protocols-This type of protocols uses flooding of the packet on the network area in which each node forwards the received message to other nodes. Broadcast-based protocols are frequently used in VANETs for different purposes such as data or traffic information sharing, advertisements and emergency news. The chief advantage of using this kind of protocols is the assurance of delivering the messages to all destinations. The broadcast-based protocols are mostly proper for the network with small number of nodes in the network as flooding method resulted high overhead cost. BROADCOMM, Distributed vehicular broadcast (DV-CAST), Edge-aware epidemic protocol (EAEP), Hybrid data dissemination (HyDi) [and Density-aware reliable broadcasting (DECA), are some example of broadcast-based routing protocols [15].

III. PROPOSED WORK

Wireless networks are affected by various channel impairments (such as fading, shadowing, path loss) and limited radio spectrum resources. Various techniques such as diversity and channel coding exist in link-layer protocols to mitigate wireless channel impairments and to improve network throughput. However, these techniques may introduce some overhead or require multiple antennas and/or transceivers. An alternative approach is cooperative communication, which makes use of nearby nodes to improve transmission performance between a pair of source and destination (s - d) nodes via diversity gain. The broadcast nature of a wireless transmission enables neighboring nodes to overhear the transmission of a packet from the source node to the destination. When the direct transmission between the s-d pair suffers from a poor channel condition, the overheard packet can be relayed to the destination node by a node or nodes which have a good channel condition to both s-d nodes. This cooperative transmission with the help of neighboring node(s) can increase throughput of the entire network and reliability of a packet delivery.

Dedicated short-range communication scheme is widely used for the intelligent transportation system, this is also called Federal Communications Commission, it is in the US to open 195 MHz of additional spectrum for use by high throughput WiFi devices in the 5:35-5:47 GHz and 5:85-5:925 GHz bands. DSRC divides the 75M-Hz spectrum into

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seven frequency bands, including one control channel (CCH) for broadcasting safety or control messages and six service channels (SCHs) for transmitting service messages. A primary task of the MAC protocol is to enable many vehicles to share limited spectrum resources and guarantee quality of service for different services. MAC protocol based on an adaptive frame structure. And the channel is divides into one CCH and multiple SCHs.

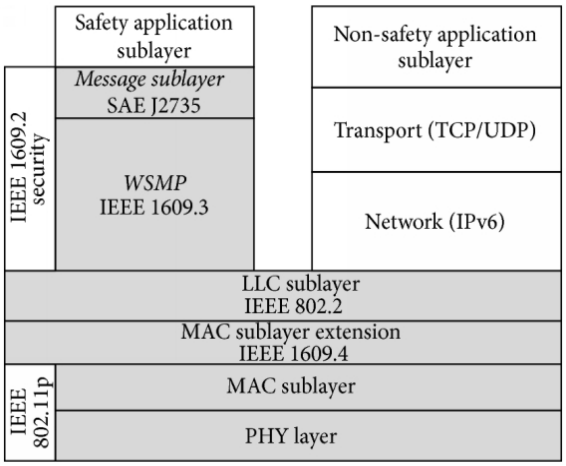

Fig 2: IEEE 1609.2 and 802.11 protocol model.

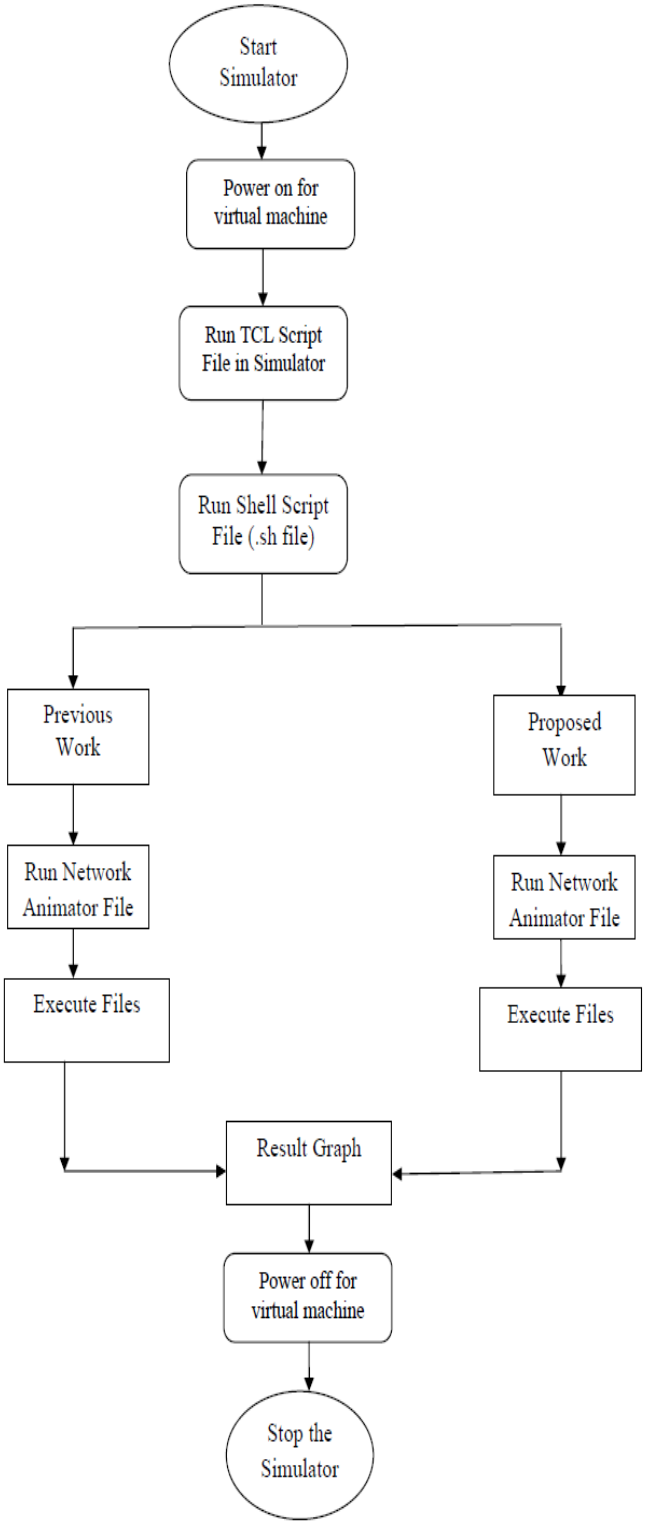

Fig 3: The above figure shows the proposed method and previous method block diagram

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IV. EXPERIMENTAL WORK

Transportation is an indispensable part of modern civilization. It is inseparable from society and exerts a powerful influence on the lives of individuals and the development of nations. Time is considered as one of the important and recognized parameters for successful operation in existing technology-based communication systems, such as computer networks, cellular network and sensor network. However, today's transportation systems do not depend on precise and accurate time in their operation. In order to alleviate the road fatalities including death, injuries and economic losses, transportation system researchers are evolving the concept of an Intelligent Transportation System. Here for the ITS we use a vehicular ad-hoc network for the improve performance of modern transportation system. In practice, VANETs differ from other mobile networks by their ad-hoc architecture, high mobility, and time-sensitive applications.

In this section we discuss about the proposed experimental environment and used performance evaluation parameter with their respective software and tools. Here we using the network simulator tool for the proposed methods simulation, which is basically support Linux operating system, here we also used some other tools like simulation for urban mobility for the vehicle node simulation and also used the network animator for the vehicle positioning in the network.

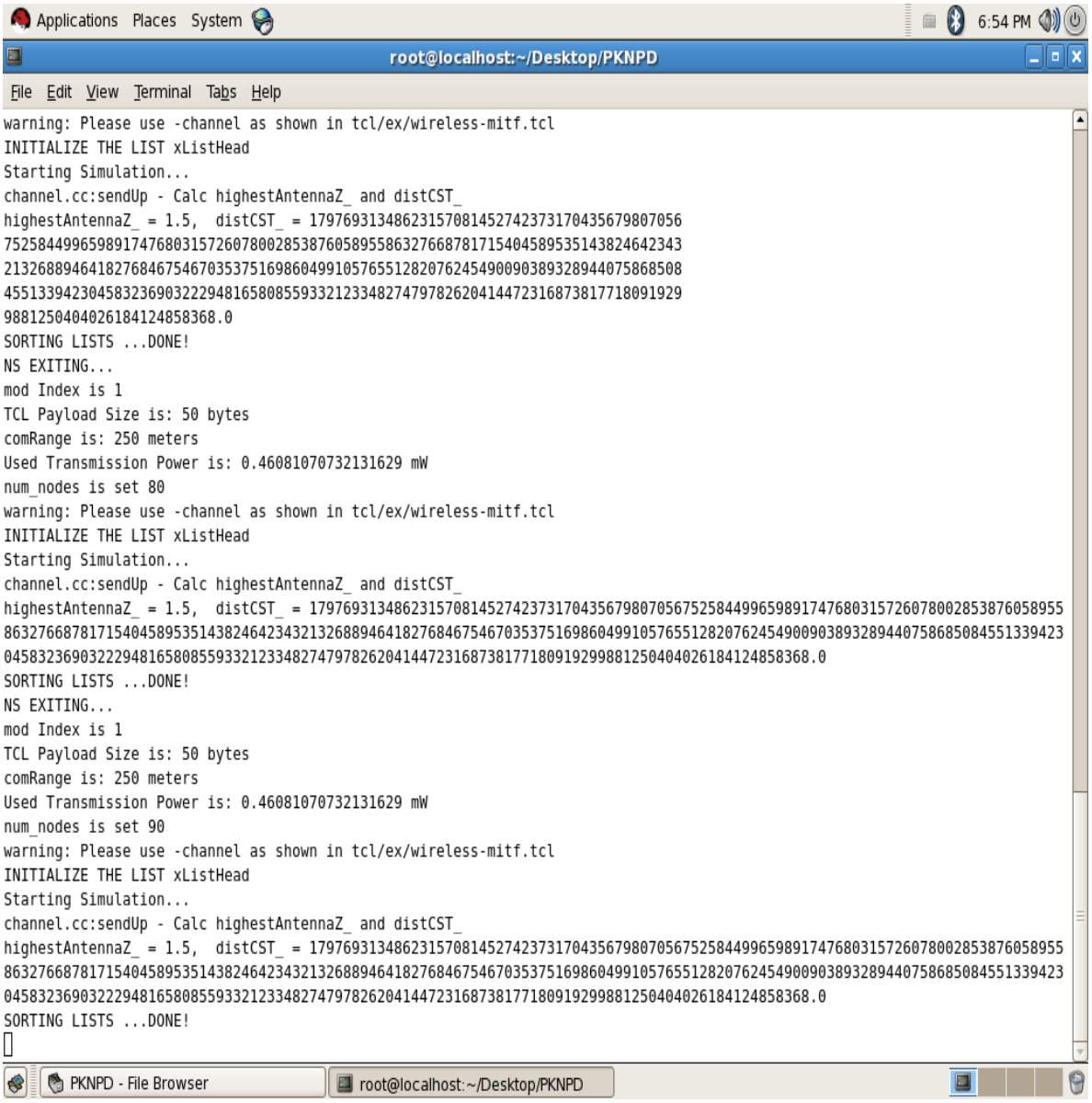

Fig 4: The above image shows the experimental program on the notepad enviornment for the results execuation

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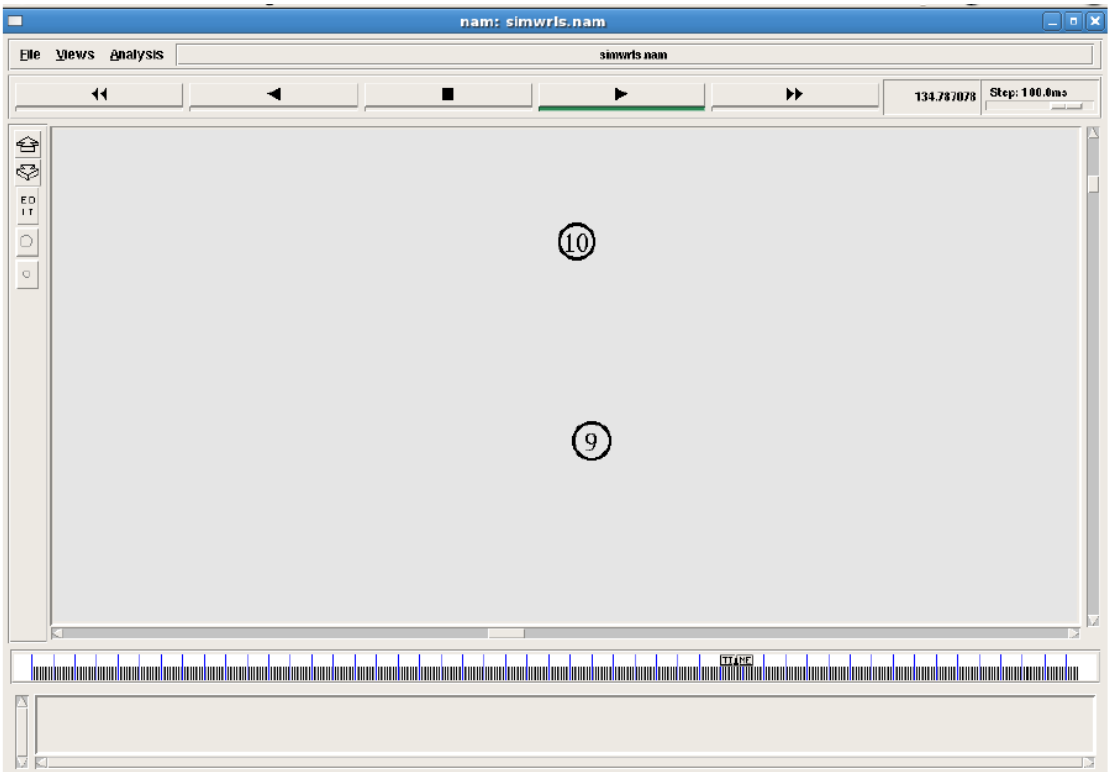

Fig 5: The above image shows the network simulation for the network animator file and vehicle node movement.

V. CONCLUSION

Transportation is an indispensable part of modern civilization. It is inseparable from society and exerts a powerful influence on the lives of individuals and the development of nations. Time is considered as one of the important and recognized parameters for successful operation in existing technology-based communication systems, such as computer networks. Here we improved the performance of vehicular ad-hoc network using the dedicated short range communication protocol, in future we can also used some optimization techniques for the efficient communication between the nodes in a network, and also reduce the time for communication and improve performance.

REFERENCES

1. Chunfeng Liu, Gang Zhang, Weisi Guo, Ran He, "Kalman Prediction based Neighbor Discovery and its Effect on Routing Protocol in Vehicular Ad Hoc Networks", IEEE Transactions on Intelligent Transportation Systems, January 2019, pp. 1-11.
2. Hussain Falih Mahdi, Mohammed Salah Abood, Mustafa Maad Hamdi, "Performance evaluation for vehicular ad-hoc networks based routing protocols", Bulletin of Electrical Engineering and Informatics Vol. 10, pp. 1080-1091.
3. Abdul Karim Kazi, Shariq Mahmood Khan, "DyTE: An Effective Routing Protocol for VANET in Urban Scenarios", Engineering, Technology & Applied Science Research Vol. 11, 2021, pp. 6979-6985.
4. M.Yea,, L.Guan, M.Quddus, "TDMP: Reliable Target Driven and Mobility Prediction based Routing Protocol in Complex Vehicular Ad-hoc Network", Article in Vehicular Communications , 2021 pp -1-35.
5. Arshpreet Singh. "Issues and Cross Layer Design Solutions in Vehicular Ad-hoc Networks", Technical Report, 2021, pp 1-11.
6. Lokesh M. Giripunje, Abhay Vidyarthi, Shishir Kumar Shandilya, "Adaptive Congestion Prediction in Vehicular Ad-hoc Networks (VANET) using Type-2 Fuzzy Model to Establish Reliable Routes", Research square, 2020, pp 1-124.
7. Gursimrat Singh, "Cross Layer Design in Vehicular Ad-hoc Networks (VANETs): Issues, Approaches and Solutions", Technical Report, 2021, pp 1-24.

8. Chinnadurai S, Abinaya R, "The Convergent Routing Scheme for Graph-Based Mechanism in Vehicular Ad Hoc Networks", International Journal of Advanced Research in Science, Communication and Technology, 2021, pp 14-21.
9. Manoj Sindhwani, " Clustering Algorithms in Vehicular Ad-Hoc Networks: A Review", International Research Journal of Modernization in Engineering Technology and Science, 2021, pp 1179-1186.
10. Irshad Ahmed Abbasi, Elfatih Elmubarak Mustafa, "A Survey on Junction Selection based Routing Protocols for VANETs", International Journal of Advanced Computer Science and Applications, 2021, pp 174-180.
11. MohammadReza Karimi, Rasool Sadeghi, Improvement of Sybil Attack Detection in Vehicular Ad-Hoc Networks using Cross-layer and Fuzzy Logic", Majlesi Journal of Electrical Engineering, 2021, pp 9-18.
12. Ankur Nahar, Himani Sikarwar, Debasis Das, "CSBR: A Cosine Similarity Based Selective Broadcast Routing Protocol for Vehicular Ad-Hoc Networks", IFIP, 2020, pp. 404-413.
13. Dr. N. Bhalaji, " Performance Evaluation of Flying Wireless Network with VANET Routing Protocol", Journal of ISMAC, 2019, pp. 56-71.
14. Dr. S. Smys, Dr. Jennifer S. Raj, "A Stochastic Mobile Data Traffic Model for Vehicular Ad Hoc Networks", Journal of Ubiquitous Computing and Communication Technologies, 2019, pp. 55-63.
15. Hui Xia, San-shun Zhang,Ben-xia Li, Li Li, Xiang-guo Cheng, "Towards a Novel Trust-Based Multicast Routing for VANETs", Hindawi Security and Communication Networks, 2018, pp. 1-13.
16. Hoofar Shokravi, Hooman Shokravi, Norhisham Bakhary, Mahshid Heidarrezaei, Seyed Saeid Rahimian Koloor, Michal Petru, "A Review on Vehicle Classification and Potential Use of Smart Vehicle-Assisted Techniques", Sensors 2020, pp. 1-30.
17. Sami Abduljabbar Rashid, Lukman Audah, Mustafa Maad Hamdi, Sameer Alani, "Prediction Based Efficient Multi-hop Clustering Approach with Adaptive Relay Node Selection for VANET", Journal of Communications, 2020, pp. 332-343.
18. Cristhian Iza-Paredes, Ahmad Mohamad Mezher, Monica Aguilar Igartua and Jordi Forne , "Game-Theoretical Design of an Adaptive Distributed Dissemination Protocol for VANETs ", 2018, pp. 1-31.
19. Zeeshan Shafiq, Mohammad Haseeb Zafar, Abdul Baseer Qazi, "QoS in Vehicular Ad Hoc Networks – A Survey", JICTRA 2018, pp. 48-59.
20. Ahmed Jawad Kadhim, Seyed Amin Hosseini Seno, "Recent Multicast Routing Protocols in VANET: Classification and Comparison", Journal of University of Babylon, Engineering Sciences, 2018, pp. 371-382.
21. Mohamed Nabil, Abdelmajid Hajami, Abdelkrim Haqiq, "Predicting the longest route lifetime as the most stable route between two vehicles in VANET", International Journal of Computer Information Systems and Industrial Management Applications, 2018, pp. 125-133.
22. Wang Tong, Azhar Hussain, Wang Xi Bo, Sabita Maharjan, "Artificial Intelligence for Vehicle-to-Everything: A Survey", IEEE Access, 2019, pp. 10823-10843.
23. Mohamed Hadded, Paul Muhlethaler, Anis Laouiti, Rachid Zagrouba, Leila Azouz Saidane, "TDMA-based MAC Protocols for Vehicular Ad Hoc Networks A Survey, Qualitative Analysis and Open Research Issues", IEEE COMMUNICATION SURVEYS AND TUTORIALS , VOL. , NO. , FEBRUARY 2015, pp 1-36.
24. Roberto M.Oliveiraa, Michelle S.P.Facina, Moises V.Ribeiro, AlexB.Vieira, " Performance evaluation of in-home broad band PLC systems using a cooperative MAC protocol", Computer Networks 95 (2016) 62–76.
25. Ju Tan, Hongping Gan, Peng Li, " Improved MAC Protocol Based on Time Division Multiple Access In Multi Channel Vehicular Networks", Journal of Residuals Science & Technology, 2016. Pp 88.1-6.
26. Meng-yue YU, Xin YANG, "A Multi-hop MAC Protocol Based on Coordinating Relay Node", 2nd International Conference on Advances in Management Engineering and Information Technology, 2017. Pp 279-284.
27. Xin Yang, Ling Wang, Jian Xie, "Energy Efficient Cross-Layer Transmission Model for Mobile Wireless Sensor Networks", Hindawi Mobile Information Systems, 2017. Pp 1-9.
28. Rodrigo Teles Hermeto, Antoine Gallais, Fabrice Theoleyre, "Scheduling for IEEE802.15.4-TSCH and Slow Channel Hopping MAC in Low Power Industrial Wireless Networks: A Survey", 2017. Pp 1-38.Mutiu Akinpelu1, Bamidele I. O. Dahunsi, OladipupoOlafusi, Olufemi S Awogboro (2013) [EFFECT OF POLYTHENE MODIFIED BITUMEN ON PROPERTIES OF HOT MIX ASPHALT], ARPN Journal of Engineering and Applied Sciences, ISSN 1819-6608, VOL. 8, NO. 4, APRIL 2013.