

Theoretical Framework on Vehicle to Vehicle Communication approach towards Autonomous Driving using VANET and Telematics

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Abstract - Vehicular Ad-hoc Networks (VANETs) have been a buzz in the research community due to their increasing prominence in building an intelligent transportation system. Every participating vehicle is turned in a router or node through a VANET. An add-on to neutralize the backdrops of VANET is Telematics. Telematics is an interdisciplinary field that includes media communications and vehicular advancements. This survey provides different approaches regarding V2V communication, wireless communication in VANETs, different routing protocols used in VANETs, location sharing through VANETs and message authentication. Despite of many proposed advancements in automobile technologies, the approaches towards autonomous driving are not yet implemented in Indian Automobile Industry. So this survey proposes to highlight the above mentioned approaches those can be a boom in the automobile industry.

Key Words: VANET (Vehicular Ad-hoc Network); V2V communication; Telematics; Location Sharing; Vehicle Diagnostics

1. INTRODUCTION

"Any sufficiently advanced technology is indistinguishable from magic." --Arthur C. Clarke

Concurring to the above given quote, it is likewise evident that the world will be in fact progressed just if the parts identified with it are. Furthermore, vehicles have been a conspicuous parts of the population. With the constant increase in the population as well as the need for automation, the need for smarter modes of transportation has also been increased. The same concept is empowered by Intelligent Transport Systems (ITS). An Intelligent transportation System (ITS) is a propelled application which, without epitomizing knowledge as such, plans to give innovative administrations identifying with various methods of transport and traffic the board and empower clients to be better educated and make more secure, progressively planned, and 'more astute' utilization of transport systems. Earlier the automobiles were used only to transport people or goods from one place to another. But due to the advancements in the automation in automobile industries, the VANET technology has created a buzz around the last decade.

Vehicular ad-hoc network (VANET) is also referred to as the network on wheels. It is used to facilitate correspondence between the vehicular nodes. It is a branch of MANET (Mobile ad-hoc network). VANETs are made by applying the standards of MANETs – the unconstrained formation of a remote system for vehicle-to-vehicle (V2V) information trade – to the space of vehicles. The vehicles within a VANET network can communicate with each other within a distance of 100 to 300 meters.

Vehicle-to-vehicle (V2V) Communication include a remote system where automobiles send messages to one another with data about what they're doing. This information would incorporate speed, area, heading of movement, braking, and loss of steadiness.

Telematics is a general term that refers to any device which merges telecommunications and informatics. Telematics includes anything from GPS systems to navigation systems. It is responsible for many features in vehicles from OnStar to hands free mobile calling. In India (2016-2017), according to the statistic report, there happened 4,80,652 mishaps and 1, 50,785 deaths. For each hour, there happen at least 55 mishaps and 17 deaths in the Indian streets. In this factual information, it demonstrates that different mishaps happen and VANET can likewise give different solutions. The governments have likewise made strides in actualizing new innovative and examine innovations to decrease mishaps.

This survey mainly focuses on the communication between vehicles as well as the transfer-ability of different types of data. There are lot of research has already made in this domain area but there is much more which is yet to implement.

This review also gives the various challenges being faced during the previous research already been done. Moreover the different types of protocols along with various techniques has been implemented to achieve message sharing, message authentication, routing techniques, security the great issue and moreover the privacy and many more.

2. METHODOLOGY

In [1], paper three Personal Area Network (PAN) standards for in-vehicle communications are presented: Blue-tooth, Zig Bee, Ultra Wide Band and Wireless Local Area Network .In [2], it implemented STDMA for real-time data traffic between vehicles. The [4] mainly contributed on flexible, practical protocol for private proximity testing .It is executed as an Android application with the Facebook online informal community utilized for communication between clients.

In [6], it uses single-hop and multi-hop methods for VANET communication. In [7], it gives the survey on the communication using Vanets and problems being faced. Also this paper discusses about different protocol stacks used in this network with their future researches. In

[10], it proposed a Trajectory-based message delivery for message forwarding scheme which utilizes the message destination trajectory. Also it has put a central manager that maintains vehicles trajectory data and which acts as a broker between vehicles and RSUs to share the trajectory data.

[12] Worked on different features like Message Fields, Consistency Checks, and Integrity checks and so on. In [14] which review on important position based unicast routing protocols for communication between vehicles. Also the simulations based study is provided on different protocols. The [15] suggested that the implementation of Vanet, WSNs and Telematics provides a variety of applications in Indian Automobiles Industry and provide ways to prevent accident and traffic congestion.



Fig:- Vehicle to vehicle Communication using Vanet & Telematics




Fig:- Telematics Device

3. LITERATURE REVIEW & ELUCIDATION

Sr. No.	Paper's Name	Name of Journal & Publication Year	Author's Name
I.	A Hybrid Architecture For Accident Detection Using Telematics	IJAERD, 2018	S.Veena, D. Priyadharshini
II.	A Review of Vehicle to Vehicle Communication Protocols for VANETS in the Urban Environment	FUTURE INTERNET,2018	Irshad Ahmed Abbasi, Adnan Shahid Khan
III.	Feature Selection for Anomaly Detection in Vehicular Ad Hoc Networks	TU/E SMART MOBILITY PROGRAMME,2018	Van Huynh Le, Jerry DEN Hartog, Nicola Zannone
IV.	Secure Vehicle Location-Sharing for Trajectory-Based Message Delivery on VANETS	IEEE, 2017	Youngho Park, Chul Sur, Si-Wan Noh
V	Synthesizing Vehicle-to-Vehicle Communication Trace for Vanet Research	IEEE,2017	Feng Lv , Hongzi Zhu
VI.	Data Communication in Vanets : Protocols, Application, And Challenges	ELSEVIER, 2016	Felipe Cunha, Leandro Villas
VII.	Review on Improve the Content Delivery and Message Communication Using Vanet	IJIRCCE, 2016	K.S.Saravann, N.Boomathi
VIII	Near-Pri: Private, Proximity Based Location Sharing	IEEE, 2014	Ed NOVAK, QUN LI
IX.	Performance of Vehicle-to-Vehicle Communication using IEEE 802.11P in Vehicular Ad-Hoc Network Environment	IJNSA, 2013	Vaishali D. Khairnar, Dr. Ketan Kotecha
X.	V2V Communication Survey (Wireless Technology)	IJCTA, RESEARCH GATE, 2012	Mrs. Vaishali D. Khairnar, Dr. S.N. Pradhan

4. APPROACHES

In [1], paper presents the specific application on wireless communication .Explicit use of Automotive Wireless Communication. The Prologue to the Automotive Wireless Communication .It clarifies the Innovation utilized for Automotive Wireless Communication alongside the different car applications depending on Remote Correspondence. Portray Vanets And Certifiable test Arrange Execution.

In [2], the Medium Access Strategy utilized in 802.11p, CSMA with Impact Shirking, does not ensure Channel Access before a limited due date. It proposed to utilize STDMA for continuous information Traffic between vehicles .It is examined by methods for the Interstate Street Recreation situation.

In [4], it manufactured one such administration that enables two gatherings to share area data secretly and safely. The principle commitment is an Adaptable, Viable Convention for Private Closeness Testing .It provides an helpful and effective system for speaking to area esteems.

In [6], it consistently gathered to deal with the Vanet communication. The Information Replication plot is utilized to lessen the Information Conveyance Delay. The Expedite Message Authentication Protocol (EMAP) is utilized for Vanets with an Effective Repudiation Checking Process

In [7], it opened a bunch of conceivable outcomes for Incredible and Potential extraordinary. The applications on well being, Proficiency, Comfort, Open Joint Effort and Investment, while they are out and about. The overview Vanets concentrating on their communication and application challenges. The Itemized discourse of various classes of Vanet Applications.

In [10],Factual Investigation Results on V2V Communication Execution. In view of a substantial volume of Certifiable Estimation follow gathered in Shanghai city. It proposed a novel plan to blend V2V Correspondence follows, For example, Arrange Convention Structure and Reproductions.802.11p-Based V2V Communication in Urban situations dependent on genuine information follows.

In [12], Direction Based Message Conveyance is a Message Sending Plan. The Secure Area Sharing Framework to enable a Vehicle to impart its Driving Direction to RSUs.

In [14], Research the utilization of White-Box Peculiarity recognition to identify assaults like Security, Accidents and so forth. the key advance in applying such a methodology is the Determination of the "Right" Conduct Highlights .It makes venture towards the plan of compelling Irregularity Discovery Motors for V2V communication.

In [15],the most Huge Position based Unicast Directing Conventions intended for Vehicle To Vehicle communication. The correlation of the Vehicle to Vehicle Communication based Directing Conventions. The Near Investigation depends on some noteworthy factors, For Example, Versatility, Traffic Density, Forwarding Systems And Technique for Intersection Determination Instrument, and Methodology used to deal with a Nearby Ideal Circumstance. It gives the Reproduction Based Investigation of existing powerful Intersection Determination Steering Conventions and a Static Intersection Choice Directing Convention.

In [16], it gives the brief depiction of Hybrid Engineering and the Utilization of Telematics for Drivers .Here, WSN (Wireless Sensor Networks) are utilized.

5. LIMITATION

According to the research from 2012-2018, it has been found that a lot of research has been carried out in the field of Vanet and Telematics separately. But it has been concluded from the research that the Vanet and Telematics together has never been used yet. Also certain limitations were found in the research like Reliability, Secure Routing, Integration of Wireless networking technologies, Message authentication and many more. The implementation of Vanet and Telematics has not yet been implemented in Indian Automobile Industry.

6. RECOMMENDATION

The survey recommends ways to utilize the future scopes of the V2V communication in the Indian Automobile Industries in order to cope the vehicles up with the upcoming future advancements. During the survey, it was experienced that V2V communication is more of a boom technology in the industry and that a lot of research has been done on it but most of these researches are not necessarily brought into implementation. Moreover, the implementation of these two new technologies has not been done in India. Thus the survey mainly suggests on the vehicle to vehicle communication using Vanet and Telematics combinely and specifically on the features of Location Sharing, Remote Car Control and Vehicle Diagnostics. The researchers suggest such a smart vehicle in way to the smart cities which will lead to Autonomous Driving.

7. CONCLUSION

This survey utilized in vehicle to vehicle communication utilizing VANET and Telematics research from 2012 – 2018 could be a very helpful resource to guide researchers searching for a suitable methodology in the area of communicating vehicles through providing a good understanding for the methodologies used by other researchers in this field. Despite of many proposed advancements in automobile technologies, these approaches are not yet implemented in Automobile Industry. Furthermore, the environmental conditions like the roads, Wi-Fi zone and other advancements are also not often available. All this is preventing us from getting ready for the future advancements. So this survey proposes to highlight the above mentioned approaches those can be a boom in the automobile industry.

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