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Design and Implementation of Secure Vehicle To Vehicle Formatted Communication

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Abstract--Vehicular Ad-Hoc Network or VANET is a form of mobile ad hoc network, to provide communications among neighboring vehicles and between vehicles and nearest fixed equipment, usually described as roadside equipment. VANET is developed for wireless communication among vehicles and authorities. Vehicles will be consists of sensors and communication devices which will allow to cooperate with each other. According to application vehicle can transfer or exchange information according to requirement. So there is a need to have some standard protocols for communication between vehicles to vehicles. Hence proposing system is an implementation of Vehicle to Vehicle communication along with categorized modes of communication like control, informational and aware messages. Expected outcome of the proposed system will be to develop a prototype vehicle models which will communicate with each other using wireless technology and react upon with defined action on specific type of message from sender vehicle.

Keywords: - Vehicular ad hoc networks (VANETs), control and aware messages, and prototype vehicle models.

I. INTRODUCTION

In VANET each car who is participating into network it converted to wireless router or node. The distance in between car is 100 to 300 meters then only cars are connect with each other and the network is connected in wide range. If the car is out of signal range and drop out of the network, other cars can join the network.

At the time of driving the demand of information regarding the surrounding traffic, routes and much more is an increase. This information can be grouped together in several categories. But in these categories the important category is driver help and car security. This category mainly consists of sensor data from other cars. Such as brake warning send from front car, tailgate and collision warning, information about road condition and maintenance, detailed regional weather forecast, sign of traffic jams, caution to an accident behind the next turn, detailed information about an accident for the rescue team and many other things. Navigation systems or an assistant that helps to follow a friend's car. Another category is infotainment for passengers. For example internet access, chatting and interactive games between cars close to each other.

The early cooperative driving concept was researched in automated highway systems, the concept of cooperative driving is being recently adapted to broader applications (e.g., cooperative adaptive cruise control, cooperative intersection safety systems, and other collision warning systems), as well as to scenarios where information is communicated between vehicles and nearby infrastructure, e.g., intersection or roadside traffic controllers. Recent advances in wireless communication systems and the fact that GPS has become common practice in vehicle applications significantly support the investigation toward new applications in cooperative driving for road safety through communication.

The main advantage of this system is that it is focusing on message types and according to that message the driver will take precautionary action to avoid accident or follow the same path followed by the vehicle moving in same direction.

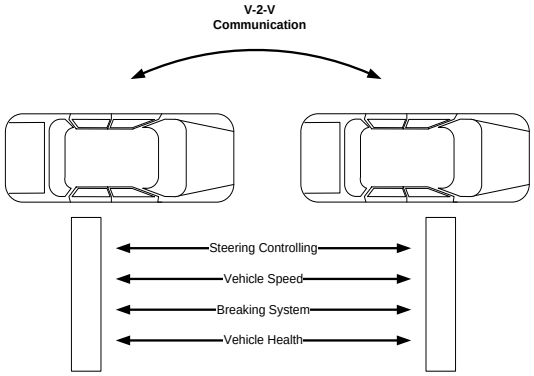

Fig.1 shows the types of messages which is transferred between the vehicles.

Steering control which belong to control type of message which indicates the controlling scenario. This scenario indicated by the indicator signaling. Similarly the vehicle control and breaking system belong to alert type of messages. This type of message is helps to warn other vehicle. And because of this warning other vehicles can take precautionary action.

II. LITERATURE REVIEW

Safe Driving in LA: Report from the Greatest Inter-vehicular Accident Detection Test Ever this paper shows the concept to report on the results drawn from the most extensive accident warning system test performed to date, to the best of knowledge, on the streets and highways. They implemented and tested an accident warning system based on the multi-hop broadcast algorithm that has been proven to be best in terms of bandwidth usage and covered distance in realistic scenarios [1].

A Secure Cooperative Approach for Non line-of-Sight Location Verification in VANET, this paper shows the non-line of site communication in vehicles. They presented a collaborative protocol to verify a broadcast position when direct communication between the replied node and the verifier is not possible. In addition to verifying a node location in a multi-hop cooperative approach, several security methods were involved to improve the message reliability [2].

Modeling Emergency Messaging for Car Accident over Dichotomized Headway Model in Vehicular Ad-hoc Networks takes various useful facts developed by traffic flow theory into account and utilizes the dichotomized headway model, the braking model, and Greenberg's logarithmic model to generate vehicular mobility traces for analysis [3].

An Adaptive Alert Message Dissemination Protocol for VANET to Improve Road Safety This paper shows the different protocols for making a communication between vehicles [4] shows the way to transfer the message [6].

Power-control-based Broadcast Scheme for Emergency Messages in VANETs shows an efficient broadcast scheme for broadcasting emergency messages.

In this paper, they proposed a multi-hop broadcast scheme, which can ensure high reliability. To mitigate broadcast storms, the proposed scheme uses boundary nodes to relay broadcast packets. The proposed scheme provides an efficient reliable broadcast solution to broadcast emergency safety messages in vehicular ad hoc networks. The following issues would be studied in the future. To differentiate emergency messages with various priorities, the corresponding broadcast scheme needs to be further modified [5].

The most important application of VANET is disseminating emergency messages to warn drivers in case of dangerous events, for that broadcasting is used to deliver messages. But in broadcasting many problems were faced [4].

To support efficient performance on delivery ratio and rebroadcast overhead a new street-based broadcast scheme has been developed [7].

IEEE 802.11p/DSRC protocol provides two types of channel i.e. control channel (CCH) and service channel (SCH) [13]. In V2V communication the simulating result reveal that a specific vehicle is forced to drop over 80% of its packet because no channel access was possible before the next message was generated. To overcome this problem STDMA for real time traffic between vehicles was proposed [8].

III. PROPOSED RESEARCH METHODOLOGY

Step 1:- Develop communication module for transferring and receiving messages.

*Step2:-*Depending upon analysis of alert warning, infotainment related information create messages. For that pocket format is proposing which will be broadcasted over channel.

Figure I Packet Format

Device Name: - For logically identifying the vehicle device name indicates the logical name of device

Fixed ID: - It is a manufacturer ID that will be used to authenticate the communication.

Channel ID: - Use for frequency over which the communication will be continued.

Setting: - This field is reserved for the future additional work.

Step 3:- Assembling a model that will help to demonstrate the functionality. Figure III shows the proposed system architecture of the system.

The architecture consist of input unit, control unit, microprocessor, LCD module, and transceiver. The external devices like clutch, accelerator gives input to the input devices. This indicates that what types of message need to be get generated, according to these messages control unit will react on it.

Control the vehicular activity like speed, break, *etc.* which is called as control devices these devices are connected to the control.

Control unit will be connected with the control devices of vehicle that will be used to control the vehicular activity like speed, break, etc.

To show the indication related to the received message type LCD module will be connected to the micro-controller.

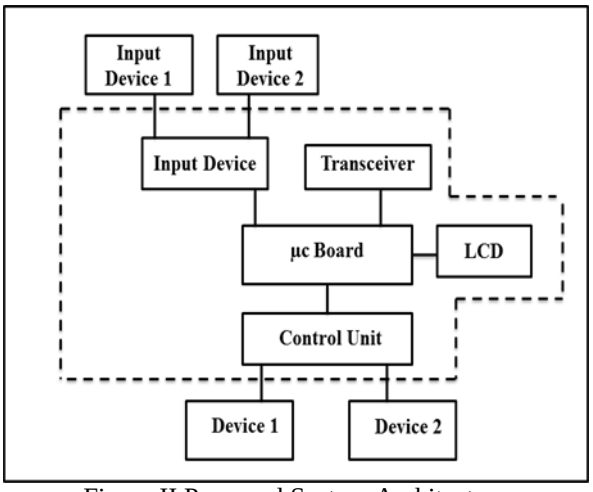

Figure II Proposed System Architecture

This methodology leads to the following point of consideration.

1. Communication,
2. Versatile Messages,
3. Data Security

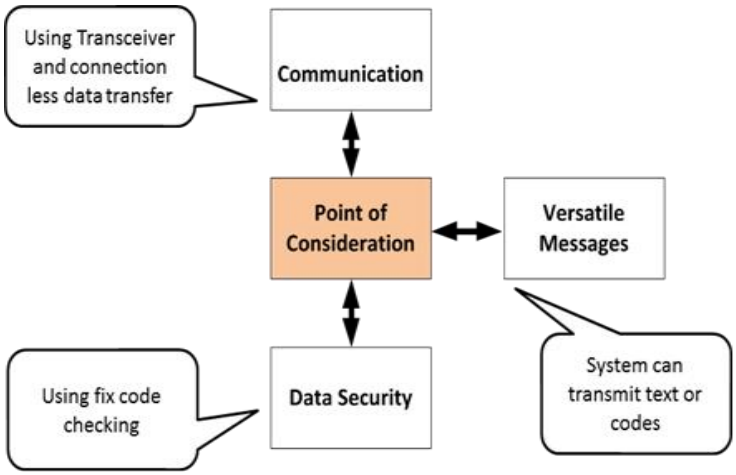

Figure III Points of consideration

For connectionless data transfer *i.e.* flexible messages any control or warning packets for this communication the transceiver is used. And the role of microcontroller is it identifies the sender. The microcontroller consists of information interpretation hardware module and software code as well as that device having a unique ID that helps to achieve that goal.

IV. COMMUNICATION MODULE

The requirement for the development of communication module by considering the hardware and software is as follows:

Hardware Requirement:

- cc2500 Transceiver Wireless Device
- ATmega16 development board
- LCD
- Power Supply

Development Tools:

- Atmel Studio 6.0
- iProg burning software
- Embedded C Language

Figure V shows the communication module i.e. device working module. This module is developed by using ATmega 16 development board integrated with cc2500 Transceiver wireless device and LCD.

For communication between devices the cc2500 Transceiver wireless device is burned with the communication logic program

After the development of this device the LCD display the ""Waiting for Connection……." messages.

When the communication is get start any device can initiate the communication. As shown in figure VI when first device initiating the connection therefore the message is displayed as "Connection Open Request sent……" and after 3 sec at the receiving side the message is display as "New Connection ... Accepted …." After time of sending request which is shown in figure VI.

Now both devices are ready to transfer the data as shown in Figure VII.

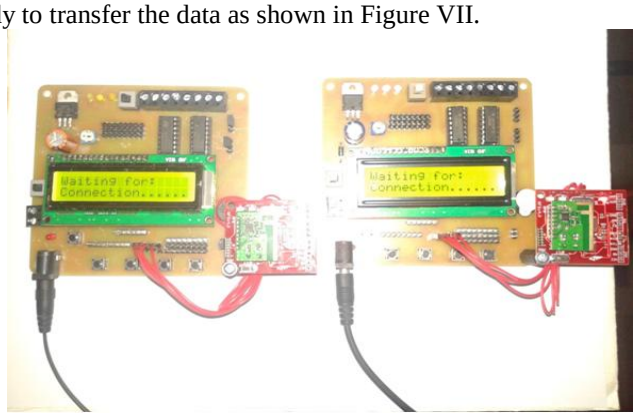

Figure V Communicating Devices

Figure VI Establishing Connection between Devices

Figure VII Transferring Data between Devices

V. CONCLUSION

So in the wireless devices *i.e.* vehicles can transfer the messages by using developed module.

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BIOGRAPHY

Rakhee G.Doijad received Graduate Degree in Computer Engineering in 2011 from RTMNU University, Nagpur. She is currently student of M.E. in wireless communication and computing branch, from RTMNU University, Nagpur.

Prof.Pradnya Kamble received Graduate Degree in Computer science engineering from Government college of engineering, Amravati and MTECH form G.H.Raisoni college ,Nagpur,2009 her area of interest is network routing ,database system etc. she presently doing her PHD on VANET system . She currently is working as Asst. Prof. at P.C.E. Computer Technology Dept. PCE, Nagpur.

