A HYBRID ARCHITECURE FOR ACCIDENT DETECTION USING TELEMATICS

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Abstract - *As the population is increasing, the automobiles are also increasing day by day. In effect of this rapid increase in automobiles, there are chances for tremendous traffic on the road. The automobiles are more prone to the accident which leads to loss of man lives. In VANET, the user cannot detect the hazardous condition on the low density roads. So, to overcome this problem, WSN (Wireless Sensor Networks) are used. This paper gives the brief description of Hybrid architecture and the use of Telematics for drivers.*

Keywords—Accident, Vehicle, Telematics, Vehicular Adhoc NETwork and Wireless Sensor Network

I. INTRODUCTION

Today's world need a driving with safety. Safety not only before the accident is going to takes place but safety must be ensured even after the accident have taken place. One of the solution is that, postaccident safety can be achieved through WSN(Wireless Sensor Networks). In Wireless Sensor Networks, the spatially dispered small sized sensors acts as nodes, which detects the physical conditions of the environment and the sensed data from Wireless Sensor Network are forwarded into the VANET architecture. In this VANET, the vehicle can broadcast it to other vehicles through IEE 802.14.

The other solution for postaccident safety is Telematics, which will be very much useful to the drivers. Telematics is a device where the driver's activities and his condition will be monitored. The activities of the Driver like the timestamp of his driving and the speed at which he is driving, the situation of the driver in which he applies brake etc will be stored. Thus, using these data and if a car undergoes any accident ,then it will be much useful for the forensic team to understand what happened during the accident.

II. Vehicular Adhoc NETwork

VANET is Vehicular Adhoc NETwork. In this, the vehicle communicates with other vehicle that are within the range of about 100-300 metres. There are three categories in the vehicular communication. They are Inter-Vehicle or Vehicle to Vehicle communication (V2V) communication, Vehicle to Roadside communication (V2R) and Inter-Roadside or Roadside to Roadside communication (R2R).

This VANET technology is implemented only in few regions of the world. VANET is yet to be fully implemented in India. When VANET is implemented, this will definitely reduce the traffic and accidents occurring in India. The Hybrid architecture system is proposed, which includes WSN with VANET and this system can add extra benefit to the existing system in WSN.

III. CATEGORIES OF VANET

a. **Inter-Vehicle or Vehicle to vehicle(V2V) -** The data is shared between the two vehicles such as speed, positions etc. In V2V Communication technology**,** the vehicles can communicate with each other by sharing the data in ten minutes per second. This V2V is in developing stage and this is being developed by the various car manufacturers such as BMW, Volvo, Audi, Honda etc.

b. **Vehicle to Roadside (V2R)-**The information is exchanged between the vehicle and the roadside unit such as tower.

c. **Inter-Roadside-** The information is exchanged between the road side units itself.

IV. APPLICATIONS OF VANET

VANET has various applications and it is a very useful especially in Ad-hoc NETwork when combined with WSN. The VANET is widely used in the automobile industry thus, it creates a revolution. A few applications of VANET are

A. Automatic brake - If the driver is in asleep state also, the sensor detects the upcoming obstacle in the road and automatically the brake is applied and the car gets slows down. Ford and Hyundai have developed this automatic brake.

B. Traffic monitoring- In this the traffic is monitored and the information is stored in the Roadside unit (RSU) and it is distributed to the other vehicles on the same road.

C. Notification- If a vehicle undergoes any accident, then the message will be broadcasted to all other vehicles in the network and so, the lives can be saved.

D. Damaged Roads - The road condition can be known using a V2V infrastructure before a vehicle is going to travel on a damaged road and this can be informed to the Driver.

E. Crash- When the two vehicles are within the range of 100 metres on the road and a crash can be detected, if any vehicle falls below this range, which can be informed to the Driver immediately.

F. ETC(Electronic Toll Control)- In India, a toll booth is used, where the vehicles stands in a queue for their payment . But now the Indian Government works on it, to implement as the Electronic toll booth.

G. Parking Availability- In VANET, the free parking area can be identified using cameras and sensors and a suitable instruction can be given to the driver to park in the correct place without any chaos.

V. HYBRID ARCHITECTURE

The Hybrid Architecture is the combination of WSN (Wireless Sensor Network) and VANET. The drawbacks of VANET can be overcome by the usage of sensor. The hybrid architecture is designed such that the sensor is attached to a node in the surrounding infrastructure and also to the vehicle. This can help in sensing the opponent very easily even on the low density road.

WSN (Wireless Sensor Network) works with the help of rechargeable Solar batteries. They not only sense the vehicle in a network but also an animal on a lonely road such as rural area. WSN can be active anywhere anytime but VANET is only a network of vehicles.
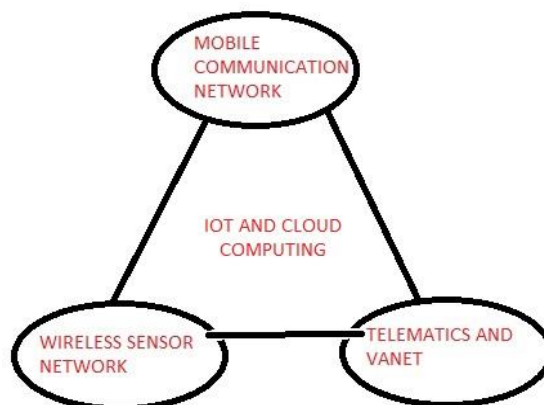

FIGURE 1: Vehicular Network

VI. ACCIDENT IN INDIA

In India (2016-2017), as per the statistical report, there occurred 4, 80,652 accidents and 1, 50,785 deaths. For every hour, there occur at least 55 accidents and 17 deaths in the Indian roads. In this statistical data, it shows that various accidents occurs and VANET can also provide various solutions. The government has also taken steps in implementing new innovative and research technologies to reduce accidents.

VII.TELEMATICS-A GREAT GIFT FOR DRIVERS

Telematics is a method used for long-distant vehicular transmission. Through this, the driver's activities can be monitored like a spy and the information are stored. It is like a black box in the aeroplane. But today, it can be implemented in smart phones also but this technology is in growing stage in India. The economically grown countries such as USA, Japan and Germany have already implemented this telematics in automobiles and have brought revolution.

VIII.   APPLICATIONS OF TELEMATICS

Telematics is important to implement in vehicles as it reduces the risk of accident and save many lives and also the Telematics insurance scheme is an added advantage. The following are some of its applications:

S.NO	APPLICATIONS	PURPOSE
1.	Wireless Vehicle	❖ The sensor is fixed at a location in a car ❖ The information such as road hazards, locations and the speed of the vehicles are displayed to drivers ❖ These information can also be communicated between the vehicles.
2.	Warning	❖ DSRC-Real time Dedicated Short Range Communication system is used to warn the drivers in emergency situations. ❖ This alert or warning message will be given to drivers for safety
3.	Insurance	❖ The driver's behaviour is monitored and the information is transmitted to the insurance company. ❖ The insurance company come to know about whether the mistake is on the driver or not during the occurrence of accident. ❖ If they come to know that driver have not done any mistake, but the opponent driver drove harsh, then driver's insurance premium will be lowered.
4.	Driverless Car	❖ In future , the driverless car can also be monitored. ❖ The reason for the collision with the other vehicle or with the pedestrian who crosses by the way, can be easily found out using this technology. ❖ The reason like Manufacturing defect, internal system error or the human error can be concluded easily by using this technology
5.	Tracking our Family And Friends	❖ Using IOT (Internet of Things), friends and the family members can be tracked easily. ❖ If a friend has undergone any accident, then the notification or an alert message will be broadcasted to all the other friends and family. So at the right time, the lives can be saved. ❖ Tracking is not only done for the friends, but even the vehicle nearer know the dangerous situation using IoT.

IX. TELEMATICS IN INDIA

Telematics industry is one of the upcoming, fastest growing segments in India. Indian telematics is expected to reach $301.23 million by 2021. It is estimated that all electronic devices, household devices and vehicles will come in contact with each other. This will be in use by 2020. In India, by the 2020, the CAGR will reach 16%. After the emergence of 5G, the telematics technology will attain the greater height in automobile industry

X. CONCLUSION

The telematics system, which is a hybrid architecture of Vehicular ad-hoc networks (VANET) and Wireless Sensor Network, IOT (Internet of things) plays a major role and it is also used in a variety of applications. The implementation of these technologies in all over Indian automobiles can be an excellent way to avoid accident, prevent traffic congestion and especially saves many lives.

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