Smart Vehicles with Everything

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***Abstract*-As the number of vehicles is increasing day-by-day, the question of how to obtain information about the Vehicles is becoming more and more difficult. In such an situation Intelligent Transportation Systems (ITSs) has emerged as a solution that is an advantage from the unique features and capabilities of Wireless Sensor Networks (WSNs) and Internet of Things (IOT). WSNs are composed of tiny devices that work in manner to sense the parameters of the vehicle. ITSs can also solve situations like intimating ambulance after occurrence of accident and track the location of the vehicle using GPS sensors. This paper presents an efficient architecture that will increase the safety of road travel using the concepts of WSN and IOT. We have proposed a low cost system to prevent road accidents and to sense speed of vehicles during road travel and also to transmit data to the cloud.**

Keywords-Intelligent Transportation System, Wireless Sensor Networks, Internet of Things, Global Positioning System.

I. INTRODUCTION

One of the major challenges that vehicle control and traffic management applications are facing is to know the position and speed of the vehicles on the road network in real-time. Vehicles equipped with GPS and Accelerometer sensor devices can communicate wirelessly with cloud. Although it is a demonstration of intelligent vehicle technologies, this requires some changes in the existing highway infrastructure to implement such a system. In ITS, the most important features are the vehicle states, which includes position, speed and direction. ITSs generally require a high data rate for communication. In this paper, we are proposing an efficient and reliable architecture for intelligent transport system with the help of WSN and IOT. [1] Vehicles transmit the information like position, speed and it is transmitted to the cloud using internet.WSNs are usually composed of small, low-cost devices that communicate wirelessly and have the capabilities of processing, sensing and storing. It is an infrastructure comprised of sensing (measuring), computing. The Internet of Things is interconnection of devices through internet. The outputs i.e. data produced by the devices are used by another device. This helps in better functioning and increases the efficiency.

II. SURVEY OF LITERATURE

Some systems use human communication for calling ambulance, Fire station & Police whenever accident occurs. Calling of these services is based upon the human effort which would result in failure in sometime. Some methods of finding over speed is placing secret cameras in between definite intervals of distance. Whenever a vehicle passes by it records the time and when it reaches the next signal, the time is noted. Speed is calculated from the time and which is useful for finding whether vehicles are violating the road rules. The present system is keeping hidden camera in roads and signals to make people obey the traffic rules [11]. In countries like America, Cameras are kept at every signals to avoid violation and over speed. Since the vehicle drivers know where the camera has been kept they slowdown the speed when they are near to cameras. Compared to our country, the fines and punishments are severe for violation of rules and disrespect of signals. In Arab countries like Oman, secret Cameras are kept so that the riders don't know about the camera and they get caught. A flashlight is also there with camera in order to make this system functioning in night time also.

Fig. 2.1 A Pillar with Camera, Oman

Fig. 2.2 Lane Speed Limit Board

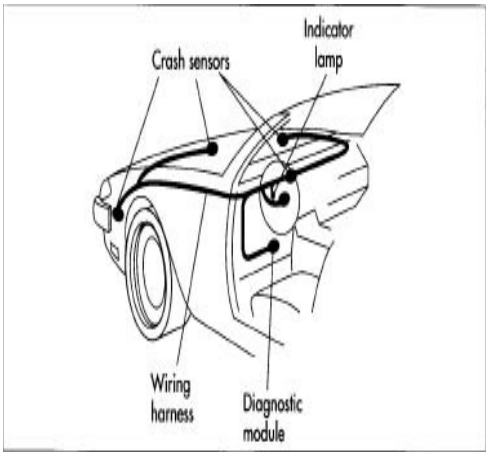

Fig. 2.3 Crash Sensor

III. SMART VEHICLES WITH EVERYTHING

We are using number of sensors (GPS, Accelerometer) to obtain information about the vehicles.

- The information is collected and with a help of a sim module it is transmitted to the cloud.[3]
- The information are updated at definite intervals.
- The data updated is always checked and if any violation is found nearby police station is alerted.[5]
- The position of vehicle is obtained by using GPS and speed is by accelerometer.[2]
- Crash sensors are used to detect whether accident is occurred if it so then nearby hospital and police station is intimated for rescue.[4]
- So, no waiting time for ambulance and police is reduced in this system.[9] The only challenge in this system is network coverage which could be avoided by upcoming technologies.[6]
- Some more additional sensors can be also used to monitor the vehicles. [8]
- Another thing in this system is each and every vehicle has a chip installed during manufacturing which helps in finding the owner's information.
- The sensors are embedded in speed breakers so that sensors kept on vehicles can also detect and the speed limit is set.
- The vehicle cannot cross the speed which is set. The emergency vehicles like ambulance, police etc do not have these sensors.
- Because they need not follow the road speed limits.
- Speed is the primary reason for accidents, so when speed is controlled accidents can be reduced.
- Since the vehicle has the vehicle chip, if it violates any signals, then also with the help of internet of things and GPS, the position of the vehicles can be tracked and necessary actions can be taken.
- This system helps in two ways, primarily accidents can be reduced and secondarily since monitoring is effective all drivers will start to obey the traffic rules.
- Because of this reasons traffic congestions can be reduced.
- When changes are made in punishments for violation of traffic rules are made severe, then the occurrence of accidents can be minimized.
- The vehicle chip also contains the information about the owner and other related information.

VEHICLE CHIP

The vehicle chip consists the following information,

1. Owner's name,
2. Owner's info,
3. Owner's number,
4. Renewal Date,
5. Blood Group,
6. Family Details,
7. Family Blood Group Details.

Fig. 3.1 Components in Vehicle Chip

The Fig. 3.1 shows the Details about the owner of the vehicle. The main important thing is the Owner's name which is primarily required, then the blood group of the owner and his contact details. Whenever he meets an accident his family members are also intimated along with the hospitals and police stations. Before the ambulance reaching the hospital, Blood

requirements are arranged. The vehicle chip also consists the Renewal Details of the vehicle chip.
If the vehicle chip is not renewed then also with the help of data in cloud, the owner can be fined or suitable punishments can be given.

This system cannot prevent all the accidents, but at least one single life can be saved which will be helpful to mankind. When the punishments are severe the occurrence of accidents can be reduced.

III. SCHEMA OF APPROACH

The below diagram (Fig-4.1) is the schema of the approach.

The left box is the vehicle embedded with the GPS, Accelerometer sensors, crash sensor vehicle chip and sim module for communication.

The information collected from the sensors are collected and sent to the cloud. The updation of information occurs at definite intervals. Since updation is regular the information is real time. Then at the end of the year during renewal all the information of each vehicle is processed and respective fines are collected. The system also consists crash sensors which are already embedded in cars to detect crashes and accelerometer sensors are also already embedded in cars to know when air bags should be activated. The main advantage of this system is that the sensors required are already installed in vehicles. The schema is just an outlook structure of the approach. Many changes can be also done in the schema for efficient and effective result.

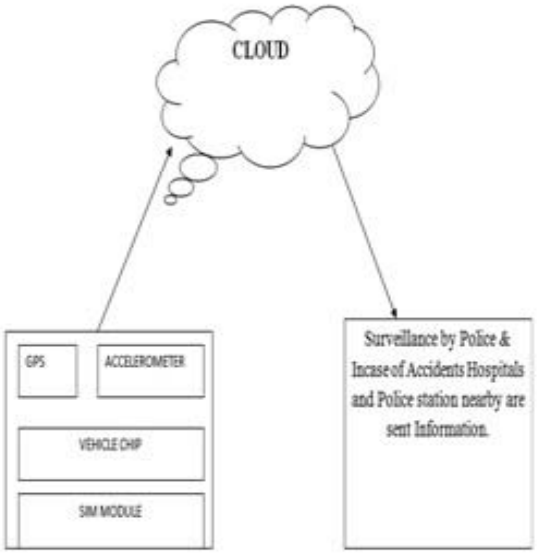

Fig. 4.1 Schema of approach

IV. CONCLUSION

In this paper we addressed the approach of IOT and sensor networks to implement an efficient ITS that increase the safety of road travel and avoid violation of traffic rules. We showed that the exchange of sensed data with cloud can be beneficially used to minimize road accidents and violation of traffic rules. If this technology can be put into practice, at least a single life can be saved.

Since Internet of Things is used, real time data's can be easily stored .It helps in reducing the accident levels. Road safety is increased. Ambulance, Police during emergency times can be availed without human communication.

The proposed system can be enhanced by manufacturing cars with this system. The network coverage can be also increased by using fiber optic cables. Some extra sensors can be also added in future in order to increase the functions. Some sensors can be also embedded for safety purposes. The safety features in vehicles can be also increased with the help of data collected from the sensors. Since Internet of things is a booming platform ,the proposed system can be improved in better ways and a efficient system could be obtained. This system will at least save a single life.

The below Fig 4.1 exhibits a sample smart vehicle if embedded with the Internet of Everything. All the sensors produce data which are sent to the cloud. A number of sensors can be embedded in future. The number of accidents can be minimized with this approach. The implementation of this approach is difficult but after Digital India Implementation. This could be achieved.

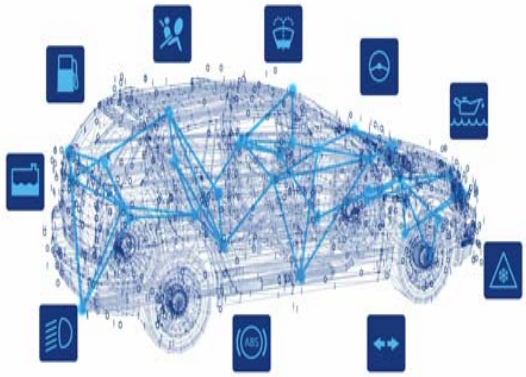

Fig. 4.1 A Sample smart vehicle

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