

## IoT As Safety Guard & Pollution Controller in Automobiles

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**Abstract**—To accommodate the world's transportation needs, automobile's number are increasing tremendously and simultaneously there is increase in pollution too. This resulted in an increasing number of road accidents and diseases caused by pollution. Moreover, this also causes the threat of extinguishing fossil fuels very early and carelessly. By acquiring Internet of Things (IoT), automobiles can be changed to smart vehicles. As most of the road accidents are due to driver failure so we can switch to driverless cars. Smart vehicles use IoT devices in vehicles which connect, communicate and flow data using IoT. This paper presents the idea of how IoT could help in safe driving.

**Keywords**—pollution, smart vehicles, self-driving, their switch, IoT

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### I. Introduction

IoT stands for INTERNET OF THINGS. It plays a major role in connecting with masses over the globe to communicate and share data. Devices such as cars, washing machines, mobile etc which we connect with the internet. Those are basically smart devices which have the ability to connect with the internet via server. The internet of things describes physical objects that are embedded with sensors, processing ability, software and other technologies that connect and exchange data with other devices and systems over the internet or other communications networks. Following are the main Characteristics of IoT that enable this technology to be used in every sector of our life.

- **Unique Identity:** In the universe there are a bunch of IoT devices if you want to identify a particular object. So, you can use its unique identifier which will help you to find your device among all the devices. Further, if two devices want to communicate with each other then they want each other's unique identifier for communication.
- **Dynamic nature:** It is the key characteristic of IoT devices. The IoT devices mode is continuously changing, they change their state from off to on, connected to disconnected.
- **Self-Adapting:** They change with respect to their changing environment. For example: A surveillance camera in morning working perfectly in normal intensity of light. But the same camera at night when the intensity of light goes down accommodates itself and shifts to nightmode.
- **Self-Configuring:** IoT devices are capable of configuring themselves. They do internet configuration, any set up, updates etc with the minimum interference of the user.
- **Heterogeneity:** There are different IoT devices, hardware platforms, standards, communication protocols, networks but within them our IoT is successful and implementing because it is having heterogeneity.
- **Integrated to information network:** All the devices are working together to achieve a common goal. For example, we get a weather report by the collective summation of all the information from different IoT devices.

Now-a-days, one of the important aspects of our life is the need for safe driving. Safe driving is important for people and also important for vehicles. Smooth and safe driving not only minimizes accidents but also over time reduces wear and tear. It also improves fuel economy and reduces overall running cost. Safe driving is relaxing therefore it reduces stress.

There are various physical factors that can contribute to safe driving such as wearing safety gear while driving, sticking to speed limit, keeping a safe distance with the car in front of you, do not drink and drive, maintaining the car in good condition, and not using mobile phones and other appliances while driving. But in this paper, we are presenting another aspect of safe driving that could be achieved with IoT devices.

### II. How IoT could help in safe driving and pollution control?

IoT provides following features for driving on road. They can easily assist drivers in driving [1- 3].

- **Driverless cars:** These vehicles use on - board sensors and evaluation equipment as shown in Fig 1.

They have an angle of view of 360 degrees of their surroundings all the time. By using automated cars, we can also reduce human errors in driving which is the main cause of 90% accidents. Self-driving cars are made up of sensors, cameras, radar and artificial intelligence. A person can easily take important calls and naps with the help of automated cars.

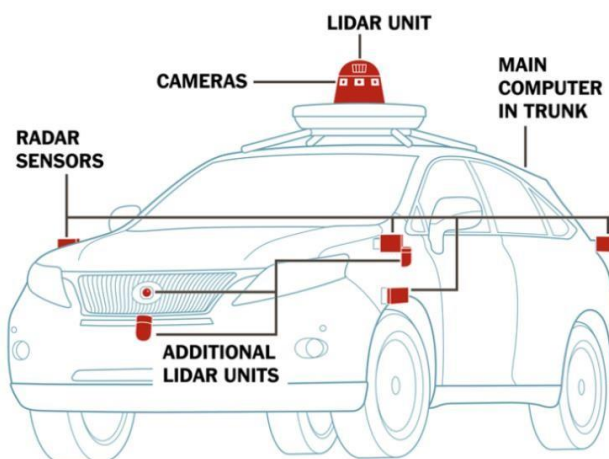


Figure 1. Self-Driving Car [4]

- *Global positioning system (GPS)*: This technology helps in navigating the location of your vehicle by mobile tracker. It not only helps in finding a parking spot instantly or the best route for travelling with minimum traffic but also helps in the safety of our vehicles from thieves.
- *Impact sensor*: It is also known as a shock sensor. Impact sensor detects sudden collision and in result of a shock it deploys an airbag for the safety of passengers.
- *Theft protection switch*: It is basically designed to protect our cars from thieves. It is installed in hidden places of cars. It has two types.  
Type 1: When you insert a key to ignition and try to start the vehicle, it will show all speedometer lights and won't start until you push the Theft protection switch.  
Type 2: When you switch on the ignition it won't show speedometer lights until you push the Theft protection switch.
- *Pollution Control*: As we all know a huge amount of mass do not switch off their vehicles at red traffic lights because of which pollution is increasing tremendously. Our governments and NGOs aware us many times but the results are still very gloomy. So, we can make an IoT device which will transmit signals. That can only be received by Theft protection switches to enable them. Further, when the Theft protection switch is enabled, the car will turn disable automatically. Furthermore, this technique will save our precious fossil fuels and pollution can also be controlled. Whenever, Traffic lights show red light, these devices will transmit signals and then all the stationary cars will be disabled under a limited range from Traffic light. Further, when the Traffic pole shows green light that signal will be stopped and the cars can again enable their engines

### III. Discussion

There are lots of development scope in future with IoT as discussed below.

*AI & IoT*: IoT collects data and sends it to AI. AI takes the data and gives some useful actions. VUI (voice user interface): User just speaks some command and the command will run.

*Miniaturization of Things*: Those devices which have the ability to collect data, store data, compute data are known as IoT things. So, we have to minimize their size without compromising with their performance and efficiency. We miniaturize devices so that we implant them anywhere, even in the human body.

*Power*: IoT devices are low powered. They do minimum energy consumption. We can use solar energy and wind energy as a power to them.

*Big Data & IoT*: There is a huge amount of data generated by IoT devices. We have to deal with this big data in the future. We have to find a solution for the problem generated by this big data.

There are other benefits of this technology also such that *Efficient resource utilization*, use resources efficiently because they are precious and limited. They also *Save the time* with high speed and advanced functions which makes things easy and quicker. IoT devices are *Userfriendly / Easy to use* anyone can easily operate them with very less time investing in its learning. They provide excellent *Security* to avoid many accidents and crimes. Eventually, one of the important benefits is we will be very less prone to *Human errors and Human efforts* will

automatically degrade.

There are substantial challenges also that might be encountered and need to be thoroughly considered while implementing IoT devices in safe driving. The data we retrieve from IoT devices many times fluctuate from real time data. There are many reports of accident of *Self Driving Cars*. The First and foremost accident that resulted in death happened in Florida on May 7, 2016. The first Uber self-driving car crash occurred on November 20, 2018 in Tempe, Arizona (fig 2). This crash takes the life of Elaine Herzberg [5]. **Uber** was involved in 37 crashes prior to deadly accident in 2018. It is the most dangerous side of IoT based cars. We can't play with human life. Similarly, vehicles would depend more on *GPS* for direction and unfortunately, *GPS* is not 100% accurate. A huge amount of expenditure and investment is needed in maintaining self driving cars. Drivers may need to attend special training to learn how to operate their autonomous vehicle safely as it is not easy to use. For implement *Theft protection switch* their signal should possess strong security and privacy features to avoid leaking and hacking attempts.



Figure 2. 2018 Self-driving Car crash [5].

#### **IV. Conclusion**

This paper discussed the importance of IoT devices in automobiles for safe driving and how IoT devices can be used to control the pollution by vehicles. This paper also highlighted some effective and unique features based on sensors in the car that will lead to a safe journey for drivers. In the end, this paper also mentioned the future of IoT devices and their benefits.

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