

A Study on Upcoming Technologies in Automobile

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Abstract: Automobile is one of the fastest growing sectors of the world. In achieving this, new technologies and inventions are helping the industry to meet high aspirations of the customer. New vehicles with superior technology are providing a better comfort and safety to the driver and at the same time surprising them with new facilities. New technology is focusing on safety, efficiency and the environment. The most important upcoming technologies that truly have a chance to be implemented are

- Energy Storing Body Panel
- Airbags that help stop car
- Augmented Reality Dashboard
- Self Driving Cars, and
- Cars that communicate with each other and the road

As time is very important in our life, the need of the hour is to move from one place to another in shortest duration without risk of accident. When these technologies are implemented, we will be able to avoid 79% of the accidents.

Key Words: Body panel, Airbags, Augmented Reality Application and V2V Communication.

1. INTRODUCTION

In this fastest growing world, auto industry is incorporating the latest technologies to ensure drivers better safety, comfort and entertainment, as well as keeping in mind its effects on environment. Most technologies incorporated are for safety, efficiency and environment. Some of them would revolutionize not only automobile industry but human transportation in general. Here we are going to discuss some of the new technologies that will be the key focus for future production in order to provide lot of information, which we were never getting before and thus making our ride enjoyable.

2. UPCOMING TECHNOLOGIES

The most important upcoming technologies that truly have a chance to be implemented is as follows:-

- Energy Storing Body Panel
- Airbags that help Stop Car
- Augmented Reality Dashboard
- Self Driving Cars and
- Cars that Communicate with each other and the Road

2.1 Energy Storing Body Panel

A group of eminent auto manufacturers are researching, developing and testing body panels that can store energy and at

the same time can be charged in a shorter duration than the conventional batteries. These panels are made of polymer fibers and carbon resins that are strong enough to be used as vehicle body parts, pliable enough to be molded into panels and at the same time could reduce the weight of the car by up to 15% as shown in figure 2.1 [1].

The panel of the car could store energy produced by different technologies such as regenerative braking or when the car is plugged in over night for charging. The stored energy is then transferred to the car when it is needed. By doing so it will help to reduce the size of the hybrid batteries and at the same time reduce weight of the car and hence eliminating waste energy to move the extra weight of the vehicle and batteries. This will ultimately lead to an environmental friendly car.

The car's body panels serve as a battery

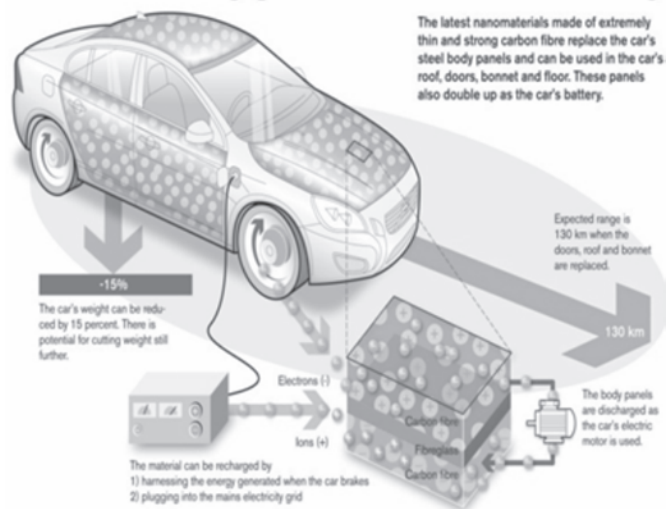


Fig 2.1: Energy saving car body panel [2]

2.2 Airbags that help Stop Car

Airbags are used in automobiles as a safety device to safeguard the passengers in case of a head on collision. Most cars today in developed countries have two bags made of nylon material, one for the driver and other for his co-passenger. These bags get inflated by nitrogen gas within milliseconds of a crash by sensors. These are available as optional safety features in Indian cars also.

Mercedes is now trying to use airbags to stop a vehicle in case of a crash by deploying them underneath the car. So the airbags

here are also part of active safety system and become functional when sensors determine that the impact is inevitable. The bags have a friction coating on its surface facing the road, which when inflated comes in contact with the road and offers heavy friction there by stopping the vehicle instantaneously as shown in figure 2.2. By deploying this system the braking power of the vehicle doubles over the conventional ones. Apart from braking, the bag lifts the vehicle up to 8 cm, which counters the normal car's dipping motion when sharp brakes are applied. Airbagbraking improves bumper to bumper contact and also helps the passenger not to move forward sharply to reduce the impact on him during collision.

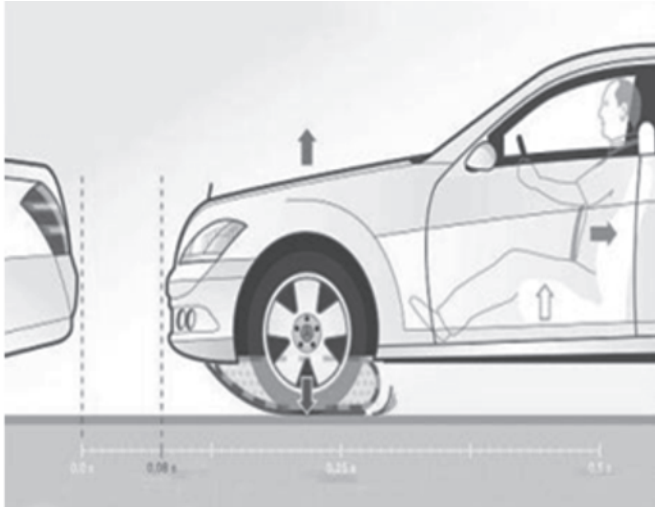


Fig 2.2: Airbags that help Stop Car [3]

2.3 Augmented Reality Dashboard

Augmented reality (AR) is the result of an overlay of computer generated information on the real world environment sensed by the driver, and is produced by human- computer interaction. This information is displayed in the space in front of the windshield that overlaps real scene in a vehicle, as shown in figure 2.3 and thus becomes a part of navigation system. This information helps the driver to navigate the vehicle very conveniently and effectively without taking his sight off the road.

Normal GPS system provides all the information necessary to driver for moving from point A to point B. But the augmented reality dashboard will be able to identify objects in blind spots and will provide such details as how far away the objects is from the vehicle and how to navigate the vehicle to avoid collision. If the vehicle is approaching another vehicle too quickly, a red box may appear on the vehicle being approached. Further it will display information on the windshield as to how to maneuver into next lane before the vehicle could collide with other vehicle.

An augmented reality GPS system could provide all the information such as actual lane you need to be in and show you when to change a lane in order to take a turn or when approaching a crossing, without you ever having to take your eyes off road. This will help to achieve less stressed driving and their by better comfort to the driver.



Fig 2.3: Augmented Reality Dashboard [4]

2.4 Self Driving Cars

A vehicle can be made self driven by using technologies such as laser, radars and cameras, which gather information about their surroundings, process them and can analyze much faster than human can.

The laser range finder mounted on the roof of car generate a detailed 3-D map of the environment, combines with high resolution map of the world, providing different types data models that help it to drive itself while avoiding obstacles and following traffic laws.

The vehicle also carries four radars mounted on the front and rear bumpers that allows the car to see far enough to be able to navigate the car through the heavy traffic.

A camera positioned near the rear view mirror, detects traffic lights and a GPS/wheel encoder etc that determine the vehicle's location and guides its movement. The location of above mounting on car are shown in fig 2.4.

In California, Google engineers have already tested self driving cars on more than 200,000 miles [1] in highways and cities successfully. Americans spends an average of 100 hours sitting in traffic every year.

Self driving cars learned the details of a road by driving on it several times. These cars not only records images of the road and surroundings but their computerized map view, road signs and traffic light before they are even visible to a person and finds alternative roots. Another advantage of self driving cars is that they can drive themselves by opting to engage in a platooning, where multiple cars drive very close to each other as one unit. The vehicles can communicate to each other and act simultaneously; therefore the chances of accidents on highways are reduced. Self driving cars could make transportation safer by eliminating the cause of 95% [1] of accidents (negligence/human error), and at the same time provide better comfort to the driver.

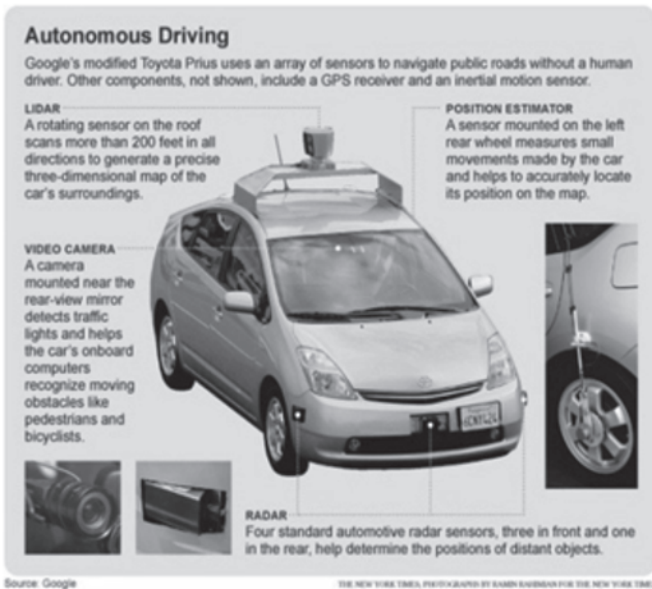


Fig 2.4: Self Driving Car [5]

2.5 Car that Communicate with each other and the Road

A new technology called vehicle to vehicle communication or V2V in cars uses advanced radar system to sense things around the cars and takes corrective actions to prevent accidents. Apart from this safety system, V2V makes vehicle to recognize each other on the road, share the information like speed, location, and travel direction and make predictions about what other cars might do and also helps to keep the vehicle at safe distance to each other. Figure 2.5 show how the information from one car is shared by other cars running side by side.

Advance versions of V2V communication is vehicle to infrastructure communication, which helps vehicle to recognize traffic signals, road signals and helps to maneuver the car safely on the road.

Another potential application of V2V communication is "Surveillance on the road". This system helps in tracking and reporting suspicious vehicle to the police.

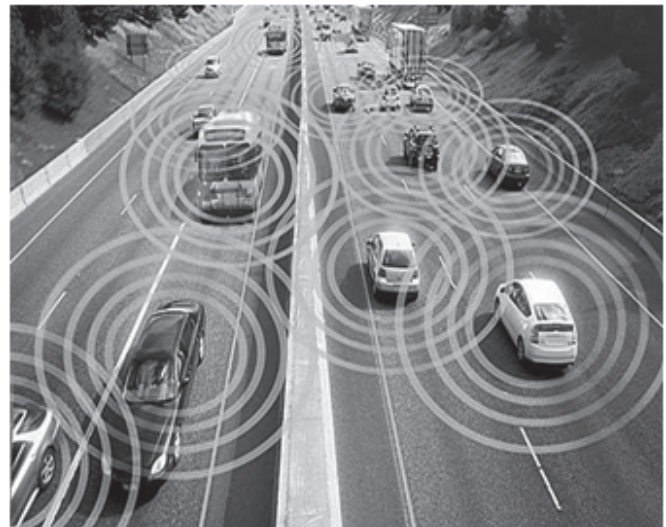


Fig 2.5: Vehicle-to-Vehicle communication [6]

3. CONCLUSION

If these technologies are developed successfully will help to

- I. Reduce vehicle accidents by 79% [1].
- II. Increase efficiency of the vehicle with varied energy sources and regulated emissions.
- III. Save on average 100-150 working hours in a year which the driver spends in traffic [1].
- IV. Provide comfort and much better safety to the driver. Enhance the capability of police in tracking culprits moving in a vehicle

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