Research Article

Need of Advanced Driver Assistance Systems

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Abstract

The automobile manufacturers invest millions in developing technologies to keep drivers safe and avoid accidents while driving their vehicles. These technologies are known as Advanced Driver Assistance Systems (ADAS). It includes systems based on sensors, such as Lane departure warning system, Electronic stability control, Active cruise control, Pre-crash systems. This paper presents the concept, different driver assistance systems, need and impact of ADAS. These are the systems which will help in automated driving.

Keywords: ADAS, active safety, driver assistance, automated driving.

1. Introduction

Road accidents have been a severe public health problem around the world. In India nearly 5 lakh accidents have taken place in 2016, killing roughly 1,50,000 people and leaving many others injured. India is a developing country and the rate of motorization is very high. The rapid development in road networks and

Advanced Driver Assistance Systems (ADAS) were built by the motive to increase vehicle safety and to decrease the number of road casualties. ADAS is made of the different sensors like RADAR, LIDAR, cameras, ultrasonic sensors and night vision sensors which allows the vehicle to monitor the surrounding areas around it and to enhance vehicle, driver, and pedestrian's safety depending on factors such as weather, traffic and dangerous road conditions. With upcoming technology ADAS play an important role in real time by warning the driver or by operating the control systems which help in the safety of vehicles and road accidents

Passive safety technologies like seatbelts, airbags cannot prevent accidents. Traditional active safety technologies such as Antilock Braking System, Electronic Stability Control are intended to improve driving stability. Modern ADAS like Lane Departure Warning, Pre-crash Systems, Blind Spot Detection, Adaptive Headlight, Parking Assistance, Cooperative Driving etc. help to avoid accidents and provides safety for the driver.

2. Objective

1. To enhance active safety of a vehicle.

2. To reduce the number of accidents.

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- 3. To make driving safer.
- 4. To alert the driver to potential problems.
- 5. To improve vehicle stability.

3. Advanced Driver Assistance Systems

There are different types of driver assistance systems, which help the driver and build safety platform for vehicles. Some systems are crucial to provide the safety of the driver while others may alert the driver of potential problems and assist the driver avoid minor road accidents. The basic working of ADAS is shown in Fig1.



Fig.1 Basic working of ADAS

3.1 Adaptive Cruise Control

Adaptive cruise control in the vehicle consists a forward radar or laser sensor which scans the area in front of the vehicle. The system automatically controls the speed of the vehicle by matching speed of the vehicle in the front and applies automatic braking and reduces acceleration to follow the vehicle. Such systems are good for long drives on highways and less traffic areas and also helps to avoid over speeding. It reduces the driver stresses for constant acceleration and braking.

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Fig 2. Adaptive cruise control

3.2 Adaptive Headlights

Adaptive headlight is an active safety feature invented to increase driving safety at night or in dim light circumstances by improving the visibility while taking turns on curved roads and while climbing over hills. When driving around a curved road, the stock headlights continuously shine in the straight direction, brightening the side of the road and the road in the front of the vehicle remains dark. In case of adaptive headlights the light beams changed their direction of illumination according to input of the steering wheel of the vehicle and making the curved roads visible.



Fig 3. Adaptive curve lights

Automatic beam switching is an advanced feature available in a vehicle which effectively does the automatic selection of the light beam according to the road conditions, traffic and surrounding areas. This system responds to the oncoming traffic by dipping from high beam to low beam and when there is no vehicle ahead it automatically switches back to high beam. Some of intelligent light system produced by car manufacturers provide a continuous and steady range of light beam.



Fig 4. Automatic beam assist

3.3 Lane Departure Systems

Lane departure warning systems helps to alert the driver if he is changing the road lanes without providing the signal by indicators. It even controls the steering of the vehicle incase no action is taken by the driver. This system ensures that the vehicles are in the driving lane. If the lane markings are not visible or faded then the working of the system may not be efficient.



Fig 5. Lane departure system

3.4 Blind Spot information Systems

The areas around a vehicle where the driver cannot recognize an obstacle with the help of their mirrors and are required to look away from the road in order to see it are called blind spots. These areas are normally around shoulders of the driver and we cannot see them in rear view mirror.

This system uses radar or laser sensors to detect the existence of other vehicles or obstaclesto the side and behind the vehicle and is designed to assist the driver when lanes are to be changed. If the system recognizes a vehicle in the driver's blind spot, the system automatically alerts the driver by a warning indicator.

This system can take corrective measures to avoid accidents by controlling the speed of the vehicle by analyzing the surrounding. If obstacle is detected at rear wheels the car is accelerated to avoid collision. If obstacle is detected at front wheels then braking is applied on the wheels.



Fig 6. Blind spot detection

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3.5 Pre-crash systems

It is a safety system of an automobile which is designed to alert a driver to probable accident and to reduce major collision of vehicles. They are also known as Collision Avoidance System or Forward Collision Warning Systems. These systems use radar, camera or laser sensors which are directed to scan the area in the front of the car and detect vehicles and other obstacles in the car and alert the driver by warning through an audible sound. It uses advanced braking systems which automatically applies appropriate brakes depending on the speed distance between the vehicle and obstacle and even seat belts are provided some tensioning.



Fig 7. Collision avoidance system

4. Results and Discussions

1. Advanced Driver Assistance Systems (ADAS) will play an important role in providing assistance to drivers who get distracted while driving and have poor peripheral vision.

- 2. The drivers will be alerted about the potential problems well in advanced.
- 3. This system is useful for new drivers and will help to build confidence in them.
- 4. It may also reduce fatigue and stresses of a driver.

5. The acceptance of this system will vary from person to person because some people may find the system overconcious.

Conclusion

Advanced Driver Assistance Systems (ADAS) will help to improve the driver safety and will making driving safer. It is different than the passive safety systems and other traditional safety features like Anti-lock Braking System (ABS) and Electronic Stability Control. The acceptance of this system will vary from user to user. Further research in this field are led towards autonomous driving vehicles.

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