Advance Driver Assist System (ADAS)

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Abstract: *Today all are moving very fast, everything is done in very faster. If we think in the case of vehicles our technologies are improving. The technology in the vehicles can be divided into two perspectives 1) Based on engine performance and milage.2) Based on safety of vehicles.Now we think about the safety of vehicles and how the technologies are helping to protect the passengers from the vehicles. There are primitive technologies such as seat belts, airbags, abs etc but these technologies only work in the case of when an accident is occurred. But now we think about a system that help all the phases of driving that is ADAS.We examined drivers' experience using 13 different advanced driver assistance systems (ADAS) and several reasons that may explain rates of use through a nationally-distributed survey.We examined drivers' experience using 13 different advanced driver assistance systems (ADAS) and several reasons that may explain rates of use through a nationally-distributed survey.*

Keywords: ADAS, Automotive Safety Systems, Radar and Vision Sensing, etc.

I. INTRODUCTION

Advance driver assist system not a system for self-drive car. It is a system help the driver to find the blind spot of a vehicle, Manages the vehicle when an emergency is occurred *e.g.,* when the vehicle needs an emergency break, the vehicle manages itself.

II. WHY ADAS IS IMPORTANT?

The number of road traffic accidents is one of the major societal problems in the world today. According to estimated data from the WHO, 1.2 million people are killed and as many as 50 million are injured each year. 50% of rear-end collisions occur without any braking and 70% with insufficient brake intensity. Many of these accidents could be avoided if the automatic systems were used to help humans when braking. Advanced Drive Assistance Systems (ADAS) cannot completely prevent accidents, but it could better protect us from some of the human factors and human error is the cause of most traffic accidents. Whether new vehicles technologies are accepted also may be influenced by the age of the user. Perceptions of self-driving vehicles among older adults has been shown to be positive in terms of their attitude, perceived usefulness, trust, and acceptance as users.

III. DIFFERENT TYPES OF ADAS TECHNOLOGY

13 ADAS technologies and asked whether they currently drive or have regularly driven a vehicle equipped with any one of the presented technologies.

1. Brake assist
2. Forward-collision warning
3. Automatic emergency braking
4. Pedestrian detection
5. Adaptive cruise control
6. Blind-spot warning
7. Rear cross-traffic alert
8. Lane-departure warning
9. Lane-keeping assist
10. Active head restraints
11. Back-up camera
12. Parking assist system

13. Automatic high beam

IV. ADAS LEVELS

ADAS is classified into six levels 0-5

Level-0(Driver assistance)

Most vehicles on the road today are Level 0: manually controlled.

The human provides the "dynamic driving task" although there may be systems in place to help the driver.

An example would be the emergency braking system, since it technically doesn't "drive" the vehicle, it does not qualify as automation.

Level 2 (Partial Driving Automation)

This means advanced driver assistance systems or ADAS. The vehicle can control both steering and accelerating/decelerating.

Here the automation falls short of self-driving because a human sits in the driver's seat and can take control of the car at any time. Tesla Autopilot and Cadillac (General Motors) Super Cruise systems both qualify as Level 2.

Level 3 (Conditional Driving Automation)

Level 3 vehicles have "environmental detection" capabilities and can make informed decisions for themselves, such as accelerating past a slow-moving vehicle.

But—they still require human override. The driver must remain alert and ready to take control if the system is unable to execute the task.

Level 4 (High Driving Automation)

Level 4 vehicles can intervene if things go wrong or there is a system failure.

In this sense, these cars do not require human interaction *in most circumstances*. However, a human still has the option to manually override.

Level 4 vehicles can operate in self-driving mode.

But until legislation and infrastructure evolve, they can only do so within a limited area (usually an urban environment where top speeds reach an average of 30mph). This is known as geofencing.

Level 5 (Full Driving Automation)

Level 5 vehicles do not require human attention—the "dynamic driving task" is eliminated.

Level 5 cars won't even have steering wheels or acceleration/braking pedals. They will be free from geofencing, able to go anywhere and do anything that an experienced human driver can do.

Fully autonomous cars are undergoing testing in several pockets of the world, but none are yet available to the general public.

How ADAS is Different from Self-Driving Cars?

In autonomous vehicles (SELF DRIVING CARS) the control is fully granted to machine from self-driving to handling or steering and braking. The driver does not control anything, it can drive itself in the right direction following the right path and traffic rules without colliding any object.

Whereas, in ADAS, systems are installed to assist the drivers when they unable to recognize the situation. In ADAS, systems work semi-autonomously to take quick action when a driver does not pay attention to make the driving safe and trouble-free.

When ADAS level 3 exceeds It become self-Driving cars

V. WORKING OF ADAS BASED SENSORS

Sensor networks - application of multisensory platforms and traffic sensor networks. ADAS provides additional information from the car surrounding environment to support a driver and assist in implementing critical actions. The synchronization of a driver's actions and the information from the environment is essential for the efficient performance of the various applications of ADAS. In the Adaptive Cruise Control system (ACC), three radar sensors are usually needed because two short range radars are used to detect objects in the adjacent lane and one long range radar is used to detect objects in-path.

As Driver Assistant Systems (DAS) and Active Safety Vehicles (ASV) with various functions become popular, it is not uncommon for multiple systems to be installed on a vehicle. If each function uses its own sensors and processing unit, it will make installation difficult and raise the cost of the vehicle. As a countermeasure, research integrating multiple functions into a single system has been pursued and is expected to make installation easier, decrease power consumption and vehicle pricing. Road boundaries can give useful information for evaluating safe vehicle paths in intelligent vehicles. Much previous research has studied road boundary detection, using different types of sensors such as vision, radar, and lidar. Lidar sensors, in particular, show advantages for road boundary extraction including high resolution and wide field of view.

Lane recognition is important ADAS component needed for a variety of driver assistance systems. For example, Lane Departure Warning (LDW) and Lane Keeping rely on information provided by a lane estimation algorithm. One important step of the lane estimation procedure is the extraction of measurements or detections which can be used to estimate the shape of the road or lane. These detections are generated by white lane markers or the road border itself. Lane estimation has for many years been under heavy development using a grey scale camera. Passive camera-based systems can be degraded on its performance under certain circumstances, e.g., at dynamic changes of ambient brightness.

Cooperative Intersection Collision Avoidance Systems (CICAS) detects information via vehicle-based sensors, which can be combined to produce better real-time knowledge of the dynamic “statemap” of an intersection. That information can be calculated by the intelligence system in each car and can alert a driver about impending hazards. Traffic Sign Recognition is a display on the instrument panel that reminds drivers of the current speed limit. This is achieved through the use of the same camera system that can also recognize speed limit signs.

Navigation systems also support this solution by storing information about the speed limit on an unsigned road. The curve warning and Adaptive Cruise Control are examples of ADAS application that use this information. The Adaptive Cruise Control application can determine whether a tracked vehicle is temporarily lost due to an upcoming curve. Once this is done, ACC can now maintain the vehicle’s speed and the appropriate following distance. This system follows the flow of the traffic that is ahead of the vehicle even if its forward progress is only stop-and-go, which is useful especially in traffic-jams.

The Blind Spot Detection (BSD) helps a driver when he pulls out in order to overtake. Sensors monitor the road area behind and next to the vehicle and warn the driver if he tries to pull out when there is no room. The system is especially useful in heavy traffic on multi-lane freeways or highways as well as in urban traffic.

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This system can be used to reliably calculate the collision trajectory and speed of the crossing vehicle and how far away it is, which allows the ADAS to be improved by this new warning function. Emergency Brake Assist (EBA) ensures optimum braking by detecting critical traffic situations. When EBA detects an impending collision, the braking system is put on emergency standby. Next, the driver is alerted and a slight pre-brake begins in order to save valuable stopping distance.The headlamps are set to provide optimum lighting via a continuous change of the high and low beams of the lights. Another important parameter is a data acquisition and processing rate.

It has been assumed that driving with 90 km/h speed, spacial resolution of detection is not greater than 1m. Therefore radar, visual or IR camera must read and process at least 25fps. In addition to the above-mentioned many new applications are being developed and optimized continuously to enhance the safety [11] of passengers and pedestrians or animals and also to provide more comfortable and economical driving.

VI. CONCLUSION

Our results capture drivers' use rates of certain Level 0 and Level 1 ADAS technologies and explore certain factors such as age and whether or not drivers who have experience using vehicles equipped with Level 1 systems, impacts understanding, trust, and perceived ease of use as each one relates to ADAS. Driver assistance technologies continue to develop and enter the market, however consumers' understanding, and acceptance of such technologies seems to trail behind most technologies' emergence. Assessing consumers' perceptions of ADAS is critical for the continued deployment of these technologies and for improving our understanding of what makes ADAS effective for driver use.

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