Smart Cars

Athul Vijay & Arjun Sreenivas
S4, Department of Mechanical Engineering
Mohandas College of Engineering and Technology

Abstract

Science is a long way from producing machine as powerful as the human brain. However, the search fo artificial intelligence has come a long way since the first robots. New technologies enables scientists to produce devices capable of a range of human-like action, while many scientists now look to the insect world for inspiration for tomorrow's thinking machines. This paper aims at three basic concepts of driving that is vehicle efficiency, driver comfort & eco-friendliness. The future is not something that we enter' but we create. So, the smart car.
Smart cars just don't mean cars that run on artificial intelligence. It's a combination of works assembled to make a masterpiece. Imagine a car with high efficiency, a car that can ease the driver stress, increase the safety & finally be eco-friendly, when all this comes in one bundle we get the smart cars. Artificial intelligence (AI) is the intelligence of machines and the branch of computer science that aims to create it. The study and design of intelligent agents,"where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success. Artificial intelligence has been the subject of optimism, but has also suffered setbacks and, today, has become an essential part of the technology industry, providing the heavy lifting for many of the mostdifficult problems in computer science. AI research is highly technical and specialized, deeply divided into subfields that often fail to communicate with each other. In this paper we are discussing about the impacts of ai in automobile industry. I-car is the latest emerging trend using ai as the base of operation. Most of the time, smart cars are mistaken with hybrid vehicles, smart cars are vehicles that use the latest technologies along with ai & other ultra modern technologies to ease human control over vehicles

Adaptive Cruise Control

Autonomous cruise control is an optional cruise control system appearing on some more upscale vehicles. The system goes under many different trade names according to the manufacturer. These systems use either a radar or laser setup allowing the vehicle to slow when approaching another vehicle and accelerate again to the preset speed when traffic allows. ACC technology is widely regarded as a key component of any future generations of intelligent cars. Laser-based systems are significantly lower in cost than radar-based systems; however, laser-based ACC systems do not detect and track vehicles well in adverse weather conditions nor do they track extremely dirty (non-reflective) vehicles very well. Laser-based sensors must be exposed, the sensor (a fairly-large black box) is typically found in the lower grille offset to one side of the vehicle. Radar-based sensors can be hidden behind plastic fascias; however, the fascias may look different from a vehicle without the feature. For example, Mercedes packages the radar behind the upper grille in the center; however, the Mercedes grille on such applications contains a solid plastic panel in front of the radar with painted slats to simulate the slats on the rest of the grille. Radar-based systems are available on many luxury cars as an option for approx. 1000-3000 USD/euro. Laser-based systems are available on some near luxury and luxury cars as an option for approx. 400-600 USD.Two companies are developing a more advanced cruise control that can automatically adjust a car's speed to maintain a safe following distance. This new technology, called adaptive cruise control, uses forward-looking radar, installed behind

the grill of a vehicle, to detect the speed and distance of the vehicle ahead of it.Adaptive cruise control is similar to conventional cruise control in that it maintains the vehicle's pre-set speed. However, unlike conventional cruise control, this new system can automatically adjust speed in order to maintain a proper distance between vehicles in the same lane. This is achieved through a radar headway sensor, digital signal processor and longitudinal controller. If the lead vehicle slows down, or if another object is detected, the system sends a signal to the engine or braking system to decelerate. Then, when the road is clear, the system will re-accelerate the vehicle back to the set speed.The 77-GHz Autocruise radar system made by TRW has a forward-looking range of up to 492 feet (150 meters), and operates at vehicle speeds ranging from 18.6 miles per hour (30 kph) to 111 mph (180 kph). Delphi's 76-GHz system can also detect objects as far away as 492 feet, and operates at speeds as low as 20 mph (32 kph).Adaptive cruise control is just a preview of the technology being developed by both companies. These systems are being enhanced to include collision warning capabilities that will warn drivers through visual and/or audio signals that a collision is imminent and that braking or evasive steering is needed. The cruise control system actually has a lot of functions other than controlling the speed of your car. For instance, the cruise control pictured below can accelerate or decelerate the car by 1 mph with the tap of a button. Hit the button five times to go 5 mph faster. There are also several important safety features -- the cruise control will disengage as soon as you hit the brake pedal, and it won't engage at speeds less than 25 mph (40 kph).
BMW 7 Series, 5 series, 6 series, 3 series, Audi A4.

Lane Departure Warning System

If the car concludes that the driver is drowsing (more on that later), it issues an audible alarm, and an icon depicting a cup of coffee flashes on the instrument panel The company's Driver Attention Warning System uses a voice alarm: If a driver is nodding off, the car announces "You are tired," followed by "You are dangerously tired! Stop as soon as it is safe to do so!" The driver's seat also vibrates to help rouse him or her. Additional measures, like emitting puffs of air on the back of a dozing driver's neck, vibrating steering wheels and automatic steering that takes over and gently uides you back into your lane when you drift, may all be found in driver alert systems soon. How can a car tell when you're nodding off? Researchers are tweaking already extant car safety technologies and applying them in new ways. For example, blind-spot warning systems in today's digital cars keep an eye out for other vehicles in places you can't see. They also analyze your car's relation to its lane and whether your turn signal's on or not. Add to this system automatic steering that kicks in when you drift, and you've got part of a drowsy driver alert system. onboard computer uses facial recognition software to determine if you're drowsing. Night vision cameras trained on your face analyze slackening facial muscles, your blinking patterns and how long your eyes stay closed between blinks. Once it concludes you're no longer awake, the system kicks in to rouse you from your dangerous slumber.

Adaptive Highbeam

Adaptive Highbeam Assist is the newest headlamp technology, introduced in 2009 in the new generation Mercedes-Benz E-Class. It is based on camera mounted behind the windshield and automatically and continuously adapts the headlamp range to the distance of vehicles ahead or which are oncoming. The same technology is also present in the BMW 7 series. BMW's version of this technology, developed in cooperation with Mobileye, uses swiveling headlights that always point in the direction the vehicle is steering so therefore the road ahead is better illuminated and obstacles become visible sooner. Adaptive Highbeam Assist is the newest headlamp technology,

introduced in spring 2009 in the new generation Mercedes-Benz E-Class. It is based on camera mounted behind the windshield and automatically and continuously adapts the headlamp range to the distance of vehicles ahead or which are oncoming.

The same technology is also present in the BMW 7 series. BMW's version of this technology, developed in cooperation with Mobileye, uses swiveling headlights that always point in the direction the vehicle is steering so therefore the road ahead is better illuminated and obstacles become visible sooner. Even when the high beam is warranted by prevailing conditions, drivers generally do not use them.[57] There have long been efforts, particularly in America, to devise an effective automatic beam selection system to relieve the driver of the need to select and activate the correct beam as traffic, weather, and road conditions change. Early systems like Cadillac's *Autronic Eye* appeared in 1952 with an electric eye atop the dashboard (later behind the radiator grill) which was supposed to switch between low and high beam in response to oncoming traffic. These systems could not accurately discern headlamps from non-vehicular light sources such as streetlights, they did not switch to low beam when the driver approached a vehicle from behind, and they spuriously switched to low beam in response to road sign reflections of the vehicle's own headlamps. Present systems based on imaging CMOS cameras can detect and respond appropriately to leading and oncoming vehicles while disregarding streetlights, road signs, and other spurious signals. Camera-based beam selection was first released in 2005 on the Jeep Grand Cherokee, and has since then been incorporated into comprehensive driver assistance systems by automakers worldwide.

Intelligent Light System is a headlamp beam control system introduced in 2006 which offers five different bi-xenon light functions,[58] each of which is suited to typical driving or weather conditions:

Country mode
Motorway mode
Enhanced fog lamps
Active light function
Cornering light function

Magnetorheological Fluid

The term "magnetorheological fluid" comes from a combination of *magneto,* meaning magnetic, and *rheo,* the prefix for the study of deformation of matter under applied stress. A magnetorheological fluid is a fascinating smart fluid with the ability to switch back and forth from a liquid to a near-solid under the influence of a magnetic field. They are mostly used as dampers in automobiles. If the shock absorbers of a vehicle's suspension are filled with magnetorheological fluid instead of plain oil, and the whole device surrounded with an electromagnet, the viscosity of the fluid, and hence the amount of damping provided by the shock absorber, can be varied depending on driver preference or the weight being carried by the vehicle - or it may be dynamically varied in order to provide stability control. This is in effect a magnetorheological damper. For example, the MagneRide active suspension system permits the damping factor to be adjusted once every millisecond in response to external conditions. The application set for MR fluids is vast, and it expands with each advance in the dynamics of the fluid.

Regenerative Braking

The ability to harness the power and energy which in many cases has been wasted in the past, such as solar panels, is an effective bonus for the electric car industry. One such method of harvesting “waste power” is regenerative braking which effectively translates the power produced when breaking into a system which allows the electric car battery to be recharged on an ongoing basis. When you consider how often you break and how much energy and power is used to slow down your vehicle, the ability to literally harness this waste energy can make a significant difference to

the efficiency of your vehicle and the impact on the environment.

Hybrid Engines

In simple terms a hybrid vehicle is a vehicle that uses a traditional internal combustion engine together with an electric backup system which can either take the lead or backup the more traditional engine fuel system. Depending upon what type of hybrid engine is available in your vehicle you will notice a distinct difference in the noise when you drive and also in the efficiency of your vehicle which is likely to offer significantly greater mileage over a traditional vehicle. A number of tests have been carried out with regards to hybrid vehicles and their impact on the environment which seem to show a reduction of around 25% in pollution. In many ways hybrid cars have been used to "break the back" of consumers who are concerned about the reliability and cost of electric cars. Hybrids also offer a significant improvement on environmental damage when compared to more traditional cars and can in many ways improve not only the efficiency of driving on the roads of today but also maximum journey lengths.

Future of Smart Cars

Smart cars of the future will be using advanced technology to perform such functions as automatic cruise control, lane departure warnings and correction, hazardous object avoidance, driver awakenings, position and satellite monitoring, self-parking and driverless transportation.

Researchers are developing automotive technology so that in the future, smart cars will be able to interface by wireless and infrared connections with road signs, signals and other roadside communication devices. This will enable computerized smart cars to automatically determine driving conditions such as traffic ahead, road hazards or steep curves and make adjustments ahead of time.

Some day, smart cars will be able to determine their own speeds, put themselves on cruise control, take themselves off, avoid hazards and park themselves with little driver interaction. If you think this is just a pipe dream, then it's good to know that the European Union has already set forth its i2010 Intelligent Car Initiative.

The initiatives goals are to develop safer, cleaner and smarter vehicles. These intelligent cars or smart vehicles will be safer to drive by using technology such as adaptive cruise control to keep a safe distance from other drivers, lane departure warnings and lane change assistants, hypo-vigilance systems for sleepy drivers and an alcohol lock for those over the DUI limits.

Through advanced communication systems including computers, wireless networking and GPS, smart cars will also be able to interactively ease traffic congestion and take more favorable routes as traffic needs arise. Smart cars will also be intelligent enough to avoid pedestrians, bicyclers and others who are not driving automobiles.Hands-free motoring is another goal for smart car developers who wish to create public transportation systems with individual cars, taxis, shuttle buses and large transport buses that will carry passengers without the need for drivers.With the ever-increasing need for newer safety measures and way to decrease traffic congestion, it is most assured that smart cars will one day provide the relief and results that many are now seeking.

What the experience of the intelligent car of tomorrow will be like going by the technology of today.

Reference

1.Safety first: VDIM puts Toyota at the head of the safety technology pack in Japan | Automotive Industries | Find Articles at BNET

2."Revolutionary Lane departure system" -Dr Kaimen James Jr.

3.AMC Smart Cars ,Mark Donohue

4.The Car That Changed The World , Bruce W. McCalley