

New ERA of Automatized Vehicles Based on Sensors

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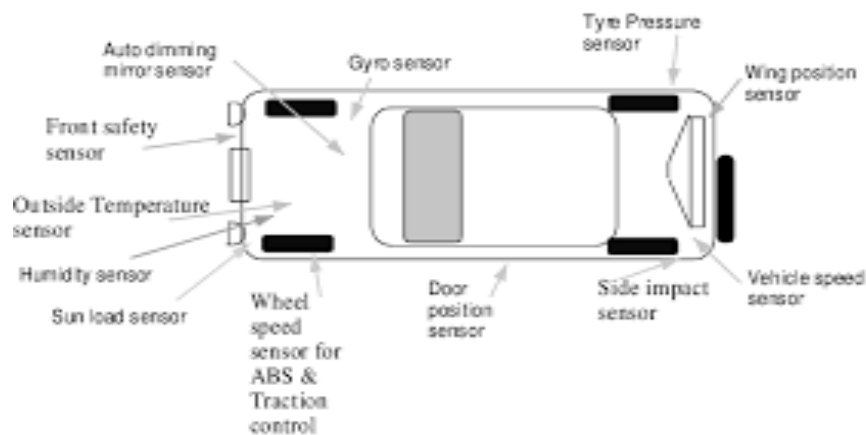
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Abstract: In this paper, we discuss the different type of sensors used in car. The sensor technology is something that is becoming more and more popular. It has also been implemented in cars. There are different types of sensors in modern cars. Approximately, 60 to 200 sensors are being used in a modern car. Sensors make the car operate very easily and identify the problems in a very short time. Different sensors serve different tasks. In this paper, we are going to different types of sensors in cars. We will talk about their functionality. We will also talk about the importance of these sensors. The computer is the real brain if you have a computerized engine control system. It uses the sensors to know what's happening inside the car. So you know how important car sensors and their functions are. The modern automobile designing can be using different types of sensors. These are arranged into the car engine to recognize & solve possible problems like repairs, servicing, etc. The sensors used in automobiles will check the function of the vehicle. An owner of a vehicle doesn't know the status of how many sensors are used in their vehicles. There are several largest sensor organizations available worldwide, which can offer an innovative solution to the customers. By using these sensors data we can increase comfort, efficiency, and safety.

Keywords: Sensors, Computerized, Vehicle, Car.

I. INTRODUCTION

Car sensors are important in order to drive your car smoothly. It will let you know if there is any problem with your car. So, it is important for you to know about car sensors and their functions.



Automobile sensors are intelligent sensors which can be used to control and process the pressure of oil, temperature, level of emission, coolant levels, etc. There are different types of sensors used in automobiles, but knowing the working of these sensors is essential.

Types of Sensors used in Automobiles

- Mass airflow sensor
- Engine Speed Sensor
- Oxygen Sensor
- Spark Knock Sensor
- Coolant Sensor

- Manifold Absolute Pressure (MAF) Sensor
- Fuel Temperature Sensor
- Voltage sensor
- Camshaft Position Sensor
- Throttle Position Sensor
- Vehicle Speed Sensor

Mass Air Flow Sensor : The MAF or Mass airflow sensor is one of the essential sensors used in automobiles. This sensor is used in an engine of the car. This sensor can be controlled by a computer and can calculate the density of the air which has been taken in by the engine. If the working of this sensor halts, then the running of the vehicle will be stopped. In addition, the usage of petroleum will be high. These sensors are classified into two types one of them is the vane meter, and the other one is the hot wire.



Engine Speed Sensor: The engine speed sensor in the automobile can be connected to the crankshaft. The main purpose of this sensor is to monitor the crankshaft's rotating speed. So that fuel injection & the engine timing can be controlled. There are different ways for the vehicle engine to stop unexpectedly. So this sensor will stop that for car drivers.



Another sensor that is used in a car is the engine speed sensor. It is another important sensor. Make no mistake about it. The sensor is attached to the crankshaft. Its job is to monitor the crankshaft. To be more precise, its job is to monitor the crankshaft's spinning speed.

Oxygen Sensor: It is a very familiar sensor. It is also known as the O₂ sensors. Located in the exhaust pipe or stream, usually near the exhaust manifold and after the catalytic converter, The sensor determines how much oxygen is left in the exhaust. It will point out whether the fuel is burning rich or lean. It can be a nuisance if the sensor does not work well. You will have some real problems a hand if the oxygen sensor does not work and you should replace it and fix the new one.



It's always essential to have the best oxygen sensor installed in your car. A faulty oxygen sensor will cause high fuel consumption which is something you want to avoid. So it is necessary to know How Oxygen Sensor Works and Why It's Important to Change If they fail.

Spark Knock Sensor: The spark knock sensor is used to ensure whether the fuel is burning smoothly, otherwise, it will cause an unexpected ignition. This ignition is very dangerous which will cause damage in the engine of the car like damage of rings, head gasket, and rod bearings. Fitting these parts can be costly. So this sensor is used to save all the troubles occurred in an engine of the car.



Coolant Sensor: The coolant sensor is probably the most important sensor. Because the computer relies on its input to control other functions. For example, activating or deactivating the Early Fuel Evaporation (EFE) system, spark advance and retard, EGR flow, canister purge, etc.



Generally, this sensor can be connected on the board. If the sensor is failed, then there will be some indications stalling, like poor fuel mileage, etc. So, the status of the sensor should be checked whether it is defective or not. If it is damaged, then it will be a problem.

Manifold Absolute Pressure Sensor (MAP)

The main function of this sensor in an automobile is to monitor the load of an engine. Mostly, it measures the dissimilarity among manifold pressure. This can be received from the outside pressure by the car to make sure that the car engine is capable to receive petroleum depending on the changes within the pressure.



Fuel Temperature Sensor: The fuel sensor is used to check the temperature of the fuel continually whether the fuel utilization is optimum or not. If the fuel of the engine is cold, then it will be denser. So it will take much time to burn due to its high density. On the other hand, you can't say the same thing about the warm fuel. The warm fuel is less dense. If the fuel is warm then it will take less time to burn. The warmer fuel burns faster and the colder fuel burns slower. Here, the main problem is the inflow varying levels. So this can injure other parts of an automobile.



If your car runs out of fuel, then many parts of your car may get damaged. So the sensor ensures the injection of the right amount of fuel. Thus, you can drive the vehicle smoothly. This sensor will monitor the petroleum is injected at the right speed and temperature. So that engine of the automobile works properly.

Voltage Sensor: Voltage Sensor is one type of sensor used in automobiles. The main function of this sensor is to manage the car speed and to make sure the speed of is increased (or) decreased as required. So it is essential to have in your car.



Throttle Position Sensor: The throttle position sensor is used with EFI (electronic fuel injection) and feedback carburetion. It informs the computer regarding the throttle opening rate as well as the position of the relative throttle. This sensor is a variable resistor, which is used to change the resistance as the throttle opens.



It is not complex to identify the faulty throttle position sensor symptoms. As there is a fall while speeding up, that your throttle position sensor is defective. It is the main symptom of a defective throttle position sensor. Then you can identify the faulty of the sensor. It is the major sign of a faulty throttle position sensor. Whenever you change this sensor, you cannot adjust it properly.

Vehicle Speed Sensor: This VSS sensor has the capability to verify the speed of the car wheels. It is a type of tachometer. This sensor is arranged within the anti braking system which is known as ABS. Additionally, the output of this sensor is also utilized for the odometer to read the speed of the vehicle to control gears depending on the vehicle speed.



These sensors are smart systems which are used for controlling different parts like coolant levels, temperature, the pressure of oil, levels of emission, etc. These automobile sensors are complex to allow a variety of values, decide and process the accurate combination.

Camshaft Position Sensor: It is one of the many examples of sensors that is worth mentioning. The control module uses the camshaft position sensor. It can indicate the position of the number one cylinder. In order to start the sequential fuel injection, the control module uses this piece of information as a reference point.

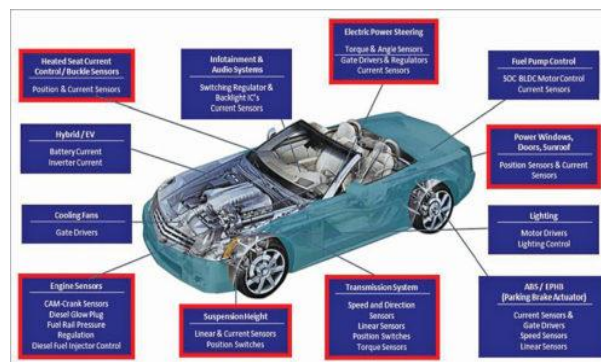


You need these sensors in cars for safety it is recommended that you buy quality sensors that are made by top automotive sensors manufacturers.

There are a lot of products out there on the market. Panlong Bluetooth OBDII Scanner, OBD2 Scanner CAN OBDII Code Reader, ANCEL AD310 Classic Enhanced Scanner, KOBRA Wireless OBD-II Scanner, BAFX Bluetooth OBD-II Scanner, Autel Autolink AL319 OBD-II Scanner, OxGord OBD-II Scanner, BlueDriver Professional Bluetooth OBD-II Scanner.

II. RESENT TECHNOLOGY IN THE AUTOMOTIVE INDUSTRY

In recent years, the automotive industry has worked hand-in-hand with major technology companies in order to deliver the most advanced, safest and most comfortable vehicles out there. Cars are becoming large smart devices with advanced emergency braking capabilities, mapping technology for autonomous driving, better fuel efficiency and cars as a service as a form of transportation. There are no shortages of ways in which cars are improving the lives of drivers and other vehicles around them in terms of safety, getting from point A to point B with less of a hassle and entertaining us throughout the process. Now one step closer to more connected and digitized environment.



Connected Mobile Apps: The Smartphone has changed everything, including how we interact with our cars. Most carmakers offer some sort of connected Smartphone app, but some are better than others. Look for one that lets you



remotely lock and unlock the doors, check the status of things like fuel and tire pressure, and even remotely start the car to warm things up on a cold winter's morning. cell phone are now capable of doing more than making calls, cars can do much more than drive and park.

More Fuel-Efficient Rides : Tesla is at the forefront of the fuel-efficiency movement, releasing a slew of electric and hybrid vehicles that can take you for hundreds of miles with a single charge. In 2016, more than 2 million electric vehicles were sold worldwide and this figure is expected to rise in the near future as more automotive manufacturers implement electric vehicle technology to their fold. Companies such as VW and General Motors have recently unveiled electric cars to their fleet, while Volvo said that all of the engines they produce will be equipped with an electric motor by 2019.

Predictive Vehicle/ Automobile Technology

Artificial intelligence (AI) and machine learning (ML) have an essential part in the future of the automotive industry as predictive capabilities are becoming more prevalent in cars, personalizing the driving experience and customizing the driving adventure. More manufacturers are applying algorithms that use data to automate the process of setting up a vehicle, including a car's infotainment system and its application preferences. Vehicles are becoming IoT devices which can connect to smartphones and take voice commands, changing the user interface.

Predictive vehicle technology can also be used in the form of sensors within a car that informs the owner whether or not the vehicle needs service from a mechanic. Depending on your car's mileage and condition, the technology will be able to estimate its performance, set up appointments in real time and inform users of any safety hazards linked with a malfunctioning car due to company recalls.

Self-Driving Technology: Autonomous vehicles are self-driving autos that utilize different cameras, sensors, an EPS motor, laser scanners, brake actuators, and obviously enchantment, to drive by itself. The most famous self-driving car, which has been around for many years and as yet going strong, has a place with Google. Google recently revealed the self-driving pod Waymo, while Local Motors released a fully-autonomous vehicle as well. Ford hopes to have a self-driving vehicle on the roads by 2021.

Numerous different automakers have additionally been working extremely hard on innovations for the autonomous vehicles. This technological progression could diminish vehicle accidents and decrease traffic.

Much has been made of autonomous driving technology, and while some companies have been testing their self-driving functionalities on open roads, we're still quite a ways away from widely adopting these cars. A number of cars already have semi-autonomous capabilities in the form of driver-assisted technologies. These include automatic-braking sensors, motorway lane sensors, mapping technology that monitors blind spots, cameras in the back and front of a car, adaptive cruise control and self-parking capabilities.

Cars-as-a-Service (CaaS) : Cars-as-a-service (CaaS) refers to an upcoming car rental service that allows city drivers to engage in a ride-sharing service. Smart device owners can hail a car with driverless technology through an app, which picks them up for their transportation or delivery needs. The great thing about the technology is that no driver's license is needed to access one of these vehicles, serving as a driverless Uber. This means of transport will be noticeably unique in numerous urban areas around the world, particularly where vehicular pollution and traffic are heating issues.

IHS Automotive predicts that driverless CaaS are on the horizon, expected to roll out before 2025. Such a technology could help to reduce mobility services costs, while also offering a safer alternative to a human driver. The rise of electric vehicle technology is helping to reduce carbon emissions without breaking the bank as more companies are designing cars with electric motors. Big data and AI are playing an essential role in the customization of vehicles as well, notifying car owners of when their vehicles need maintenance. Plus, the rise of self-driving vehicles and the potential of CaaS as a mobility service will save consumers greatly, while also increasing their safety.

Automatic High-Beam control: In the updated RX, Lexus offers a framework that naturally lights up and dims the high-beam headlights in connection to the moving traffic. A camera installed on the rearview mirror recognizes when the car is surrounding approaching traffic, and additionally vehicles ahead going a similar way, and withdraws the high beams.

Backup Cameras: The entry-level autos

Fit accompany a backup camera as standard, so, you don't generally need to turn your head to look back. Truth be told, rear-view cameras will be required on all vehicles less than 10,000 pounds. The advantages of these gadgets are self-evident. With a high-resolution image to reference, it turns out to be significantly less troublesome (however not feasible)



to hit over the trash bins toward the end of the parking, and even with parking sensors activated, backing into a tight place has never been simpler.

Smart Home Integration: The smart home integration technology was introduced with the Alexa amalgamation by Ford and Amazon in the year 2017. Alexa gives in-car command over carport doors, home lighting, and any other gadget that may be associated with your home's PC network through the SYNC3 infotainment system seen in new Ford automobiles. Different auto manufacturers are additionally venturing up to the bat with associated auto contributions.

GPS Vehicle Tracking: A GPS tracking system can help by updating a vehicle's position at regular intervals. It can be really helpful to parents who want to keep a watch on their teenager for safety concerns. Watching it live just needs Internet access. Little and convenient, the GPS device can be moved from vehicle to vehicle. It can likewise caution guardians through their phone if the vehicle's preset speed threshold is surpassed or if the vehicle enters/leaves certain regions. The items like LiveViewGPS are additionally convenient devices for organizations that want to track their fleet vehicles.

Vehicle-to-Vehicle Communication: Vehicle-to-vehicle communication or V2V is another new innovation in autos that enables vehicles to speak to each other, things around them and the road. All in all, like self-driving cars, this innovation can help essentially decrease traffic, vehicle accidents, and fatalities. With V2V innovation, your vehicle will get a signal from the other vehicles in your route directly, in this way cautioning you through a potential crash prediction or automatically applying the brakes.

Versatile Cruise Control: The advanced driver help frameworks like versatile cruise control can take away a plenty of the worry of the experience. By utilizing a variety of sensors incorporated with the auto, versatile cruise control can coordinate the speed of the vehicle before you, which means you don't should be always hitting the gas and brake in highway rush hour gridlock. A few frameworks even enable the automobile to be led to a total pause and afterward continue automatically, making unpredictable traffic significantly less worrying.

Automatic Liftgates: Gratefully, modern cases of the automatic liftgate don't require much effort to work. Basically, stroll up to your car with the key fob in extent and the car will detect it and open for you automatically. The 2013 Ford Escape with this technology is the best automobile on the planet.

Biometric Seat Technology: This innovation enables drivers to manage ordinary disturbances while driving, making the entire adventure more secure and comfortable. Biometric seat tech uses data from the driver's face, and palm, joining it with real-time data gathered from the auto's steering wheel, accelerator, clutch, and throttle to identify the driver's anxiety and instructs him/her to take a break when required.

Teen Driver Technology: Handing over the keys to your teenager can be a nerve-wracking experience, but some clever new tech might ease your mind a little bit. Several cars have some type of teen driver limitations built in that can notify you if the car is driven over a certain speed, disable the stereo if seatbelts aren't used, and even keep the stereo from being turned up past 7 never mind full blast. Chevrolet's Teen Driver feature also offers a Report Card that will tell parents if safety systems like ABS or forward collision alert have been triggered while Junior was behind the wheel.

Stolen Vehicle Tracking Software: Experts estimate that. While that number sounds alarming, nearly 46 percent of those vehicles will be recovered and that number continues to improve. Much of the credit goes to innovative technology that automakers are building into their vehicles, such as the ability for the stolen car or truck to tell law enforcement when it is being held.

The technology is bundled into the vehicle's assistance and security systems, such as BMW's Connected Drive or GM's OnStar. While those advertised features allow effortless diagnostics, concierge, and post-crash notification for summoning rescue services, they may also be used by law enforcement to pinpoint the exact location of a vehicle that is no longer in the owner's possession. Criminals beware.

Apple CarPlay and Android Auto: Though they are loath to admit it, many manufacturer infotainment systems the do-it-all screens that control stereo, navigation, and climate control aren't very user-friendly. That's why we like Apple's CarPlay and Google's Android Auto. Plug in your smartphone and it takes over that big screen, replacing it with something that looks a lot more familiar and easy to use.

You'll get a simplified control scheme to access your music, maps, and your phone's built-in voice-control features while avoiding the unnecessarily complicated system that comes with the car. Basically every manufacturer has promised

support for at least one or both Apple and Google's systems, but not all trim levels will support them. Make sure to verify your car has the right options, and that it matches your mobile devices.

Adaptive Cruise Control: Advanced driver assist systems like adaptive cruise control can take a lot of the stress out of the experience. By using an array of sensors built into the car, adaptive cruise control can match the speed of the car in front of you, meaning you don't need to constantly hit the gas and brake in highway traffic. Some systems even allow the car to be brought to a complete halt and then resume automatically, making stop-and-go traffic considerably less frustrating.

Exit Warning to Protect Cyclists: The systems are engineered to work for several minutes after the engine has been turned off. If the sensors see an approaching bicyclist or close vehicle, they alert the passenger with a series of bright lights. If the warning is ignored, the most advanced systems will physically lock the door to prevent it from being swung open into the path of the approaching object. Automakers are beginning to address this common danger with rear-looking sensors that detect approaching bicycles and traffic.

Rear Cross-Traffic Alert: Parking lots are extremely common sites for low-speed -but pricey car crashes. Backing out of a parking spot, even with a rear-view backup camera, can be a perilous exercise. That's why rear-cross traffic alert is so useful.

The system can alert you to approaching vehicles, shopping carts, or pedestrians who might wander behind your car without you noticing. Loud beeps are standard with these systems, but some cars can even automatically brake before a collision occurs.

Lane Departure Warning: Distracted driving happens. Whether it's a quick glance at the stereo to change the channel or a child urgently asking for your attention, sometimes we pay a little less attention to the road than we should.

Lane departure warning systems use cameras to determine if a car has drifted across a marked lane line, giving a visual or audible notification (or even a vibration through the seat or steering wheel) that you've moved too far out of your lane. The system turns itself off when you use a directional, so there's no fear of accidental engagement. More advanced tech, sometimes called Lane Keeping Assist, can even help nudge you back into the proper lane, which can be a literal life-saver if you were heading into opposing traffic.

Automatic Emergency Braking: Automatic Emergency Braking or AEB uses a variety of sensors to determine if a forward collision crash is imminent and automatically applies the brakes to diminish the severity or avoid a crash entirely. The auto industry agreed to make AEB standard in cars by 2022, but many vehicles have it available today. The systems are extremely good, though you absolutely shouldn't rely on it to stop you -- it's meant as a last resort for when the driver isn't paying attention, and it's extremely alarming when the system does engage. While Apple CarPlay and smartphone apps are important, this one could save your life, so it's worth making this one a high priority on your shopping list.

360-Degree Camera: Insurance claims from low-speed crashes are some of the most common in the industry. Usually occurring during parking, a 360-degree camera system can make life a lot easier for folks who might not realize just how big that new SUV is.

By combining cameras on every side of the car with some clever computing power, your car's display can show a virtual top-down view of your surroundings. It can show the sides of your garage, whether you're lined up in the parking spot at the grocery store, or provide invaluable assistance while parallel parking.

III. CONCLUSION

This Paper was all about car sensors, their functions and use new technology in automated cars. So hopefully, it helped you to know about the uses of sensors, types of vehicle sensors, and how sensors work in general.

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