

Automotive Safety Technology- 2015

This is not a complete list, since even a basic seatbelt would fit the list, but here are the majority of newer safety innovations. Don't get too dependent on the features, as nothing replaces good driving habits and paying attention. Some features have different names, depending on the manufacturer. Many of these are in upscale cars today, but it typically takes up to three decades for any safety feature to become standard on all cars/trucks.

- 1) **Adaptive Cruise Control- (Autonomous cruise control ACC; also called radar cruise control)** is a cruise control system for vehicles that automatically adjusts the vehicle speed to maintain a safe distance from vehicles ahead. These systems use either a radar or laser sensor setup allowing the vehicle to slow when approaching another vehicle ahead 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. Introduced by Acura in 2005.
- 2) **Adaptive Headlights-** Headlamps that use sensor inputs to determine when the vehicle is turning, approaching another vehicle, or in inclement weather. The headlights are rotated with a corner, which illuminates the road in front of the vehicle. Other adaptive headlight systems use sensors to determine when the brightness should be adjusted. This saves the driver from having to operate the high beams manually, which allows for a maximum sight distance at all times. Some of these systems can determine how far away other vehicles are and adjust the brightness of the headlamps so that light reaches them without creating glare. First introduced in the 2004 model year. As of the 2014 model year, they were standard on 14 percent of models and optional on 22 percent.
- 3) **Advanced Airbags-** Advanced frontal air bags use sophisticated sensing devices to provide the right level of protection to drivers and front seat passengers in the event of a crash. The "brain" of the air bag is its electronic control unit (ECU), which receives signals from various sensors and then decides if, when and how each air bag should deploy. The ECU will decide what deployment level is best, depending on the occupant's weight, seating position, seat track position and seat belt use, as well as the severity of the crash. When appropriate, it may signal the frontal air bag(s) to shut off entirely (referred to as "suppression"). First used in 2004.
- 4) **Automatic Folding/Positioning Headrests-** refers to a head restraint that folds down if not needed, or automatically adjusts the position of the head restraint when the seat is

occupied so that it is centered with the back of the head and no more than an inch from touching the head. First used in 2002.

- 5) **Automatic Exterior Lights On/Off-** Light sensors that automatically turn on/off headlights and other exterior lights are handy so that you don't forget to turn off (drain battery) or turn on your headlights. **Daytime Running Lights** are similar- they turn on only your headlights with the engine or when you are in Drive so that others can see you better (visibility). You are 30% more likely to be seen even during the day with headlights on. It is required on all drivers' ed. vehicles in Montana to have your lights on while driving, even during the day.
- 6) **Automatic Parallel Parking-** Drivers first pull up alongside the parking space. They move forward until the vehicle's rear bumper passes the rear wheel of the car parked in front of the open space. Then, shifting to reverse automatically activates the backup camera system, and the car's rear view appears on the dash navigation/camera display. The driver's selection of the parallel park guidance button on the navigation/camera touchscreen causes a grid to appear (with green or red lines, a flag symbol representing the corner of the parking spot, and adjustment arrows). The driver is responsible for checking to see if the representative box on the screen correctly identifies the parking space; if the space is large enough to park, the box will be green in color; if the box is incorrectly placed, or lined in red, using the arrow buttons moves the box until it turns green. Once the parking space is correctly identified, the driver presses OK and takes his/her hands off the steering wheel, while keeping the foot on the brake pedal. When the driver slowly releases the brake, while keeping the foot on the brake pedal, the car will then begin to back up and steer itself into the parking space. First used in 2003. Found today on many models, though generally high end cars or as expensive options.
- 7) **Automatic Tilting Side Mirrors-** When the vehicle is put into reverse, the side mirrors automatically adjust down so that you can see close up behind your vehicle, including tires position, instead of far away.
- 8) **Blind Zone Alert-** What you may miss in a quick glance (head check) is what blind spot detection or Blind Zone Alert picks up. This driver assistance technology senses cars coming up in your blind spot behind or alongside you, and if your turn signal is on, it alerts you not to change lanes. You're warned by a flashing light on the side view mirror and then a beep or steering wheel



vibration. If you're not planning to change lanes (there is no turn signal on), the warning light glows steadily but doesn't flash and there's no audible alert. First used by Ford in 1995.

- 9) **Bird's Eye View**- These cameras could be the next big thing in automotive safety. They cost more and do more for safety than the long-delayed rear camera that will be required on all 2018 cars. A properly implemented surround view system — with cameras on all four sides — will guard against back over deaths as well as more commonplace damage when you scrape a fender or alloy wheel. A surround view monitor, or around view monitor system, stitches together a birds-eye view of your car from overhead and shows a moving image on the car's LCD display, along with parking lot lane markings, curbs, and adjacent cars. The best systems reinforce the visual information with sonar that warns if you're too close to an obstruction, whether it's behind or in front.



- 10) **Center Front Airbag**- GM introduced a front-center airbag that deploys between the front seats in its 2013 Acadia. The airbag deploys from the right-hand side of the driver's seat during a serious side-impact collision from either side. In a serious side-impact, the barrier between the seats can prevent two occupants' heads from knocking against each other. First Used by GM in 2013.



- 11) **Drowsiness Detection**- Various systems that scan to determine if the driver is tired or falling asleep, such as eyes closing frequently or head nodding. Alerts may include a chime, a stab of the brakes, a tug on the shoulder belt, and/or an illuminated cup of coffee icon in the instrument cluster. First used in 2008.
- 12) **Electronic Stability Control ESC**- Claimed to be one of the best in-car safety technologies ever invented, also referred to as **electronic stability program (ESP)** or **dynamic stability control (DSC)**, is a computerized technology that improves a vehicle's stability by detecting and reducing loss of traction (*skidding*). When ESC detects loss of steering control, it automatically applies the brakes to help "steer" the vehicle where the driver intends to go. Braking is automatically applied to wheels individually, such as the outer front wheel to counter oversteer or the inner rear wheel to counter understeer. Some

ESC systems also reduce engine power until control is regained. ESC does not improve a vehicle's cornering performance; instead, it helps to minimize the loss of control. It can be deactivated when a vehicle is stuck in mud or snow. Introduced by Cadillac in 1990.

13) **Front Crash Prevention System-** Forward collision warning systems use cameras, laser beams and/or radar to scan the road ahead and alert the driver to any objects in the road ahead. If the system detects an object that the driver does not appear to be reacting to, it takes action. Some systems will sound an alert and prepare the brakes for full stopping power; others will apply the brakes automatically to prevent a crash. Other variations scan also or exclusively for pedestrians &/or bicycles, automatically applying the brakes for partial or complete braking. First used in 2006 by Audi.

14) **Global Positioning System (GPS)-** a satellite navigation system designed for use in automobiles to acquire position data to locate the user on a road in the unit's map database. Using the road database, the unit can give directions to other locations along roads also in its database. Dead reckoning using distance data from sensors attached to the drivetrain, a gyroscope and an accelerometer can be used for greater reliability, as GPS signal loss and/or multipath can occur due to urban canyons or tunnels or in/around large buildings. Used since the late 1980s.

15) **Heads-Up Display-** A head-up display or heads-up display—also known as a HUD—is any transparent display that presents data without requiring users to look away from their usual viewpoints such as speed, miles & gauges. First used in 1988 on the Oldsmobile Cutlass Supreme.



16) **Lane Departure Warning-** a mechanism designed to warn a driver audibly when the vehicle begins to move out of its lane (unless a turn signal is on in that direction) on freeways and arterial roads. Some systems also cause the steering wheel to vibrate and/or “nudge” the car back into the lane. These systems are designed to minimize accidents by addressing the main causes of collisions: driver error, distractions and drowsiness. First used in 2000 by Mercedes.

17) **Night Vision Windshield-** a system using a Thermographic camera to increase a vehicle driver's perception and seeing distance in darkness or poor weather beyond the reach

of the vehicle's headlights. They are currently offered as optional equipment on certain premium vehicles. First introduced in 2000. Currently offered by Cadillac, Mercedes-Benz, Audi, BMW, Toyota, & Honda.

18) **On Star/In-Drive**- Built in or after-market devices that uses your cars computer to send for help in an emergency, put limits like speed and distance for a teen driver, track your car via GPS (check on your teen or locate a stolen car), hands-free mobile talking, dashboard report card that suggest ways to improve your driving & insurance discounts, or monitor the safety lights and recalls of your vehicle. First used by GM in 1995.



19) **Rear Mounted Radar or Rear Cross Traffic**- Have you ever backed into a car? A pole? A person? Well if you have, you might want to check out the rear-mounted radars offered in some vehicles. Ford's system dubbed the Cross Traffic Alert is offered in many new Fords. What the radars do is scan for objects behind them such as a fence, wall, pole, pedestrian etc.... and it alerts or shows you a visual from a camera. When the radar detects traffic approaching while you're backing up it also alerts you with an alarm. Most of these new systems use a hidden LCD in the mirror to show you what's behind you. Chrysler's version is called Cross Path Detection System. This type of technology helps drivers reduce the amount of mistakes and errors while driving, or backing up. While these backup cameras and sensors are getting better, there still is no sure way to know entirely what's behind than by actually turning your head and watching where you are backing.

20) **Seat Belt Air Bags**- The technology does just as the name says—in a crash, a tubular airbag “unzips” from the seams of the seat belt across the occupant’s chest. The inflatable seat belts have two advantages: First, they spread the crash force over a wider area of the body, potentially reducing the risk of injury to the chest from the belt. Second, deployment of the bag tightens the belt, reducing forward movement and reducing the potential for head injury. Some “active” belts will tighten up if the car perceives a likely collision. Introduced by Ford in 2009.

21) **Side (Curtain) Airbag-** (SABs) are inflatable devices that are designed to help protect your head and/or chest in the event of a serious crash involving the side of your vehicle. There are three main types of SABs: chest (or torso) SABs, head SABs and head/chest combination (or "combo") SABs. They deploy with side impact to the car and come from either the side of the seat, from the door, or above the door (roof). Some even protect specific areas such as knees, arms & shoulders- covering most of the door. First used in 1998.



22) **Talking Cars-** so-called vehicle-to-vehicle (V2V) communications, the technology lets cars automatically exchange safety data such as speed, direction, and GPS position 10 times per second, and sends warnings to drivers if an imminent collision is sensed.

23) **Tire Pressure Monitor System- (TPMS)** is an electronic system designed to monitor the air pressure inside the pneumatic tires on various types of vehicles. TPMS report real-time tire-pressure information to the driver of the vehicle, either via a gauge, a pictogram display, or a simple low-pressure warning light. This is especially helpful for those who forget to do a pre-trip inspection and may suffer from a blow out from an under-inflated tire. First used in America by Porsche in 1986.

24) **Voice Commands-** Infotainment systems programmed so that you can control hands-free your GPS navigation, music, and speaker phone (all wireless by built-in Bluetooth). This can be a safety device so that your eyes stay on the road, but some of these systems are not very accurate and therefore can be more of an added distraction rather than a help. Simplified forms used since the 1980s.

25) ***Automatic Driving Cars-** An **autonomous car**, also known as a **driverless car**, **self-driving car** and **robotic car**, is an automated or autonomous vehicle capable of fulfilling the main transportation capabilities of a traditional car. As an autonomous vehicle, it is capable of sensing its environment and navigating without human input. Autonomous vehicles sense their surroundings with such techniques as radar, lidar, GPS, and computer vision. Advanced control systems interpret sensory information to identify appropriate navigation paths, as well as obstacles and relevant signage. By definition, autonomous vehicles are capable of updating their maps based on sensory input, allowing the vehicles to keep track of their position even when conditions change or when they enter uncharted environments. These cars include nearly all of the available in-car safety innovations. They are still in protocol form.