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## **AUTOPILOT TECHNOLOGY IN VEHICLES**

Autopilot technology is on everyone's lips these days. But why? Autopilot is a generic term used in multiple industries, particularly aircraft, and generally means that something can guide itself without human intervention. Autonomous systems in cars and self-driving vehicles can take many different forms, from basic driver assistance features, like cruise control, to semi-autonomous, all the way to full self-driving capabilities. In 2022, most major automakers are targeting Level 2 autonomy.

This level may include the following features:

- Traffic-Aware Cruise Control: Matches the speed of your car to that of the surrounding traffic
- Autosteer: Assists in steering within a clearly marked lane, and uses traffic-aware cruise control
- Navigate on Autopilot: Actively guides your car from a highway's on-ramp to off-ramp, including suggesting lane changes, navigating interchanges, automatically engaging the turn signal and taking the correct exit.
- Auto Lane Change: Assists in moving to an adjacent lane on the highway when Autosteer is engaged.
- Autopark: Helps automatically parallel or perpendicular park your car, with a single touch.
- Summon: Moves your car in and out of a tight space using the mobile app or key.
- Smart Summon: Your car will navigate more complex environments and parking spaces, manoeuvring around objects as necessary to come find you in a parking lot.

Also, most vehicles that have autopilot-like features have fairly common automated safety systems called advanced driver assistance systems (ADAS) in the industry. These core security features include:

- Automatic Emergency Braking (AEB) to avoid a front-end collision if a large object is detected ahead, in addition to collision warnings
- Blind Spot Monitoring to alert a driver if another car is in the blind spot
- Lane Departure Warning to alert the driver if they are drifting out of the lane

All these features are “must-have” today and you should double-check to ensure they are included with your vehicle and package options.

Historically, most auto manufacturers have relied on Original Equipment Manufacturers (OEMs), like Mobileye, Delphi and Bosch, etc. to provide autopilot parts and technologies for their cars, including things like navigation systems. This allows the auto manufacturers to concentrate on developing and marketing the core cars themselves while other companies focus on specialized parts and technology. Mobileye, which was purchased by Intel, is arguably the leading OEM in providing autopilot technology, via their EyeQ line of visual perception chips, to auto manufacturers. They famously provided Autopilot technology for the first-generation Tesla Model S vehicles that came with Enhanced Autopilot. Later, Tesla began to develop its own technology as Elon Musk wanted to push autonomous driving technology faster.

The leader in terms of quality and functionality of the autopilot in cars is the already mentioned company Tesla, not only is their system one of the most sophisticated and accurate on the road, it is also constantly updated over the wireless network so cars are getting better and better. The biggest downside is that driver monitoring only uses steering wheel inputs to determine whether the driver is paying attention vs facial monitoring, for example. Tesla uses

eight cameras around the vehicle for a full 360 view, plus a front-facing radar and long-range ultrasonic sensors. It uses a powerful machine learning computer (called the Full Self-Driving Computer, aka Hardware 3) which began rolling out in early 2019.

As technology improves, features like autopilot are becoming more and more popular. By the end of 2022, most car manufacturers will offer more advanced self-driving capabilities. And by 2025, there will be about 8 million autonomous or automated vehicles on the roads. In addition to the available and widely used, levels 1 and 2 already exist and will be used in the future such levels of autonomy as:

- 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)

The key difference between Level 3 and Level 4 automation is that Level 4 vehicles can intervene if things go wrong or there is a system failure. However, a human still has the option to manually override.

- 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.

However, mass production is still years away from anything above level 2. Not because of technological capability, but because of safety or lack thereof. Earlier this year, the Ponemon Institute published titled "Connected Vehicle Security: An Exploration of Cybersecurity Practices in the Automotive Industry." The report found that autonomous vehicles are rich in physical safety features — seat belts, airbags, anti-lock brakes — but not as rich in digital safety features. When it comes to what it takes to operate safely in the online world, connected cars aren't ready for prime time just yet. It's fair to say that not all consumers will embrace autonomous cars unless they're confident they'll be at least as safe as they would be in a commercial plane, train, or bus. This day is coming. But the auto industry must first overcome a few speed bumps.

#### Джерела:

1. <https://www.synopsys.com/automotive/autonomous-driving-levels.html>
2. <https://www.tesla.com/support/autopilot#:~:text=Autopilot%20is%20an%20advanced%20driver,an%20additional%20layer%20of%20safety.>
3. <https://www.autopilotreview.com/cars-with-autopilot-self-driving/>