

Autonomy for the Masses

By Louis Bedigian

The auto industry is eager for consumers to buy, lease or share autonomous vehicles, but no one knows what will happen to the millions of existing (non-autonomous) automobiles. Are they as good as dead when autonomy takes over, or might there be a way to purchase upgrades and transform them into self-driving vehicles?

Cruise Automation, a startup acquired by General Motors, thought it had the answer. The company was previously developing an autonomous kit for the Audi A4 and S4. That kit seems to have been abandoned, but there are other companies – including Nauto and Comma.ai – exploring aftermarket alternatives.

“The technology needed to make an existing car autonomous varies based on the needed level of autonomy and your initial vehicle platform,” said Jay Franklin, founder and CEO of openboards.io, a hardware company specializing in full service prototype development and production for both open and closed source projects.

“Most new cars today have the option for SAE Level 1 autonomy already, which includes front facing radar, wide angle front camera and a host of ultrasonic sensors to aid in things like blind spot detection and reverse parking,” Franklin added. “If you are looking for conditional automation (Level 3) or high/full autonomous vehicles (Level 4 and 5), those hardware requirements will increase, but not by much.”

To really achieve a higher level of autonomy, cars will need a greater understanding of their environment/surroundings. Franklin explained how a vehicle must be able to see around itself while sensing the travel speeds of other automobiles.

“Humans do this largely by vision and their own internal processing,” said Franklin. “However, many of the vision systems today aren’t capable of delivering that kind of accuracy in a reliable manner. Instead, we elect to enhance their vision capabilities with sensing instruments, such as radar and LiDAR.”

Taking all of that into account, Franklin highlighted four key features that are necessary to take a vehicle from Level 1 to Level 5 autonomy:

- 360-degree wide angle vision
- Multifocal forward cameras
- Forward facing radar
- Rear radar package to handle lane changing events

No one is currently building an aftermarket kit that includes all of those features, but that could change in the near future.

Better technology = better cars

Dr. Oliver Rumpf-Steppat, head of product requirements, development and connected drive at BMW of North America, said he would not exclude the possibility that Level 4 or 5 autonomous driving could be achieved with an upgrade. However, he's not sure there will be a business case to justify its deployment.

"There's so much technology that you have to build into the car – hardware, not only software – and it will be pretty expensive," said Dr. Rumpf-Steppat. "Right now nobody has the technology to get them running on Level 3 or 4. I think the first task is to achieve the target. After that we can look at aftermarket solutions. I don't think it makes sense to do it the other way around."

Franklin thinks that aftermarket solutions could prove to be hugely beneficial to drivers seeking the latest technology.

Said Franklin: "In some cases, the upgraded vehicles can be light-years ahead of developed cars. Autonomous tech thrives on consistent upgrades – in the machine learning, in the code and in the hardware. The weak spot for developed cars is that once they are released, they are stuck with the tech they have, most of which is already older by the time it debuts. Upgrading your own vehicle allows you to always be on the cutting edge. You aren't limited by long-term development schedules and manufacturing quotas."

The upgrades are coming

Innoviz, a new auto tech company out of Israel, is developing an aftermarket LiDAR solution for the testing and R&D of autonomous driving technology. It's not intended for consumers, but could it be a first step in that direction? Omer Keilaf, CEO of Innoviz, isn't so sure.

"Upgrading an existing car will not provide for a fully autonomous vehicle, nor will it provide for the customer experience which will accompany the arrival of the fully autonomous vehicle," said Keilaf.

Luc Langlois, VP of marketing at LeddarTech, said that unless an upgrade is developed in partnership with (and installed by) an OEM, he doesn't expect aftermarket solutions to be more than a warning system. He said: "As you can imagine, each car is going to react differently. I don't think the government will allow the car to be driven or to be active safety operated with an aftermarket product that will not be otherwise qualified by OEMs. That's the limitation of these products if they are not coming directly from the OEMs."

Insuring the aftermarket: can it be done?

Insurance policies could go through drastic changes if and when conventional vehicles are upgraded for autonomy. It's a complex issue with no clear answers, but there is a lot to be learned from existing ADAS features and the impact they may have on today's motor vehicles.

"If you're putting this technology out there, presumably the frequency of accidents would decline," said Geoff Williams, VP of automotive at Allstate. "You already have advanced safety features that the OEMs are adding, including forward collision warning, lane departure, side view assists. Right now those are optional packages and you know we're trying to decode those and understand what they're doing for safety."

Williams added that while it looks like ADAS is helping, it is difficult to quantify how much it may be contributing to driver safety. That may change in the not too distant future if insurance companies are able to pull sensor data to better understand what determines risk. This could apply to any vehicle with any degree of autonomous functionality.

One such example involves vehicle maintenance: is there a substantial difference in the risk that one takes when driving a vehicle that is really well maintained versus one that is not? Grady Irey, CDO for Arity, hopes to eventually provide consumers with a clear answer to that and other safety-related questions.

"I have every confidence that, given access to the right data, we can prove that out and consumers would appreciate it," said Irey.