



# Connected Cars & Autonomous Vehicles



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## New Technologies Disrupting ADAS and Autonomous

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The pursuit of self-driving cars and zero fatalities by ADAS is driving disruptive technologies. The technologies of sensors, fusion, real-time data, 3D mapping, over-the-air updates, prognostics and deep data increase safety, profits, economies of scale and societal benefits.

**Advances in ADAS**

Advanced Driver Assistance Systems (ADAS) have to access the situation faster than humans, because, human reaction time is too long for some situations. Currently, automakers are using, cameras, sensors, and radar for ADAS which can also be used for adaptive cruise control and traffic jam assist that will lead gradually to autonomous driving. These technologies are getting more precise and enabling more complex detection of objects, says Jeremy Carlson, senior analyst, IHS Automotive.

“Look for vehicles with front crash prevention and pedestrian detection in the future,” said David Zuby, executive vice president, and chief research officer, Insurance Institute for Highway Safety (IIHS).

**Mapping out the Future**

A problem with automotive GPS signals is that they are not precise enough for autonomous driving. There is a push for 3D maps from companies like Google, HERE, and TomTom because it gives geospatial relationship to what’s on the road.

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3D mapping along with the GPS location for some systems, provide information about roads road signs, crosswalks, and other road information this is very effective and important in cities, says Carlson. However, 3D mapping on country roads may not be as important.



## Fusion Technology

To achieve better accuracy, automotive technology suppliers are turning to fusion technology. Fusion technology combines technology from different sources to create an innovative improved product.

Delphi Automotive and Mobileye recently announced that they are partnering for

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next generation sensor fusion technology. The Delphi/Mobileye system, “Central Sensing Localization and Planning” (CSLP) fuses sensor data, vision data, artificial intelligence and route learning.

The CSLP platform combined two flat platforms to create a much higher resolution to locate the vehicle and also reduced the error rate.

“Automotive GPS is currently limited to ~1.5m resolution (longitude/latitude coordinates). CSLP provides a 20cm resolution making the largest error (20cm) where CSLP is able to place the center of a vehicle in a roadway lane while piloted autonomously,” said Gary O’Brien Ph.D., global advanced engineering director at Delphi Electronics and Safety.

Dr. O’Brien notes that localization is especially important for areas where there is GPS denial such as tunnels and where there are not strong road lane markings.

### Real-Time Data & Bigger Bandwidth

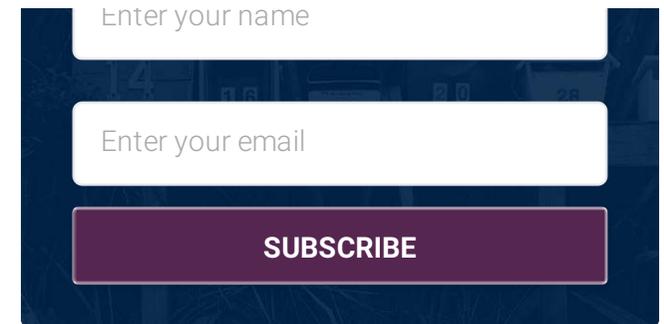
Sources and uses for real-time data are growing for ADAS and self-driving. [HERE](#) announced a platform for sharing real-time data for road hazards, traffic updates and on-street parking for the Paris Auto Show. HERE believes these services will also support increased advanced driver assisted systems and, later, autonomous driving solutions.

To share real-time data, vehicles must be equipped with embedded modems and wireless data connections.

There is a trend of automakers using 4G LTE for data connections. However, 4G has latency while DSRC (dedicated short-range communications) that is currently in very limited deployment has low latency.

“We don’t know the specifications for a 5G, yet. But it is understood that it will be low latency,” said Carlson.

Automakers and tech companies are working to make 5G a reality. Audi, BMW, Daimler, Ericsson, Huawei, Nokia, Intel, and Qualcomm have partnered to form



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the [5G Automotive Association](#) to evolve, test and promote 5G for connected mobility.

As the data pipe gets bigger and faster there will more opportunities for real-time data. Real-time data can also be used to improve automotive performance.

“Real-time data can enable vehicles to run more efficiency, cut down on the emissions and potentially avoid accidents with other vehicles,” said Scott Beutler, vice president, Continental Automotive Systems.



### The Prognosis for Prognostics is Good

Prognostics use computer algorithms to detect potential hardware problems and provide alerts.

Prognostics systems are in the early stages of deployment. General Motors recently introduced *OnStar Proactive Alerts*. The service sends proactive alerts

notifying customers of impending problems with the fuel pump, starter motor, and battery for some GM models. Alerts are also sent to the dealer. When the customer takes the vehicle in for service the repair technician doesn't have to diagnose the problem and replaces the part faster. GM will introduce the service for models in the future.

“Prognostics are critical to both autonomous driving and ADAS because it will create an unprecedented change in the transportation industry,” said Susan Beardslee, senior analyst at ABI Research, “Prognostics will disrupt the supply chain and provide a higher return on investment and new revenue streams.”

Prognostics are vital to autonomous driving because there is a potential for unattended faults which may cause fatalities. Prognostics are needed not just for the hardware but also for the software.

Each new version of the software for self-driving and ADAS requires more and more lines of code which can have bugs. Cyber attacks and hacking can cause the need for software updates.

“Over-the-air (OTA) updates are a necessary remedy to managing software updates,” said Oren Betzaleli vice president of Redbend at HARMAN. He says OTA updates are not as simple as they seem. There are many [rainy day scenarios](#) when a software update might fail such as losing power during the update or a cyber attack.

Automakers lose millions of dollars when they have to pay dealers to update the software. OTA updates save money. Proactive prognostics save even more money. Prognostics data can be used to predict recalls and order parts for the recalls, notes Beardslee.

“Data and analytics are the new currency of the automotive industry,” said Beardslee.

**The Ultimate Pay Off of ADAS & Autonomous Tech**

The transportation industry is slow to adopt disruptive technologies. The timeline for fully autonomous vehicles is unclear and complex, however, the technology benefits everyone.

“It took decades for automakers to offer seatbelts and years for air bags. In the meantime, current ADAS systems and partial self-driving systems reduce the severity and frequencies of crashes,” said Chris Hendrickson Ph.D., director of Carnegie Mellon University’s Traffic21 Institute, author of [Cost and Benefit Estimates of Partially-Automated Vehicle Collision Avoidance Technologies](#), “These safety systems at current prices provide financial benefits for both the car buyer and society.”

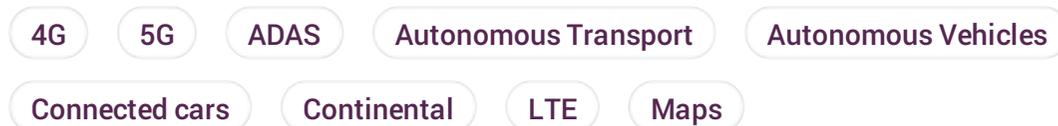
*By Lynn Walford*

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