# Key Technologies Driving the Car of the Future

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## EDITORIAL

The automotive industry is becoming increasingly coupled with digital technologies. Today, as the digital transformation sweeps across the automotive sector, cars are on the verge of becoming technical accessories. While its fundamental purpose to transfer people from 'Point A' to 'Point B' has remained unchanged, practically all of the value-added characteristics of the vehicle are now related to digital capabilities, shifting the focus from hardware to software content.

Admittedly, there is a changing pattern of car use and customer behaviour. Electric vehicles have become more popular due to environmental regulation, fuel price and shifting customer preferences. Advanced Driver-Assistance Systems (ADAS) are developing rapidly and self-driving technology will fundamentally disrupt the mobility industry as we know it (Hashim & Omar, 2017). Nevertheless, experts do not expect to see the first fully self-driving car before 2021.

The car is becoming a supercomputer on wheels. The customer will want this computer to be connected with all existing electronic devices (Kim et al., 2018). Smartphone integration is becoming more commonplace. There is also the anticipation of a seamless experience in an integrated technology environment with any smart phone, be it Android or Apple IOS (Gupte & Askhedkar, 2018).

As cars become smarter and more automated, innovative technology will be required to make them even more useful to drivers. The cars of the future, whether autonomous, connected, electric or a mix of all three, will be fuelled by cutting-edge technologies. Companies that can deploy this technology successfully will emerge victorious in this highly competitive industry.

The four key technologies that are driving the automotive industry into the future include:

**(i) Internet of Things (IoT)** – A combination of software, hardware and, sensors added to vehicles that shall introduce new challenges and present new opportunities. Sensor fusion technology has become an important field to deliver solutions for integrating and intelligently managing the data acquired from the large number of sensors in a model car. Using IoT and sensor technology, data can be gathered on functions including steering, braking and navigating on the road; which then can be digested, analysed and acted upon to continuously improve automotive driving capabilities (Datta et al., 2018).

The IoT data shall also be used for many other related support areas such as predictive maintenance, emergency calls, and telematics. All the data have to be shared via fast evolving connection capabilities. New technology such as 5G is paving the way for true vehicle autonomy allowing cars to communicate with other cars, smart traffic and other "things" wirelessly connected to the IoT (Pawłowicz et al., 2018).

With these new computing tasks becoming prominent, it is pertinent to address the increasing demand to compute intensive work loads and store huge amounts of data. Cloud providers are investing significant R&D resources in their systems while car manufacturers are collaborating with these providers to leverage new innovative technology and offer novel experiences and products for customers.

**(ii) In-Car Apps** – The latest car models are getting increasingly packed with software. Data gathered through IoT and other sensors are processed, and their feedback provides drivers with value added services via In-Car apps. For example, real time driving data can provide information for navigation apps alerting drivers to road conditions, traffic situations and items of interest nearby.

**(iii) AI and Analytics** – Artificial Intelligence (AI) has become increasingly prominent in the automotive sector. It is way ahead of traditional classical methods in decision making and analysis. It has been proven that AI improves safety, comfort, and performance. Automotive companies around the globe are investing to develop AI capabilities in simulation testing, image recognition, image processing and enlisting the help of deep learning for more accurate analyses (Nelson, 2018). AI has already been used to train algorithms powering future automotive vehicles. On the other hand, analytics can be further applied in many ways, from assessing product efficiency for reducing waste and costs to analysing data patterns of accidents and failures. Driving monitoring systems are already becoming standard in some high-end models.

**(iv) Digital Factories** – The digital factory will be an integral part of the automotive future. A digital factory can produce cars in the most efficient, effective, and error-free manner across the globe (Silva et al., 2018). It uses technologies such as systems modelling, automation and digitization for flexible and cost-effective mass production. In addition to standardizing the use of automotive and robotics in manufacturing, the use of digitization can produce business benefits in areas such as supply chain planning, logistics, quality control and maintenance. To incorporate all the technology into vehicles, car makers are developing modular car architectures through the consolidation of Electronic Control Units (ECUs) (Vipin, 2018). More importantly, reducing product fragmentation and increasing standardization will

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enable developers to realize mass integration in building the complex high-technology solution embedded in the cars of the future. The automotive industry has become so dependent on advanced technology, that only companies that successfully integrate and apply emerging technologies in a quick and efficient manner will gain success.

To summarize, the automotive future resides with increasingly automated, electric-powered, shared and constantly connected vehicles, which are frequently updated.

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