Validating the Ecosystem: E-Mobility, Autonomous Driving, Connected Vehicle & Security

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Mobility Concepts Of The Future

THE EVOLUTION OF THE CAR

Based on …

… more stringent CO₂ regulations around the world, our future mobility will be increasingly use alternative powertrain concepts.

Based on …

… an increasing number of people – mainly in urban as well as sub-urban areas – who are using individual transportation options, autonomous driving will become a requirement in order avoid grid-locks and optimize the use of our infrastructure.

Based on …

… the consumer behavior of today’s and generations to come, being connected to the network in a safe and secure way is no longer optional and expected anytime, anywhere.
Validating The Mobility Ecosystem

WE ALL WOULD HAVE THOUGHT TO BE FURTHER ALONG BY NOW...

The Revolutionary Development of Self-Driving Vehicles and Implications for the Transportation Engineering Profession

Significant numbers of self-driving vehicles are expected to be on the roads within the next decade. This paper documents current technology developments and potential safety and mobility benefits.

Introduction

Highway travel is poised to undergo a dramatic transformation that is experienced in the history of transportation. A recent report by the Institute of Transportation Engineers (ITE) and the Mobility Transformation Initiative (MTI) highlights a number of self-driving vehicles' advantages and challenges that will shape the future of our society. Small papers and presentations within the field highlight the potential development of autonomous vehicles, which could impact transportation in a more rugged way. However, it is clear that the transportation engineering profession is becoming more acclimated with the movement of this field.

What will autonomous vehicles mean for the transportation engineering profession? What is new about the technology? What are the opportunities and challenges that the profession faces? This paper seeks to answer these questions.

Source: The Revolutionary Development of Self-Driving Vehicles and Implications for the Transportation Engineering Profession - July 2013

CARS & TRAFFIC

Could driverless cars reshape our major cities?

Car makers say autonomous vehicles are imminent. If so, they could dramatically reshape our cities, yet current long-term planning for our biggest cities assumes they’ll never happen.


News

2015: the year electric vehicles went mainstream

6 October 2015

The September Paris Motor Show has been covered in automakers’ transformation of the world as we know it. Electric vehicles (EVs) are now mainstream, with car manufacturers and governments focusing on their environmental benefits. Electric vehicles went mainstream in 2015, and the trend is expected to continue.


Figure 1: Total number of available EV models on the market in Europe

Validating The Mobility Ecosystem

**WE ALL WOULD HAVE THOUGHT TO BE FURTHER ALONG...**

EV/HEV offerings address urban driving patterns – other consumer requirements are still not sufficiently met.

On a large scale, autonomous driving is transitioning from level 2 to level 3 – mainstream level 4 or 5 is still years away.

While cars today can be labeled ‘connected cars’, the introduction of 5G will provide the next boost in regards to new services and capabilities.
All major OEMs have an active EV/HEV strategy in place to meet environmental goals for their portfolio in order to avoid penalties and/or restrictions in some of the target markets. There are stills challenges which need to be addressed:

- The financial attractiveness for consumers is still limited without subsidies and other forms of incentives
- Range anxiety, charging availability and the required time is still a concern, longevity of batteries are still not synchronous to the rest of the car
- Profitability of current Li-ion batteries is still a concern across the supply chain
- Re-use and recycling needs to be improved to deal with limited resources
Investments in autonomous driving concepts and associated Artificial Intelligence systems has been accelerated over the past years, the path to full autonomy is still taking a few more years. There are stills challenges which need to be addressed:

- Integration of all sensor types – line-of-sight and none-line-of-sight – to obtain a realistic image of reality while driving
- Enhance drive scenarios and testing concepts to address repeatable and realistic threat scenarios
- Agree on conformance and compliance regime to fulfill regulatory requirements
- Resolve insurance and ethical questions to allow autonomous driving to progress towards level 4 / 5
A Closer Look Into The Ecosystem

While connected cars are a reality today, the possibilities they present are still largely untapped and associated services are still in their infancy. There are stills challenges which need to be addressed:

• Connectivity today is still dominated by tethered connections – embedded infrastructure starts to dominate new car shipments
• With 5G on the horizon, bandwidth improvements will allow different experiences and use models
• In-car networks will become more important as cars become more autonomous as priority management will be crucial
• The use of telemetric data will allow new concepts for fleet management, insurance and asset optimization
Minimizing Cyber vulnerability in a car is becoming mission critical as the number of wired and wireless interfaces are rapidly growing and becoming increasingly connected through in-car networks. There are stills challenges which need to be addressed:

- To minimize structural threat scenarios, cyber security needs to be already considered during the design phase.
- As vulnerabilities may not only be present at the time of shipment, it is imperative to develop a concept to perform testing repeatably and on an ongoing basis.
- As systems will be imperfect, cyber concepts needs to be able to detect intrusions and alert drivers and/or securely bring a vehicle to a safety stop.
Predictions Going Forward
WHERE DO WE GO FROM HERE

51%

EV CONSIDERATION
On average 51% of drivers who are aware of EV / HEV products are considering a purchase.
Actual purchases are still remain in single-digit % ranges in most major markets.


44%

AV SAFETY
According to an international study, 44% of the surveyed population felt that current AV product are safe or somewhat safe.
The major driver towards this perception is experience as the majority was driving in a car with AV features.


90%

CONNECTIVITY RATE
By 2023, 90% of all shipped passenger vehicles in the US will have an embedded connectivity infrastructure.
The global service market for connected vehicles will reach $200bn by 2023 growing with a CAGR of 23%.


Empowering The Future Mobility System

A HOLISTIC VIEW

The Environment

End Node

Edge

End Node Resource

Autonomous Vehicle (AV)

Electrical Vehicle (EV)

Cellular Network Longhaul Xmission

Data Centers

New Grid

Inverters

Alternative Energy Gen.

Environment

Sensors
Radar, Lidar, Camera, GPS

Base Stations

Charging Stations

EPS
DER
PCS
LOAD

EPS
DER
PCS
LOAD

Sensors
Radar, Lidar, Camera, GPS

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Empowering The Future Mobility System

HOW CAN KEYSIGHT HELP EMPOWERING THE ECOSYSTEM

Unique EV Capabilities and Experiences
Decades of Wireless Experiences
World-Leading mmWave Solutions
Worldwide Service & Support
Global Project Teams
Driving Innovations or Autonomous and Electric Vehicles

ENABLING BUILDING BLOCKS THAT MAKES TOMORROW’S CAR A REALITY

90+ Solutions
Across Multiple Technology Domains

Vehicle to Everything (V2X) Communications
- Radar Collision Avoidance
- Infotainment and Entertainment
- Emergency Call
- Automotive Cybersecurity Penetration Test
- Charging Function and Interoperability Test
- Converter and Inverter Efficiency
- Cells Forming and Self Discharge Optimization
- Automotive Ethernet and Serial Bus Testing
- Engine Control Unit Security and Testing
- Body and Safety Electronics Test Solutions
- Electronics Functional Test Systems

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Ecosystem Solutions

**OUR ENGAGEMENT MODEL IS PARTNERSHIP**

**Workflow**
Help customers optimize workflow processes with Keysight tools. Become part of automation flow

**Maximum Contribution**

**Solutions**
Complete end-to-end answers to a customer problem
Software, Fixturing, HW & Expertise

**Higher Value**

**Applications**
Multiple Keysight products based on fit to specific customer applications.
One Stop Shopping Value

**One Supplier**

**Products**
Single products based on best-in-class attributes.

**Single Product**

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THE FUTURE IS HERE

BRING THE FUTURE TO REALITY FASTER AND BETTER
Summary

• Disruptive innovations in automotive will create a new mobility ecosystem including challenges for E-Mobility, Autonomous Driving, Connected Vehicle & Security

• There is a chance to create together a more connected and better world

• Let’s partner to master the technological challenges and bring your innovations to market first