Status Report:
Automated & Connected Vehicles

CATES
Center for Advanced Transportation and Energy Solutions

John Niles, CATES Research Director
December 4, 2014
Future Driverless Car Interior Imagined
Google Car Version One - 700,000 Miles
What a Google Car Sees with LIDAR
Google Car Avoiding Collisions
All of the Global Auto Industry Working on Automation

Tier 1
How Volvo Promotes its 100 Car Trial
Multiple Sensors Watching All Around

Birdseye view of the 2013 Lexus LS460

LEVEL 2 AUTONOMOUS TECHNOLOGIES IN USE TODAY
Automated Driver Assistance
Massive Computer Processing in Small Space

CMU Professor Raj Rajkumar
Volvo: Threat assessment problem

Given estimates of vehicle state and surrounding environment, can we find an admissible sequence of control signals s.t. the vehicle state evolves within the prescribed constraints?
Driver Assist Automation
On a Path to Evolve into Autopilot
Automation Can Be Turned Off
Sometimes the Driver Still Drives
Toughest Problem – Transition from Distraction to Driving
Google Car, Version Two
Horizontal Elevator
Easier No Driver Environment: Slow and Nobody in the Vehicle
Automated Driver Assistance Systems

Forecast of Deployment Timeline

Estimated Growth of Automation in U.S. Light Vehicles

Based on assumptions that 5% of new cars in 2017 and 80% in 2030 will have ADAS.
Benefit: Traffic Congestion Mitigation
Smoother Flow, Fewer Accidents
Benefit: Reduce a Leading Cause of Crashes
Benefit: Do Non-Driving Activities While Moving in a Car
Benefit: Fewer Collisions
Vehicle Technology Enhances Sustainability by Pushing Back on Two Main Killers

“Nearly 3,400 people die on the world's roads every day. Tens of millions of people are injured or disabled every year. Children, pedestrians, cyclists and older people are among the most vulnerable of road users.”

The Telegraph

“Exhaust fumes are twice as deadly as roads, study claims

According to the Massachusetts Institute of Technology, more than 5,000 people die prematurely from conditions like lung cancer and heart disease because of emissions Photo: ALAMY

By Nick Collins, Science Correspondent
7:30AM BST 19 Apr 2012
Nissan Leaf Electric Autonomous Drive
Policy Recommendations

• Acknowledge & monitor coming changes
• Flexibility in regional plans & investments
• Keep roads maintained; lanes well marked
• Highway shoulders for fail-safe refuge
• Uniform traffic devices along the road
• Minimize legislative/regulatory intervention
• Remove barriers to Mobility as a Service
MaaS = Mobility as a Service
2040: Uncertain combination of privately owned vehicles and those providing MaaS
The end of driving

The world waits in anticipation for the first self-driving cars. But after all the impossible pieces are sorted and the wonder dissipates, what will the world be like? And will there be some unintended consequences that belie optimistic predictions of today?

Words | Ben Gross and John Niles

The self-driving car vehicle is increasingly an object of fascination, plausible and hype. Opinions are divided on its veracity and innovation longterm. 2010 to 2020 — or later. The autonomous vehicle promises so many benefits that some see it as an escape from the unintended utopia of today’s road travel vehicles. To greet the new utopia, there are calls for changes in how we plan transportation, demands for paradigm shifts.

There are also conflicting hand signals to see the self-driving car (SDC) as utilitarian for a long time, a marketing ploy to entice self-driving, with fewer flaws than benefits. Which are my opinions, they are usually viewed through a technological lens. The SDC will be autonomous, it will never be distracted. It will see more and respond faster. Quickly. It will be cleaner because it can be lighter and quieter. It will reduce congestion because it will follow more closely and have fewer accidents. Alternatively my opponents argue that it is too complicated, it can’t withstand snow.

“To greet the new autonomous utopia there are calls for changes in how we plan transportation, demands for paradigm shifts.”
Solution for Sustainable Cities: Merge New Technologies into Cars

- Automated driving - A
- Electrically powered - E
- Wireless connections - C
- Tailored size & configuration - T
- Shared use of vehicles – S
- C-A-T-E-S
CHAPTER 9

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Thank You Very Much!

For further information
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