Benefits of Automation

- Safety 30K, 1K
- Congestion
- Mobility
- Sustainability
- Productivity
- In-Vehicle Personal Time
Enablers of Automation

- Technological Advancements
- Industry
- Government
- Media
Google’s Self-driving Car

LIDAR
A rotating sensor on the roof scans more than 200 feet in all directions to generate a precise three-dimensional map of the car’s surroundings.

VIDEO CAMERA
A camera mounted near the rear-view mirror detects traffic lights and helps the car’s onboard computers recognize moving obstacles like pedestrians and bicyclists.

RADAR
Four standard automotive radar sensors, three in front and one

POSITION ESTIMATOR
A sensor mounted on the left rear wheel measures small movements made by the car and helps to accurately locate its position on the map.

Advance Driver Assist Systems (ADAS)

How does it Work?
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*Drive to Automation*

Connected Vehicles
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**Autonomous vs Connected Cars**

**Autonomous** + **Connected** = **Automated**

- **AV**
- **CV** = VxV & VxI
- **AV + CV**
Automation Levels vs Time

Automation Levels vs Years

Level of Automation (SAE)
- Full
- High
- Conditional
- No

OEMs
Google

Year
Challenges Facing Automation

- Cyber Infrastructure
- Product Liability
- Cyber Security
- Driver Acceptance
- Value Proposition
Recent Developments, 2010 - 2014

- Automakers
  - NISSAN
  - VOLVO
  - Ford
  - German Luxury Automakers
  - TESLA
  - Tier 1 Parts Suppliers
  - Google
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Ford’s ADAS cars – Focus and Mondeo

2014 Ford Focus

2014 Ford Mondeo
Recent Developments, 2010 - 2014

- Google (Cont’d)
  - Influence
  - Public awareness of AV
  - Promises kept
  - Would it deliver near automatic car by 2018?
  - Formidable competitor to automakers
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What Google’s Self-Driving Car Sees
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**Autonomous Vehicles**

Google’s prototype self-driving car V3
Recent Developments, 2010 - 2014

- Government and Academia
  - Government
    - US DOT
      - FHWA, ITS JPO
      - NHTSA
    - States
      - DOTs
      - Legislators
      - DMVs
Recent Developments, 2010 – 2014 (Cont’d)

- Government and Academia
  - Academia
    - Industry Partnerships (UMTRI, MTC)
    - Applied Research (Artificial Intelligence)
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External Accelerators

- EV - AV
- AV - CV
- AV - IN
- AV - RS
In closing…

- Work in progress
- Lots of Challenges Ahead – uncharted territory
- Champions
- Will we see near Autonomous Cars in 2018?
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Drive to Automation

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The End