Automated Vehicles

The Future is Near

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The Future is Near

- Are we all going to have a fully automated vehicle next year?

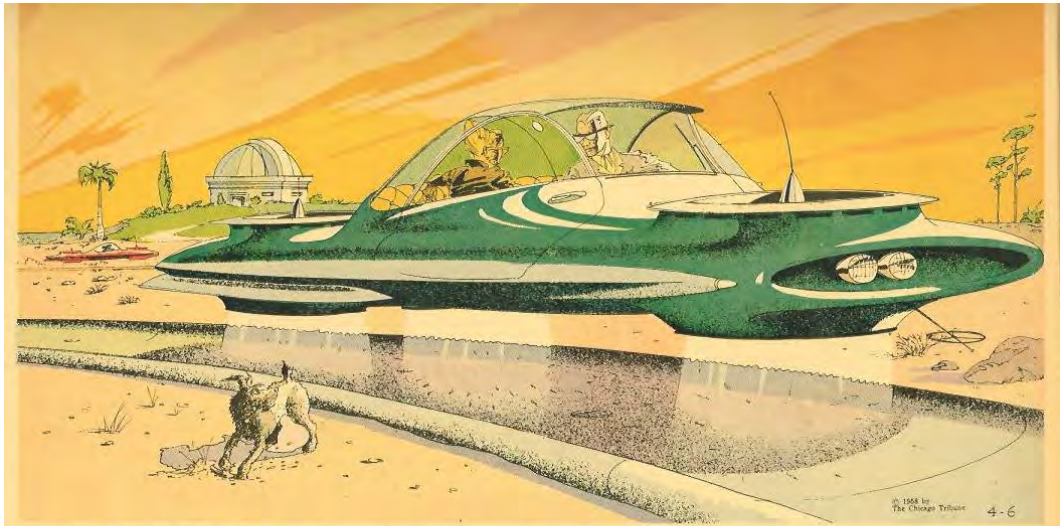
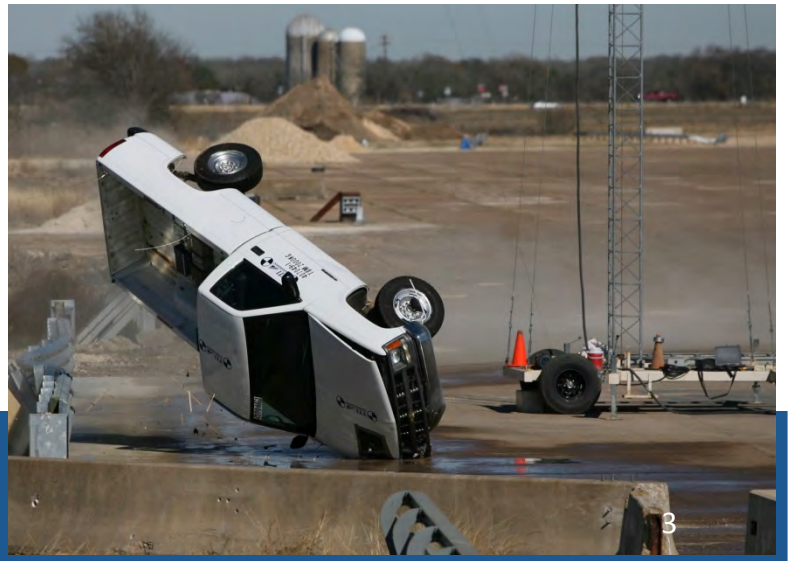


Image Credit: http://expresslane.idrivesafely.com/wp-content/uploads/2011/02/The-Jetsons-Flying-Car.jpg
http://i.kinja-img.com/gawker-media/image/upload/s--N1ErH54I--/18lrz59goy7bsjpg.jpg

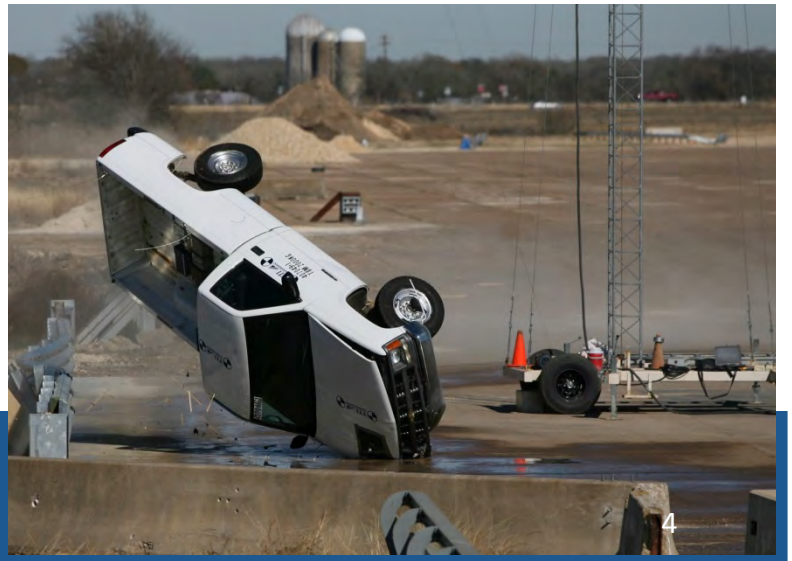
The Future is Near

- Maybe not, but automation is already saving lives today
  - Driver warning systems
    - Proximity warning
    - Blind spot warning
    - Forward crash warning
    - Lane departure warning
    - Pedestrian warning
    - Curve speed warning
    - Back-up warning



The Future is Near

- Advanced Driver Assistance Systems (ADAS)
  - Electronic stability control (ESC)
  - Adaptive cruise control (ACC)
  - Crash imminent braking (CIB)
  - Lane keeping assist
  - Lane departure prevention
  - Traffic jam assist
- The systems of today serve as underpinnings of the AVs of tomorrow



Defining Terms

- Autonomous
  - "existing or acting separately from other things or people"
  - "undertaken or carried on without outside control"
- Automated
  - "to run or operate by using machines, computers, etc., instead of people to do the work"

Source: Merriam-Webster Online

How Do AVs Work?

- Gather and integrate info from various sensors to understand the world
  - Radar
  - Lidar
  - GPS
  - Camera
  - Ultrasonic
  - DSRC

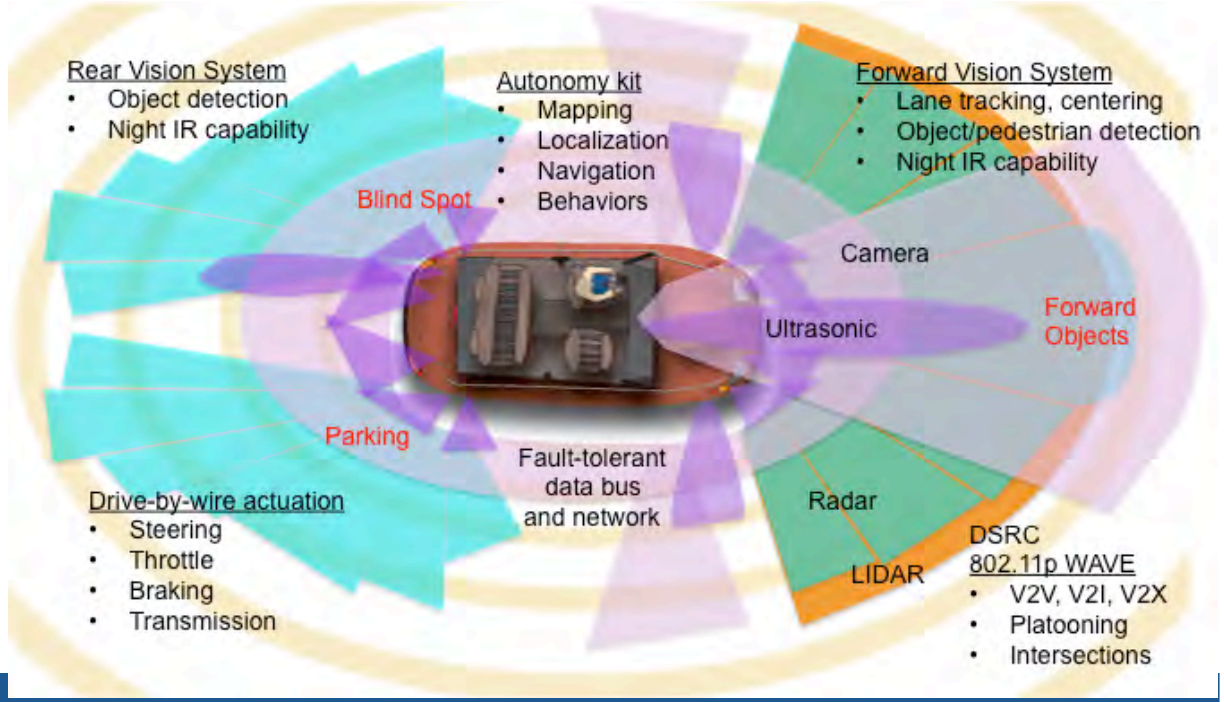


Image Credit: UMTRI

How Do AVs Work?

Image Credit: http://googleblog.blogspot.com/2014/04/the-latest-chapter-for-self-driving-car.html

Classifying AVs

NHTSA Level		Description
Zero	No Automation	-
One	Function-Specific	Single features independently automated
Two	Combined Automation	Multiple features automated in coordination
Three	Limited Self-Driving	Capable of automated driving in most circumstances
Four	Fully Automated	Fully capable of driverless automation

Classifying AVs

- According to OEMs, when will AVs be available?

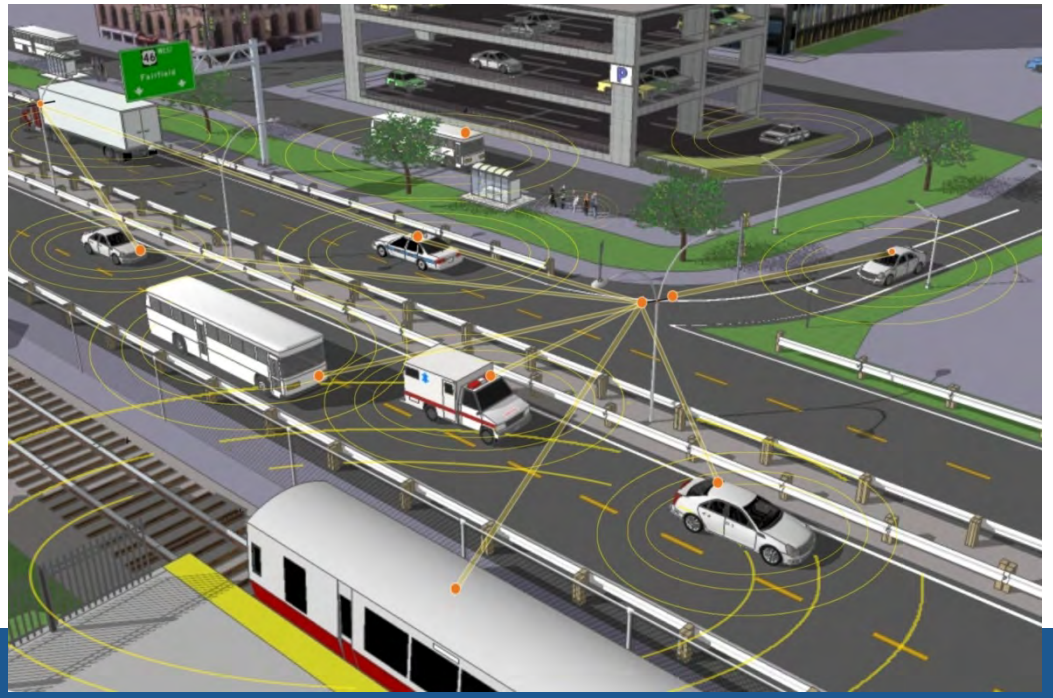
NHTSA Level		Availability?
Zero	No Automation	Now
One	Function-Specific	Now
Two	Combined Automation	Now to 3 Years
Three	Limited Self-Driving	3 – 10 years
Four	Fully Automated	7 – 12+ years

Why Do We Care?

- Safety benefits
  - 95% of crashes partially attributable to human error (NHTSA)
- Mobility and congestion reduction
  - AVs and CVs could increase throughput through platooning, tighter lane spacing
- Quality of life
  - Comfort, convenience, productivity

Connected Vehicles

- Vehicles talk to each other, the infrastructure, and other modes through DSRC, Wi-Fi, and Cellular
- AKA: V2V, V2I, V2X
- Focus on safety; also provides environmental and mobility benefits



Where to From Here?

- Uncertainty in Abundance
  - Estimates based on models and assumptions; limited empirical evidence
  - Current infrastructure is designed for human drivers
    - Funding?
  - Establishing legal and regulatory environment
  - How will motorists respond when the direct and indirect costs of driving decrease?

Thank You!

Questions?

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