MIT AgeLab Efforts in Vehicle Automation

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MassDOT AV Working Group Meeting
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Multi-disciplinary team studying aspects of the evolving automation ecosystem and its impact on the future of mobility

- **Advanced Vehicle Technology (AVT) Consortium**
  - Studying currently available automated vehicle technologies
  - Implications for future technology development, policy, insurance, acceptance, etc.

- **Advanced Human Factors Evaluator for Automotive Demand (AHEAD) Consortium**
  - Driver workload metrics for HMI evaluation and driver monitoring
  - Situational awareness, attention management in an increasingly automated ecosystem

- **Highly automated vehicles**
  - Human centered considerations in trust, attention, situational awareness, etc.
  - Factors that may influence the adoption of automated vehicle systems
  - Non-verbal communication between road users

- **Applications of Deep Learning**
  - Driver monitoring
  - External scene perception
The Advanced Vehicle Technology Consortium

• **Originators:** MIT AgeLab, Touchstone Evaluations & Agero

• **Founding Members:** Delphi, Liberty Mutual, Jaguar Land Rover, Autoliv, Toyota

• **Full Members:** TBD

• **Affiliate Members:** Consumer Reports & TBD

• **Focus:** To collect and analyze cutting edge data that objectively characterizes the behavioral and safety benefit of advanced driver assistance systems, higher levels of automation, and other in-vehicle technologies under real-use conditions

Looking Beyond the Technology

An understanding of system performance and how drivers adapt to, use (or do not use), and behave with advanced vehicle technologies
Investigating Automated Technology Use in the Wild

MIT Autonomous Vehicle Technology Study

Study months to-date: **20**  
Participant days: **8,994**  
Drivers: **60**  
Vehicles: **24**  
Miles driven: **252,173**  
Video frames: **4.7 billion**  
Video pixels: **4.4 quadrillion**

Study data collection is ongoing.  
Statistics updated on: Sep 1, 2017
Communication between Road Users

Establishing a baseline and informing automation and infrastructure design

Confidential do not record.
Using Naturalistic Data to Teach Robots to Drive

Illustration: End-to-end deep neural networks for perception and steering control

Goal: Developing a deep reinforcement based perceptual control system that learns from experience how to avoid high speed crashes.

Learning Episode 203
Developing an Integrated Model of Driver Attention

- Broadening scientifically valid perspectives and methodologies for the objective measurement of demand placed on drivers by in-vehicle systems and technologies during vehicle use, while considering the increasing role of attention support and management.

- Moving the language of demand assessment from one somewhat focused on distraction, to one that emphasizes driver attention management and safe operation, such that demands on driver, active safety systems, and other higher order forms of automation can be considered as a whole.