2012 Road Vehicle Automation Workshop

July 24-26, 2012
Irvine, California

Organized by
Transportation Research Board

Supported by
Intelligent Transportation Systems (AHB15)
Vehicle-Highway Automation (AHB30)
Major Activity Center Circulation Systems (AP040)
Emerging and Innovative Public Transport and Technologies (AP020)
Emerging Technology Law (AL040)
Vehicle User Characteristics (AND10)

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

WORKSHOP AGENDA

Tuesday, July 24

Noon - 5:00 p.m.
Registration

Arrive Tuesday afternoon for a pre-workshop discussion of operational concepts that take advantage of emerging vehicle automation capabilities. (There is a separate registration for this workshop.)

1:00 p.m. - 5:00 p.m.
Early Automation Deployment Opportunities in Managed Lane Operations (Audio)

Managed-use lanes offer the possibility of safely integrating early automated vehicles onto highways and arterials. The objective of this half-day workshop session is to define fertile research topics at the nexus between managed lane operations and road vehicle automation, so that public agencies and independent researchers, especially in universities, can focus their attention on these topics.

1:00 p.m. – 1:10 p.m.
Welcoming Remarks, Definition of Meeting Purpose
Bob Ferlis

> *1:10 p.m. – 1:30 p.m.*
> **Introduction to the Current State of Development of Managed Lanes in the U.S.**
> Ginger Goodin, TRB Managed Lanes Committee Chair

> *1:30 p.m. – 1:50 p.m.*
> **Presentation on potential synergies between managed lane operations and automated vehicle operations (example operating concepts) and capacity and access challenges**
> Steven Shladover

> *1:50 p.m. – 2:10 p.m.*
> Introduce discussion topics on opportunities and challenges, and solicit more topics from attendees. Converge on priority topics for more in-depth discussion.

2:10 p.m. – 2:30 p.m.
Break

2:30 p.m. – 5:00 p.m.
Discussion of priority topics and specific research needs in each topic area, concluding discussion, with research needs identified.

5:00 p.m.
Adjourn

7:00 a.m - 5:30 p.m.
Registration

7:30 a.m - 8:30 a.m.
Breakfast

8:00 a.m - 9:30 a.m.
Opening Session (Video - Opening, Session 1)

Welcoming remarks and workshop plan
Jane Lappin, Volpe National Transportation Systems Center

Lexicon and Taxonomy of Automated Vehicle Systems
Steven Shladover, University of California Berkeley

Expert Panel Discussing the Benefits of Automation (to set the scene as motivation for interest in automation)

- Safety – **Tim Johnson**, NHTSA

- Energy and Environment – **Matthew Barth**, U.C. Riverside

- Traffic Flow and Capacity – **Steven Shladover**, U.C. Berkeley

- Mobility/Accessibility – **Mohammed Yousuf**, FHWA

9:30 a.m. - 9:45 a.m.
Break

9:45 a.m. - noon
State of the Art Session 1 – Private Personal Vehicles (Autonomous)

Google's Self-Driving Cars – **Anthony Levandowski**

Stanford University research – **Chris Gerdes**

TARDEC military vehicles – **Jim Overholt**

Vislab/University of Parma – **Alberto Broggi**

General Motors EN/V vehicles – **Chris Borroni-Bird (VIDEO)**

Mercedes – **Luca Delgrossi**

Questions and Answers/Discussion

Noon - 1:00 p.m.
Lunch

1:00 p.m. - 3:15 p.m. (**Video - Sessions 2 latter half & Session 3** *- technical difficulties with some audio*)
State of the Art Session 2 – Trucks and Transit Vehicles (Cooperative)

Energy ITS truck platoon – **Sadayuki Tsugawa**, Meijo University

SARTRE project mixed platoon – **Erik Coelingh**, Volvo Cars

KONVOI and interactIVe projects: Truck platooning and Crash Avoidance –**Adrian Zlocki**, RWTH Aachen University

Truck Platooning and Transit Bus Guidance – **Steven Shladover**, U.C. Berkeley PATH Program

CityMobil Project – **Adriano Alessandrini**, University of Rome

ULTra Personal Rapid Transit – **Martin Lowson**, ULTra PRT

Questions and Answers/Discussion

3:15 p.m. - 3:30 p.m.
Break

3:30 p.m. - 5:30 p.m.
State of the Art Session 3 – Cross-Cutting Activities

HAVEit Project – multiple levels of automation – **Anna Schieben**, DLR

GM EARP project on human factors of automation – **Jeremy Salinger**, GM

BASt study of legal issues in Germany– **Tom Gasser**, BASt

Legal issues in the U.S. – **Bryant Walker Smith**, Stanford University

European Commission Working Group on Automation – **Joakim Svensson**, Volvo Group Trucks Technology

Questions and Answers and Discussion

5:30 p.m. - 5:45 p.m.
Closing and adjourn for the day

5:45 p.m. - 7:30 p.m.
Reception

Thursday, July 26

7:00 a.m - 5:30 p.m.
Registration

7:30 a.m - 8:30 a.m.
Breakfast

8:30 a.m - 11:00 a.m.
Break-out Groups: Session 1 (Audio)

- Public Policy Issues (Audio)

- Driver-vehicle Interaction (Audio)

- Information Architecture and Operational Concepts (Audio)

- Technology Needs and Constraints (Audio)

11:00 a.m. - 11:30 a.m.
Break while group leaders prepare report-out

11:30 a.m. - 12:15 p.m.
Plenary report-out from Session 1 (Audio)

12:15 p.m. - 1:15 p.m.
Lunch

1:15 p.m. - 3:45 p.m.
Break-out Groups: Session 2

- Transition and Deployment Strategies (**Crystal Cove - Emerald Bay - Laguna**)

- Legal, Liability, and Risk (**Audio**)

- Vehicle Safety and Security (**Audio**)

3:45 p.m. - 4:15 p.m.
Break while group leaders prepare report-out

4:15 p.m. - 5:00 p.m.
Plenary report-out from Session 2 (Audio)

5:00 p.m. - 5:15 p.m.
Closing

5:15 p.m. - 6:30 p.m.
Reception

Friday, July 27

7:00 a.m - 11:00 a.m.
Registration

7:30 a.m - 8:30 a.m.
Breakfast

8:00 a.m. -11:00 a.m.
Post-Workshop planning

The workshop team (at least one reporter from each discussion group) plans next steps including proceedings and panel session at the 2013 TRB annual meeting.

The objective of the breakout groups is the development of research needs statements to inform future research on automated vehicles.

Morning

Public Policy Issues

This session will explore the public policy and spatial implications of vehicle automation in terms of urban planning, architecture, land use, economic impacts, traffic patterns, public transportation, newly mobile populations and other social issues.

Driver-vehicle Interaction

This session will discuss a wide variety of human factors considerations for automated vehicles including driver expectations, safety issues surrounding the transition between manual and automated driving modes, trust in automation, and unintended consequences of automation. The session will also address individual differences in drivers due to ability and impairment. The group will generate research ideas and data needs as applied to all levels of automation.

Information Architecture and Operational Concepts

This session will address the application and role of vehicle communications and the use of roadway infrastructure for automated vehicles, considering the respective roles of the private and public sectors.

Technology Needs and Constraints

This session will address the technology needs of and constraints on automated vehicles including sensors, actuators, microprocessors, location devices, antennae, and the full range of hardware and software requirements to enable the vehicle to assist the driver and drive itself.

Afternoon

Vehicle System Safety and Security

A focus on issues related to safety, security, and reliability including: threats from hackers and data security, defending a system and maintaining vehicle safety in an autonomous or cooperative automated driving environment.

Legal, Liability, and Risk

The current legal framework, which generally assumes that a human is in control of a vehicle at all times, may not clearly or sufficiently address high levels of vehicle automation. This session will seek to identify new scenarios for which current law may be unprepared, isolate the issues presented, and articulate the information still needed to develop the steps, ideally short of full-scale reforms, that could help ease the transition.

Transition and Deployment Strategies

How will the world transition to a road environment with automated vehicles and how will deployment occur? Will the deployment be entirely market-led or will public sector incentives shape automated mobility? What will be the deployment trajectories of different types of passenger and commercial vehicles? How will infrastructure factor into the transition to automated vehicles? This break-out session will use future automated-vehicle scenarios as a point of departure for exploration of transition and deployment strategies--investments, innovations, practices, and policies--that have enabled the "future."