



Summary of the April 26, 2019 Workshop on Safety and Risks of Autonomous Vehicles

Panel on Advancing Safety Technologies for Autonomous Vehicles

United States Congress

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2044 Rayburn House Office Building

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Autonomous Vehicles: Features & Issues

- Remarkable and trendiest technology
- Obsolete car ownership
- Industry hope of “zero crashes”
- Leaders include Waymo and Tesla, Ford Motor Company, General Motors, Mercedes-Benz
- Traffic and pollution in urban centers
- Shared mobility options
- Slow advances on safety, risk and reliability
- Poor average distance driven to an incident

Workshop Objectives

Examine views from Academia,
Government, and Industry:

- Safety, risk, security, and reliability of AVs
- Adequacy of road infrastructures
- Legal, ethical and regulatory considerations
- More safety research and technology needs



The poster is titled "Workshop on Risk Analysis for Autonomous Vehicles: Issues and Future Directions" and is dated April 26, 2019. It is held at the Key 12 Boardrooms, Kim Building of Engineering, University of Maryland, College Park. The poster contains several sections: a main text block on the left discussing the rapid advancement of autonomous vehicles and the need for research; a smaller text block on the right about the workshop's objective to gather experts; a central image of a hand holding a key; a "Workshop topics" section listing areas like R3 engineering, communications, and legal issues; a "Sponsors" section featuring logos for the University of Maryland, ASME, and Ford; and a "Co-Organizers" section listing Professor Mohammad Modarres and Dr. Mohammad Pourgol-Mohammad. Logos for the Center for Risk and Reliability, ASME, and Ford are also present.

Workshop on Risk Analysis for Autonomous Vehicles: Issues and Future Directions
April 26, 2019
Venue: Key 12 Boardrooms, Kim Building of Engineering, University of Maryland, College Park

The world is witnessing remarkable technology advancements and competitions in autonomous and connected transportation vehicles. These include major developments of self-driving electric cars by high tech companies as well as the traditional automobile manufacturers. Urban areas are bracing for a rapid infusion of these technologies into their roads in the near future. While technology development has been the prime focus of most recent technology innovations, we have witnessed only limited advances on issues of risk, reliability, and resilience. A number of accidents have already occurred.

Most surveys show that while the public at large is extremely excited about these technologies, concerns over safety, software reliability, security, hacking/misuse, and licensing remained as paramount.

The objective is to gather the experts from academy, research institutes, and industry to discuss the issues, identify the gaps, and propose the directions for basic and applied research activities.

The conference will follow with a congressional briefing to update the policy makers about the risk of the technology and potential directions for necessary funding.

Workshop topics:

- Risk, reliability and resilience (R3) engineering,
- Communications, information and network security,
- Transportation and road infrastructure,
- Learning and reasoning to control complex behavior
- Legal, ethical and regulatory issues
- Educational programs related to autonomy

Sponsors

Co-Organizers

- Professor Mohammad Modarres, Center for Risk and Reliability, CRR, University of Maryland, College Park, modarres@crr.umd.edu
- Dr. Mohammad Pourgol-Mohammad, Safety Engineering and Risk/Reliability Analysis (SEREA), American Society of Mechanical Engineers (ASME), Johnson Controls Inc., pourgol-mohammad@asme.org

Big Picture for Self-Driving Safety

- True self-driving long time away
- Aspiration: Self-driving safer than conventional technologies
- Driver assistance offers a low hanging fruit
- More independent safety transparency and collaboration
- Need minimum performance standards
- Better autonomy software safety standards



From: Philip Koopman Presentation: The Big Picture for Self-Driving Car Safety



Maryland MDOT Initiatives

- Strategic Plan for Connected and Automated Vehicles (CAV Plan)
- Develop robust CAV, including:
 - CAV sensor collects data on bridges, roads, pavements
 - Use of predictive analytics
 - Integrated communications controllers and networks
 - Planning a Security Credential Management for secure management

Current TAMP plan includes:

- *Inventory of pavement and bridges*
- *Assess historic condition information*
- *New assets being built*

TRANSPORTATION ASSET MANAGEMENT PLAN

TRANSPORTATION ASSET MANAGEMENT



MDOT Administrator: Gregory Slater:
Maryland Cybersecurity Initiatives in a
Connected and Autonomous World



NHTSA Considerations for Automated Driving



- Evaluating emerging safety issues and technologies
- Building knowledge of new technologies
- Developing technology-neutral procedures
- Modernizing requirements and performance criteria
- Develop best practices guidance

From Dee Williams: NHTSA's FMVSS Considerations for Vehicles with Automated Driving Systems



Measuring AV Safety

- Need a better and transparent evaluation of unsafe events
- Develop a protocol for information sharing
- Common safety design taxonomy
- Establish designated demonstration period for safety benchmarking
- More research on AV safety and collaboration between regulators, academics and industry

From Marjory Blumenthal: Measuring Automated Vehicle Safety: Building Better Outcomes and Policy



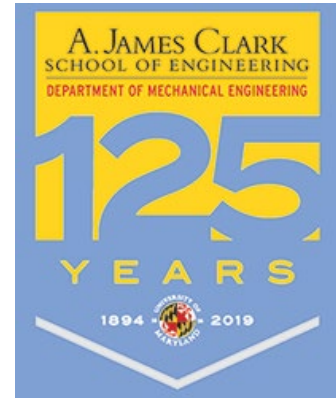
More Academic Perspectives on AV Safety and Risk

- Learn from other high-risk industries: nuclear power, pharma, etc.
- Risk-informed performance-based assessment
- Insufficient collaborations between stakeholders
- Match human cognitive adaptability and on-the-fly reasoning
- Need a gradual path to full AV
- Developers appear over-enthusiastic and confident
- Regulators and policy-makers are slow

More Academic Perspectives on AV Safety and Risk

- Safety analysts highly skeptical
- Major ethical issues
- Risk modeling, safety assessment path planning
- How machine learning techniques adapt themselves to unforeseen conditions?
- Is the policy that China views: Re-engineer entire road infrastructure better?
- Dedicated roads or lanes to AVs?
- Consensus: full autonomy principle is possible, surely not imminent

Thank You



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