Connected and Automated Vehicles

The Course at the Epicenter of Connected Vehicle Research and Development

Join leading US researchers at the University of Michigan for a four-day immersion in connected and automated vehicles. You’ll learn about key topics, technologies, and challenges for this emerging industry, as well as the solutions and standards being developed right here in Ann Arbor and around the world.

Learn more and register:
isd.engin.umich.edu/cav
Program Details

Only two courses will be offered this year.

**MONDAY**

**Big Picture: Trends, Opportunities, and Challenges**
- Societal trends
- Safety, mobility, and energy/environment
- Early success stories
- Known challenges

**Past and Present Research, Demonstration, and Deployment**
- EU programs and key lessons learned
- Japan/Asia programs and key lessons learned
- US programs and key lessons learned

**Connected Vehicle Technology**
- Overview, objectives, and how they complement vehicle-based sensors (radar, lidar, etc.)
- Technologies
  - Vehicle-based CV devices
  - Infrastructure-based CV devices
  - Vehicle-to-Vehicle applications (V2V)
  - Vehicle-to-Infrastructure applications (V2I)
  - Infrastructure-to-Infrastructure applications (I2I)
  - Vehicle-to-Everything Else (V2X)
- Deployments of Connected Vehicle Technology

**TUESDAY**

**Connected Vehicle Data Standards**
- SAE J2735
- IEEE 1609
- ASTM E2213-03
- CVRIA

**Connected Infrastructure:**
- Fundamentals
- Data standards
- Hands-on exercise
- Simulation

**WEDNESDAY**

**Cybersecurity and Privacy of CAV**
- Introduction to cryptography, data security, and privacy
- Cybersecurity standards: secure communication protocols, secure development, secure platforms
- Related activities in the US and EU
- Secure vehicle-to-vehicle safety application communication
- Secure vehicle-to-infrastructure applications communication
- Security credential management system
- Automotive security applications
- Secure automotive electronics architectures

**THURSDAY**

**Automated Vehicle Technology**
- Why automated driving?
- UM’s Mobility Transformation Center
- Case study: Next generation vehicle project with Ford Motor Company
- Mapping & localization primer
- Critical challenges ahead
- Overview of Human Factors Considerations
- Testing & Evaluation, Laws & Regulations

**Simulation Tools**
- Carsim (MSC speaker), Prescan (TASS speaker)
- POLARIS and Vissim

**Summary and Conclusion**

Space is limited to 33 people per offering, so register today!

**World-Class U-M Faculty + Researchers**

- **Ryan Eustice**
  Associate Professor of Naval Architecture & Marine Engineering, Electrical Engineering and Computer Science, and Mechanical Engineering

- **Henry Liu**
  Professor of Civil and Environmental Engineering, University of Michigan Transportation Research Institute

- **Huei Peng**
  Professor of Mechanical Engineering, Director of Michigan Mobility Transformation Center

- **James Sayer**
  Director, University of Michigan Transportation Research Institute

- **André Weimerskirch**
  VP Cyber Security, Lear Corporation

**Learn more**

Our CAV program faculty are at the forefront of connected and automated vehicle research and testing. Learn more about their work at isd.engin.umich.edu/cav

Join us May 8–11 or October 16–19
Program Overview

**MONDAY**
Big Picture: Trends, Opportunities, and Challenges
- Societal trends
- Safety, mobility, and energy/environment
- Early success stories
- Known challenges

Past and Present Research, Demonstration, and Deployment Activities in EU, Japan, and US
- EU programs and key lessons learned
- Japan/Asia programs and key lessons learned
- US programs and key lessons learned

Connected Vehicle Technology
- Overview, objectives, and how they complement vehicle-based sensors (radar, lidar, etc.)
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Equipped Van Ride

**TUESDAY**
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Connected Infrastructure:
- Fundamentals
- Data standards
- Hands-on exercise
- Simulation

Traffic Control with Connected Vehicles
- Adaptive traffic signal control
- Traffic signal priority
- Ramp metering control
- Mobile accessible pedestrian signal system

**WEDNESDAY**
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Mcity Tour

**THURSDAY**
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Summary and Conclusion
Program Details

Who Should Attend
This course is ideal for engineers, managers, and thought leaders interested in understanding the technologies, challenges, and current development efforts in connected and automated vehicles.

Register Today!
Visit our program web page at isd.engin.umich.edu/cav, send an email to isd-answers@umich.edu, or call (734) 647-7200.
Connected and Automated Vehicles

The Course at the Epicenter of Connected Vehicle Research and Development

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About Michigan Engineering and Integrative Systems + Design

The University of Michigan's College of Engineering was founded in 1853. Today, Michigan Engineering and its academic departments rank in the top ten in their respective areas (U.S. News and World Report). The faculty's ongoing research and industry consultation in engineering contribute to Michigan's strength and impact on professional development. Michigan Engineering's research expenditures for fiscal 2014 totaled $217.9 million, placing it in the forefront of collegiate engineering research in the U.S.

Integrative Systems + Design (ISD), a division of Michigan Engineering, offers credit courses to students on campus and at locations around the world. Recognized as a global leader in online education in addition to offering on-campus programs, ISD provides lifelong learning to technical professionals, and has served more than 100,000 students with intensive short courses, conferences, professional certifications, and advanced degree and certification programs; offered online, on campus and on site. ISD responds to the needs of industry, healthcare, government, the military, and non-profit organizations with specialized education programs.

For more information about ISD, visit isd.engin.umich.edu

Questions? Email isd-answers@umich.edu

Exclusive Mcity Tour: One of Many Course Highlights

Course participants will have the opportunity to tour the cityscape for testing driverless vehicles at U-M. Mcity, a 32-acre “mini-city” located on the University of Michigan's North Campus, is designed expressly for testing connected and automated vehicle systems and other emerging 21st-century smart city technologies.

Learning Objectives

• Hear from leading US researchers on the current V2X standards and technologies with a focus on safety and traffic control applications using dedicated short-range communication (DSRC)
• Learn about the scope and major findings from recent connected and automated vehicle research and development projects in the EU and US
• Understand the key cybersecurity and privacy issues and solutions under development
• Gain insight into both full-automated and partial-automated vehicle technologies and challenges, including their human factor issues and testing/evaluations
• Learn about several simulations tools used in connected and automated vehicle development

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ISD responds to the needs of industry, healthcare, government, the military, and non-profit organizations with specialized education programs.

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