



## Energy and Flow Effects of Optimal Automated Driving in Mixed Traffic

**Speaker: Ardalan Vahidi, Professor of Mechanical Engineering,  
Clemson University**

**Web:** <https://cecas.clemson.edu/~avahidi/>

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**11:00 AM – 12:00 PM**

**Location: EEB 248**

**Zoom:** <https://usc.zoom.us/j/93103284622?pwd=SDg1bVVSMdc1SS84bzdQU1d4TVlVZz09>

**Meeting ID:** 931 0328 4622    **Passcode:** 394765

### **Abstract:**

Connected and automated vehicles (CAV) are marketed for their increased safety, driving comfort, and time saving potential. With much easier access to information, increased processing power, and precision control, CAVs also offer unprecedented opportunities for energy efficient driving. This talk highlights the energy saving potential of connected and automated vehicles based on first principles of motion, optimal control theory, and practical examples from our previous and ongoing research. Connectivity to other vehicles and infrastructure allows better anticipation of upcoming events, such as hills, curves, state of traffic signals, and movement of neighboring vehicles. Automation allows vehicles to adjust their motion more precisely in anticipation of upcoming events, and save energy. Opportunities for cooperative driving could further increase energy efficiency of a group of vehicles by allowing them to move in a coordinated manner. Energy efficient motion of connected and automated vehicles could have a harmonizing effect on mixed traffic, leading to additional energy savings for neighboring vehicles.

Latest analytical and experimental results will be shown on energy and traffic flow impacts attained by anticipation and coordination. The benefits are shown in simulated scenarios and in experiments on a test track where urban and highway conditions are emulated.

### **Biographical Sketch:**

Ardalan Vahidi is a professor of mechanical engineering at Clemson University, South Carolina. He received his Ph.D. in mechanical engineering from the University of Michigan, Ann Arbor, in 2005, M.Sc. in transportation safety from George Washington University, Washington, DC, in 2002, and B.S. and M.Sc. from Sharif University of Technology in 1996 and 1998, respectively. He has held Visiting Scholar positions at the University of California, Berkeley (2012-2013), and University of California, San Diego (2023), and scientific visiting positions at BMW Technology Office in California (2012-2013), and at IFP Energies Nouvelles, in Paris (2017). He is a Senior Member of IEEE, a Fellow of ASME, and an Associate Editor for IEEE Transactions on Control Systems Technology. His core expertise is in systems and control and his recent publications span topics in automated and connected mobility, electrified transportation, and modeling and optimization of human performance. His research has been sponsored by US Department of Energy, NSF, US Army, and research labs of BMW, Ford, GM, Cummins, and Eaton.

**Hosts:** Dr. Petros Ioannou, [ioannou@usc.edu](mailto:ioannou@usc.edu)