The American Society of Mechanical Engineers
Delaware Section

The Delaware Section of ASME & Brandywine Valley ASM cordially invite you to

Autonomous Vehicle Update Presentation
By Dr. Andreas Malikopoulos

Tuesday – January 16, 2018

Agenda:

- **6:00 PM** **Social Hour**
- **6:30 PM** **Dinner**
- **7:30 PM** **Presentation by Dr. Andreas Malikopoulos**
- **8:30 PM** **Q&A and End of Program**

- **Dinner and Cost:**

MEAL	ASME/ASM MEMBER	NON-MEMBER	STUDENT
North Atlantic Salmon	$30	$35	$20
Steak / Prime Rib	$35	$40	$25
Garden Vegetable Wellington	$30	$35	$20

- **Dinner includes beverage, soup or salad, vegetable of the day, potato/rice selection (Chef's choice) and dessert.**
- **No Charge for ASME students or ASME Member's student attending.**
- **If you are unable to attend dinner, you are welcome to the presentation at no charge!**

- **PDH: Potential 1 to 2 Professional Development Hours (PDH) depending on presentation technical content and length.**

- **Location: The Mendenhall Inn – 323 Route 52, Mendenhall, PA:** http://mendenhallinn.com

Reservations: Please contact Jeffrey Hall (jhall@2spi.com or call 610-436-5400 x106) no later than noon on Friday January 12. Please leave your full name, affiliation (ASME), meal selection (Salmon, Prime Rib or Vegetable Wellington) and contact number. If you find you cannot attend, please call in a cancellation before the January 12th deadline.

TITLE: Decentralized Optimal Control for Connected and Automated Vehicles

ABSTRACT: In this "new world" of massive amounts of data from vehicles and infrastructure, what we used to model as uncertainty (noise or disturbance) for traffic becomes extra state information in a much higher-dimensional vector. Connected and automated vehicles provide the most intriguing opportunity for enabling users to better monitor transportation network conditions and make better operating decisions to improve safety and reduce pollution, energy consumption, and travel delays.

While progress has been made, especially in the area of safety and how accidents could potentially be prevented, one particular question that still remains unanswered is "how much can we improve fuel consumption, if we assume that the vehicles are connected and can exchange information with each other and with infrastructure?"

This talk will address the problem of coordinating vehicles that are wirelessly connected to each other at different transportation segments, e.g., intersections, merging roadways, to achieve a smooth traffic flow without stop-and-go driving. I will present a decentralized optimal control framework whose closed-form solution exists under certain conditions, and which, based on Hamiltonian analysis, yields for each vehicle the optimal acceleration/deceleration at any time in the sense of minimizing fuel consumption.

The solution, when it exists, allows the vehicles to cross the intersections and merging roadways without the use of traffic lights, without creating congestion, and under the hard safety constraint of collision avoidance.

BIO: Dr. Andreas Malikopoulos is an Associate Professor in the Department of Mechanical Engineering at the University of Delaware (UD). Before joining UD, he was the Deputy Director and the Lead of the Sustainable Mobility Theme of the Urban Dynamics Institute at Oak Ridge National Laboratory (ORNL), and a Senior Researcher with General Motors Global Research & Development.

He received a Diploma from the National Technical University of Athens, Greece, in 2000, and his M.S. and Ph.D. degrees from the University of Michigan, Ann Arbor, in 2004 and 2008, respectively all in Mechanical Engineering.

His research interests span several fields, including analysis, optimization, and control of cyber-physical systems; decentralized stochastic systems; stochastic scheduling and resource allocation; and complex systems. The emphasis is on applications related to connected and automated vehicles, smart cities, and sociotechnical systems.

Dr. Malikopoulos is the recipient of several prizes and awards, including the 2007 Dare to Dream Opportunity Grant from the University of Michigan Ross School of Business, the 2007 University of Michigan Teaching Fellow, and the 2010 Alvin M. Weinberg Fellowship. He has been selected by the National Academy of Engineering to participate at the 2010 German-American Frontiers of Engineering (FOE) Symposium and organize a session in transportation at the 2016 European-American FOE Symposium. He has also been selected as a 2012 Kavli Frontiers of Science

Scholar by the National Academy of Sciences. He is an ASME Fellow and an IEEE Senior Member.

Directions to: 323 Route 52 (Kennett Pike), Mendenhall, PA 19357

- **Take Route 141 North to DE Route 52.**
- **Merge onto DE Route 52 North / Kennett Pike via the ramp to Greenville.**
- **Continue to follow Kennett Pike for 6.6 miles.**
- **When you enter Pennsylvania, the Mendenhall Inn will be on the right.**

OR – If construction on DE Route 141 exists from I 95, then:

- **Take I 95 to Pennsylvania Avenue exit and exit I 95..**
- **Take Pennsylvania Avenue towards Greenville, DE / Pennsylvania.**
- **Follow Pennsylvania Avenue / DE Route 52 for 17.1 miles to Mendenhall Inn.**