

WORKSHOP AT THE 2014 AMERICAN CONTROL CONFERENCE

On June 3, 2014, [Tansel Yucelen](#) (Missouri S&T), [Bozenna Pasik-Duncan](#) (University of Kansas), [Anuradha Annaswamy](#) (Massachusetts Institute of Technology), [Naira Hovakimyan](#) (University of Illinois at Urbana-Champaign), [Susan Frost](#) (National Aeronautics and Space Administration), and [Margareta Stefanovic](#) (University of Wyoming) will organize a workshop entitled "**Emerging Frontiers in Adaptive Systems and Learning**" at the 2014 American Control Conference. Below you will find this workshop's abstract and outline. [This workshop will be also special in that it uniquely integrates research and K-12 outreach such that participants and speakers will interact with middle and high school students and share "cool" demonstrations.](#) Please let Dr. Yucelen know by e-mail if you need a copy of our presentations and/or simulation files that we will use in our talks.

Abstract

This workshop will (1) provide a detailed review of a number of well-established and emerging methods in adaptive systems and learning and (2) discuss the future directions of this field. Starting with an overview of nonlinear stability theory, adaptive systems, and learning, this workshop will build a strong foundation of adaptive control techniques and the tools used in their stability and robustness analysis. Specifically, authors will cover state-of-the-art methods including frequency-limited adaptive control, open- and closed-loop reference model design for safe and robust learning, L1 adaptive control, stability margins of adaptive systems, verification and validation of adaptive systems, and unfalsified switching adaptive control with applications to networked control systems, multiagent networks, large-scale modular systems, wind turbines, and stochastic systems. The workshop will then continue with a discussion panel to create a venue for opening a pathway to merging ideas to allow for a unified viewpoint on the future directions of adaptive systems and learning field.

Outline and Speakers

Section 1: Motivation and Preliminaries (8:00am – 8:15am)

- Welcome (**Tansel Yucelen**, 15 min)

Section 2: Motivation and Mathematical Preliminaries (8:20am – 9:10am)

- Nonlinear Stability Theory and Adaptive Systems (**Tansel Yucelen**, 50 min)

Section 3: Emerging Frontiers in Theory I (9:20am – 11:00am)

- Open- and Closed-Loop Reference Models in Adaptive Control (**Travis Gibson**, 25 min)
- L1 Adaptive Control (**Naira Hovakimyan**, 25 min)
- Safe Adaptive Switching Control (**Margareta Stefanovic**, 25 min)
- Frequency-Limited Adaptive Control (**Tansel Yucelen**, 25 min)

Section 4: Emerging Frontiers in Application I (11:10am – 12:00pm)

- Flexible Structures with Applications to Wind Turbines (**Susan Frost**, 25 min)
- Cyber-Physical-Human Systems (**Naira Hovakimyan**, 25 min)

Lunch (12:00pm – 1:30pm)

- Lunch with middle and high schools students *

Section 5: Emerging Frontiers in Theory II (1:30pm – 3:10pm)

- Verification and Validation of Adaptive Systems (**Travis Gibson**, 25 min)

- Unfalsified and Data Driven Adaptive Control (**Margareta Stefanovic**, 25 min)
- Infinite Dimensional Adaptive Control (**Mark Balas**, 25 min)
- Adaptive Control of Stochastic Systems (**Bozenna Pasik-Duncan**, 25 min)

Section 6: Emerging Frontiers in Application II (3:20pm – 5:00pm)

- Adaptive Control of Networked Control Systems (**Travis Gibson**, 25 min)
- Certifiable Adaptive Control with Applications to Modular Systems (**Tansel Yucelen**, 25 min)
- SLS Adaptive Augmenting Ctrl and Flight Characterization Exp. on F/A-18 (**John Wall**, 25 min)
- Nonparametric Learning for Data-Driven Adaptive Control (**Girish Chowdhary**, 25 min)

Section 7: Discussion Panel (5:10pm – 6:00pm)

- Future Directions of Adaptive Systems and Learning: A Unified Viewpoint

** Those who will make commitment to come the lunch and interact with middle and high schools students or would share some cool demonstrations/videos will be rewarded by having nice cost free lunch as a part of The Beauty of Controls Workshop. Let Dr. Yucelen (yucelen@mst.edu) or Dr. Pasik-Duncan (bozenna@math.ku.edu) know if you are interested in this unique engagement of research and education outreach beforehand.*



Registration

Pre-registration for this workshop is strongly encouraged. To pre-register, please visit the conference registration page at <http://a2c2.org/conferences/acc2014/>.