

## UTC INSTITUTE FOR ADVANCED SYSTEMS ENGINEERING Seminar Series

Monday November 12<sup>th</sup>, 2018

1:00 - 2:00PM

UConn, Storrs Campus – IPB 203

[To view live webcast click here](#)

### Delay Propagation in Air Traffic Networks

Flight delays result in significant costs to passengers, airlines, and society as a whole. This fact motivates the development of models that can help characterize air traffic delays, and optimization algorithms that can help reduce them.

In the first part of the talk, I will describe the development and validation of a new class of networked system models of delay dynamics. I will describe machine learning algorithms for identifying these network models from operational data. These models reflect both the spatial properties (i.e., inter-airport interactions) and temporal patterns of delay propagation. They provide features that can help assess various aspects of system resilience, and even predict the future evolution of delays.

In the second part of the talk, I will present an integer programming approach to mitigate flight delays by solving large-scale air traffic flow management problems in the presence of manned and unmanned aircraft, and capacity uncertainties. Using nation-scale examples involving planning trajectories for over 75,000 flights in a 24-hour period, I will demonstrate that the approach is scalable and fast enough for real-time implementation.

### Hamsa Balakrishnan

Hamsa Balakrishnan is an Associate Professor of Aeronautics and Astronautics at the Massachusetts Institute of Technology (MIT). She is an Associate Department Head of Aeronautics and Astronautics, as well as the Director of Transportation@MIT, an institute-wide initiative to transform the future of transportation. She received her PhD from Stanford University, and a B.Tech. from the Indian Institute of Technology Madras. Her research is in the design, analysis, and implementation of control and optimization algorithms for cyber-physical infrastructures, with an emphasis on air transportation systems. She is the co-founder and chief scientist of Lumo, a Boston-based travel startup.

Prof. Balakrishnan is the recipient of numerous awards, including the NSF CAREER Award in 2008, the inaugural CNA Award for Operational Analysis in 2012, the AIAA Lawrence Sperry Award in 2012, the American Automatic Control Council's Donald P. Eckman Award in 2014, and multiple best paper awards. She is an Associate Fellow of the American Institute of Aeronautics and Astronautics.

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