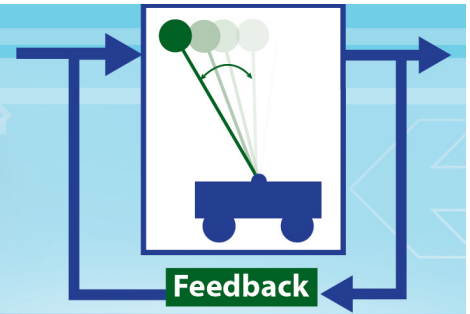


COLLEGE OF ENGINEERING

Control Seminar



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Safe Multi-Vehicle System Planning and Coordination



Ella Atkins / Hossein Rastgoftar

University of Michigan

Department of Aerospace Engineering

Friday, March 16, 2018

3:30 – 4:30 pm • 1500 EECS



ABSTRACT: Continuum deformation is a recently-proposed approach for unmanned vehicle (UXV) coordination that considers UXVs as particles in a continuum, deforming in a 3D motion space. Continuum deformation guarantees collision-free collective motion with minimal communication and computation overhead, enabling distance between individual UXVs to significantly change while assuring the vehicles do not collide. This presentation will describe continuum deformation and its application to cooperative aerial payload transport in a cluttered environment. Flight safety will be defined for disaster relief and urban delivery applications. Strategies for optimal and safe swarm flight planning will be summarized. Simulation results will be presented along with plans for indoor motion capture and M-Air tests in Summer 2018.

BIO: Dr. Ella Atkins is a Professor in the Department of Aerospace Engineering at the University of Michigan, where she is director of the Autonomous Aerospace Systems (A2SYS) Lab. Dr. Atkins holds B.S. and M.S. degrees in Aeronautics and Astronautics from MIT and M.S. and Ph.D. degrees in Computer Science and Engineering from the University of Michigan. She previously served on the Aerospace Engineering faculty at the University of Maryland, College Park. Dr. Atkins is past-chair of the AIAA Intelligent Systems Technical Committee, AIAA Associate Fellow, IEEE senior member, small public airport owner/operator (Shamrock Field, Brooklyn, MI) and private pilot. She served on the National Academy's Aeronautics and Space Engineering Board (ASEB) (2011-2015 term), was a member of the Institute for Defense Analysis Defense Science Studies (DSSG) Group (2012-2013), and recently served on an NRC committee to develop an autonomy research agenda for civil aviation (2013-2014).

Dr. Hossein Rastgoftar is an assistant research scientist in the Aerospace Engineering Department at the University of Michigan. He was a postdoctoral researcher at the University of Michigan Autonomous and Aerospace Systems Laboratory, directed by Professor Atkins, from 2015-2017. He has received his Ph.D. in Mechanical Engineering from Drexel University in 2015. Hossein has two MS degrees (one in Mechanical Systems and the other in Solid Mechanics) and a BSc degree in Mechanical Engineering-Thermo-Fluids. Hossein is currently collaborating with Professor Ella M. Atkins on cooperative aerial payload transport by autonomous Multi-UAV (Unmanned Aerial Vehicle) System (MUS) as an application for MAS continuum deformation.