



ME Seminar



Learning and Control for Dynamical Systems

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ABSTRACT

Design of control strategies for nonlinear dynamical systems arising in robotics and mechanical systems in general is challenging and concerns researchers in both control and robotics community. The first part of the talk consists of my research contributions in addressing a handful of such problems in robotics: (1) Geometric control for swing up of a spherical pendulum mounted on a quadrotor, (2) Dynamic manipulation (throwing) with a robot arm, and (3) Learning a stable dynamical system from a single expert demonstration using Laplacian eigenmaps. The recurrent theme in all the topics is that the underlying structure of the dynamical system is leveraged for learning and control. I shall also present a few interesting problems in the broad area of: learning from demonstrations, path planning using dynamical systems, and dynamic manipulation which I feel are strongly relevant to my background. Lastly, I shall present my teaching plan for a prospective faculty position in the Department of Mechanical Engineering at IISc Bangalore.

ABOUT THE SPEAKER

Aradhana Nayak is a postdoctoral researcher at the Learning Algorithms and Systems Laboratory (LASA) at EPFL, Switzerland; where she works with Prof. Aude Billard. Prior to this, she held a postdoctoral position at the School of Mines, ParisTech where she was supervised jointly by Prof. François Chaplais and Prof. Delphine Bresch-Pietri. She completed her Ph.D in the Department Systems and Control Engineering at the Indian Institute of Technology Bombay with Prof. Ravi Banavar. Her main research interests are in geometric control, dynamic manipulation of robotic systems, machine learning for control of dynamical systems, and learning from demonstrations (LfD). She is particularly interested in applying control theory and machine learning to robotic systems for path planning, LfD, and other dynamic tasks.



January 13, 2023, 4:00 pm, Microsoft Teams (Online)