Hasan A. Poonawala

Assistant Professor

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Education

2010–2014 **Ph.D, Electrical Engineering**, *University of Texas at Dallas*, Richardson,TX.
Thesis: "Formation Control and Connectivity Control for Mobile Robot Networks using Vision-based Measurements"

2008–2009 **MS, Mechanical Engineering**, *University of Michigan*, Ann Arbor, MI.
Mechatronics and Control Systems focus

2003–2007 **B. Tech, Mechanical Engineering**, *National Institute of Technology*, Surathkal, India.

Research Experience

October 2018 – Present **Assistant Professor**, *Department of Mechanical Engineering*, University of Kentucky, Lexington, KY.

October 2015 – September 2018 **Postdoctoral Fellow**, *Institute for Computational Engineering & Sciences*, University of Texas, Austin, TX.
Research Topics:
1. Analysis of controllers designed using machine learning and data.
2. Planning under uncertainty for spacecraft rendezvous and docking.
3. Probabilistic verification for motion planning using convex optimization.
4. Robust control of brain-computer interfaces.

August 2014 – Sept' 2015 **Postdoctoral Researcher**, *Laboratory for Autonomous Systems*, University of Texas at Dallas, Richardson,TX.
Research Topics:
1. Control of directed sensing networks.
2. Time-optimal control of nonholonomic wheeled mobile robots.

June 2010 – May 2014 **Research Assistant**, *Laboratory for Autonomous Systems*, University of Texas at Dallas, Richardson,TX.
Research Topics:
1. Connectivity control for directed and undirected mobile communication networks.
2. Decentralized estimation of the algebraic connectivity of directed networks.
3. Vision-based formation control.
4. Robust Control of quadrotors with uncertain model parameters.

January 2010 – May 2010 **Research Assistant**, *Human Biomechanics and Control Laboratory, University of Michigan*, Ann Arbor, MI.

1. Estimated stride length during walking using a 6 DoF IMU attached to a foot.
2. Modified and calibrated accelerometer for improved accuracy when used as gravity sensor

November 2008 – August 2009 **Mechatronics Engineer**, *Center for Human Growth and Development*, University of Michigan, Ann Arbor, MI.

1. Designed and fabricated a mechatronic system for use in research experiments.
2. Created a software user interface to enable real-time video playback control based on measurements.

June 2007 – July 2008 **Research Assistant**, *Dept. of Aerospace Engineering*, Indian Institute of Science, Bangalore, India.

Research Topics:

1. Design of a light-weight quadrotor using composite materials.
2. Refraction angle compensation for sensors in guidance systems.

Teaching Experience

Spring 2015 **Instructor**, *Dept. of Mechanical Engineering*, University of Texas at Dallas, Richardson,TX.

Course: Systems and Controls Laboratory.

Spring 2014 **Teaching Assistant**, *Dept. of Electrical Engineering*, University of Texas at Dallas, Richardson,TX.

Course: Nonlinear Control Systems.

Fall 2013 **Teaching Assistant**, *Dept. of Systems Management, University of Texas at Dallas*, Richardson,TX.

Course: Dynamics of Complex Networks & Systems

1. Formed the adjacency matrix of a graph whose nodes are actors, with an edge existing between two actors if they were cast in the same movie. This graph was obtained by parsing the IMDB database.
2. Created custom visualization tools using the Java Universal Network Graph framework.

Summer 2012 **Teaching Assistant**, *Dept. of Systems Management, University of Texas at Dallas*, Richardson,TX.

Course: Dynamics of Complex Networks & Systems

Fall 2009 **Teaching Assistant**, *Dept. of Mechanical Engineering*, University of Michigan, Ann Arbor, MI.

Course: Mechatronics System Design

1. Designed and fabricated force sensors using strain gauges.
2. Designed and fabricated custom voice coil motors.

Publications

Journal

Hasan A. Poonawala and Mark W. Spong. Cooperative visibility maintenance in SE(3) for multi-robot-networks with limited field-of-view sensors. *Control Theory and Technology*, Nov 2017.

Hasan A. Poonawala and Mark W. Spong. Time-optimal velocity tracking control for differential drive robots. *Automatica*, 85:153 – 157, 2017.

H. A. Poonawala and M. W. Spong. Preserving Strong Connectivity in Directed Proximity Graphs. *IEEE Transactions on Automatic Control*, 62(9):4392–4404, Sept 2017.

Dario J. Villarreal, Hasan A. Poonawala, and Robert D. Gregg. A Robust Parameterization of Human Gait Patterns Across Phase-Shifting Perturbations. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, PP(99):1–1, 2017.

Hasan A. Poonawala, Aykut C. Satici, and Mark W. Spong. Collision-free formation control with decentralized connectivity preservation for nonholonomic-wheeled mobile robots. *IEEE Transactions on Control of Network Systems*, 2(2):122–130, June 2015.

Aykut C. Satici, Hasan A. Poonawala, and Mark W. Spong. Robust Optimal Control of Quadrotor UAVs. *Access, IEEE*, 1:79–93, 2013.

Conference

Hasan A. Poonawala. Stability analysis via refinement of piece-wise linear lyapunov functions. In *IEEE Conference on Decision and Control*, 2019.

Sudarshanan Bharadwaj, Steven Carr, Natasha Neogi, Hasan Poonawala, Alejandro Barberia Chueca, and Ufuk Topcu. Traffic management for urban air mobility applications. In *NASA Formal Methods Conference*, 2019.

Hasan A. Poonawala, Niklas Lauffer, and Ufuk Topcu. Training classifiers for feedback control. In *American Control Conference*, 2019.

Hasan A. Poonawala and Ufuk Topcu. Robustness of Classifier-in-the-Loop Control Systems: A Hybrid-Systems Approach. In *IEEE Conference on Decision and Control*, 2017.

Hasan A. Poonawala, Mohammed Alshiekh, Scott Niekum, and Ufuk Topcu. Classification Error Correction: A Case Study in Brain-Computer Interfacing. In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2017.

Murat Cubuktepe, Nils Jansen, Sebastian Junges, Joost-Pieter Katoen, Ivan Papusha, Hasan A. Poonawala, and Ufuk Topcu. Sequential Convex Programming for the Efficient Verification of Parametric MDPs. In *Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, 2017.

Hasan A. Poonawala and Mark W. Spong. Maintaining Visibility in Multi-Robot-Networks with Limited Field-of-View Sensors. In *American Control Conference*, 2017.

Hasan A. Poonawala and Ufuk Topcu. Filter-Based Stochastic Abstractions for Constrained Planning with Limited Sensing. In *IEEE Conference on Decision and Control*, Dec 2016.

Hasan A. Poonawala and Mark W. Spong. From nonholonomy to holonomy: Time-optimal velocity control of differential drive robots. In *Robot Motion and Control (RoMoCo), 2015 10th International Workshop on*, pages 97–102, July 2015.

Hasan A. Poonawala and Mark W. Spong. Decentralized estimation of the algebraic connectivity for strongly connected networks. In *2015 American Control Conference (ACC)*, pages 4068–4073, July 2015.

Aykut C. Satici, Hasan A. Poonawala, Hazen Eckert, and Mark W. Spong. Connectivity preserving formation control with collision avoidance for nonholonomic wheeled mobile robots. In *2013 IEEE/RSJ International Conference on Intelligent Robots and Systems*, pages 5080–5086, Nov 2013.

Hasan A. Poonawala, Aykut C. Satici, and Mark W. Spong. Leader-follower formation control of nonholonomic wheeled mobile robots using only position measurements. In *2013 9th Asian Control Conference (ASCC)*, pages 1–6, June 2013.

Hasan A. Poonawala, Aykut C. Satici, Nicholas Gans, and Mark W. Spong. Formation control of wheeled robots with vision-based position measurement. In *American Control Conference (ACC), 2012*, pages 3173 –3178, june 2012.

Hasan Poonawala and Debasish Ghose. Refraction angle compensation with tracking applications. In *International conference on Avionics Systems*, 2008.

Hasan Poonawala, K.N. Krishnanand, and D. Ghose. Design of a quadrotor micro air vehicle. In *Conference on Advances in Space Science and Technology*, 2007.