Farhad A. Goodarzi

Ph.D. Candidate
Department of Mechanical and Aerospace Engineering
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EDUCATION

- **PhD Mechanical Engineering**, The George Washington University, Washington DC (GPA 4.0) Jul 2015
  Thesis: *Payload Transportation using Multiple Cooperative Quadrotor UAV's*
  Relevant Coursework: Estimation and Mobile Robotics; Mechatronics; Nonlinear Control and Design; Spacecraft Attitude Control; Electro Mechanical Control Systems; Adv. Robotics, Adaptive Control.

- **MSc Mechanical Engineering**, Santa Clara University, Santa Clara, CA (GPA 3.85) Dec 2011
  Thesis: *Passive Control and Modeling of a Satellite with Partially Filled Liquid Tank*
  Relevant Coursework: Modern Control Systems; Probability and statistics; Embedded Systems; Adv. Vibration.

- **BSc Mechanical Engineering**, Sharif University of Technology, Tehran (GPA 3.7) Dec 2009
  Thesis: *Drug Transport Through Nanotube Using Capillary Effect with ANSYS*
  Relevant Coursework: Internal Combustion Engines; Heat Transfer; Auto-mechanic (lecture + workshop); Machinery Design & Manufacturing.

ACADEMIC EXPERIENCE

- **Graduate Student Researcher**, The George Washington University 2012-Now
  - Adaptive Geometric Nonlinear Controller designed and validated to transport a variable unknown mass in a desired trajectory autonomously
  - Payload stabilization and load transportation using multiple quadrotor UAV's. The cable that connects the payload to the quadrotor is modeled as an arbitrary number of links like a chain pendulum to model flexibility
  - Geometric Nonlinear Controller for a quadrotor UAV is developed to autonomously follows a given position and attitude command robustly when global exponential attractiveness is guaranteed in the presence of unknown disturbances in both translational and rotational dynamics
  - Rigorous Lyapunov analysis is presented to establish stability properties without any timescale separation assumption
  - Extended Kalman Filter has been developed and tested for the fully dynamics model to estimate state vectors accurately by integrating noisy measurements from multiple sensors
  - Utilizing C/C++ multi-thread and network programming to connect devices via WIFI in real-time experiments
  - Conducting laboratory experimentation (using Vicon Cameras, a Quadrotor UAV, and Microstrain sensors) and numerical modeling using MATLAB, Linux, and C programming, to maintain complex trajectory control
  - Numerical and experimental studies illustrate that the proposed controller can guarantee unprecedented challenging maneuvers such as multiple flipping in a unified way

- **Graduate Student Researcher**, Santa Clara University 2010-2012
  - Fuzzy controller for Rigid-Body using MATLAB and SIMULIMK
  - Presented the force-acceleration relationship of the entire wind turbine system
  - Developed the expressions relating to the kinematics and kinetics of wind turbine motion
  - Verified theoretical results by creating experimental projects and operating lab instruments
  - Managed large research projects and delegated tasks to other team members

- **Undergraduate Student Researcher**, Sharif University of Technology 2007-2009
  - Project leader in Drug Transport Through Nanotube Using Capillary Effect with ANSYS

INDUSTRIAL EXPERIENCE

- **Manufacturing Design Intern** Jennings Technologies. (Thomas and Betts Company) San Jose, CA 2011
  - Prepared CAD blueprints, assembly drawings, and 3D modeling using SOLIDWORKS
  - Designed and development of new product (Vacuum Interrupter RP-138)
  - Stress analysis and simulation with SOLIDWORKS
  - Run experiments and tests to achieve the quality assurance and required certificates
  - Learned fundamental of high voltage switchgear and its material science

- **Full Time Engineer** Tahvieh Air-Conditioning Equipment Company 2009
  - Developed a model for industrial clean rooms with a turbulent air flow using FLUENT software
  - Reviewed an existing system and designed a new system based on user requirements
  - Collaborated with a large team and wrote technical reports
  - Designed and optimized solar thermal systems for commercial buildings with AutoCAD
  - Reviewed mechanical drawings and created quality control reports
  - Generated cost estimates and provided system description catalogs
  - Designing air conditioning unit, heating system, gas pipes, water supply system, sewage system and mechanical room of various residential and industrial areas
  - Delivered presentations to customers

PEER REVIEWD JOURNAL PUBLICATIONS

- **Farhad A. Goodarzi**, Daewon Lee, Taeyoung Lee, "Geometric Control of a Quadrotor UAV Transporting a Payload Connected via Flexible Cable," International Journal of Control, Automation and Systems, Vol. 13, No. 6, Dec 2015.
- **Farhad A. Goodarzi**, Daewon Lee, Taeyoung Lee, "Geometric Adaptive Tracking Control of a Quadrotor UAV on SE(3) for Agile Maneuvers," ASME Journal of Dynamic Systems, Measurement and Control, Under Review, Nov 2014.
- M. Ayoubi, **Farhad A. Goodarzi**, Arun K. Banerjee "Attitude Motion of a Spinning Spacecraft with Fuel Sloshing and Nutation Damping," Journal of American Astronautical Sciences, Vol. 58, No. 4, Oct-Dec 2011, pp. 551-567.

SELECTED CONFERENCE PROCEEDINGS

- **Farhad A. Goodarzi**, Taeyoung Lee "Dynamics and Control of Quadrotor UAVs Transporting a Rigid Body Connected via Flexible Cables," in Proceeding of American Control Conference (ACC 2015), Accepted, Chicago, IL, Jul 2015.
- **Farhad A. Goodarzi**, Daewon Lee, Taeyoung Lee "Geometric Stabilization of a Quadrotor UAV with a Payload Connected by flexible Cable," in Proceeding of American Control Conference (ACC 2014), Portland, OR, Jun 2014.
- **Farhad A. Goodarzi**, Daewon Lee, Taeyoung Lee "Geometric Nonlinear PID Control of a Quadrotor UAV on SO(3)," in Proceeding of European Control Conference (ECC 2013), pp. 3845-3850, Zurich, Switzerland, Feb 2013.
- Sina Hamzehlouia, **Farhad A. Goodarzi**, Sohel Anwar "Stability Analysis of Hydraulic Wind Energy Transfers" in Proceeding of IEEE International Conference on Electro/Information (EIT 2013), Rapid City, SD, Mar 2013.
- M. Ayoubi, **Farhad A. Goodarzi**, Arun K. Banerjee "Passive Control of a Satellite with Partially Filled Liquid Tank," AAS-11109, in Proceeding of 21st AAS/AIAA conference, New Orleans, Louisiana, Feb 2011.

SELECTED HONORS AND AWARDS

- Student Travel Award, American Control Conference (ACC 2014) 2014
- Recent inductee to the Golden Key International Honor Society 2013
- Graduate Engineering Fellowship, George Washington University 2012
- Graduate Engineering Grant, Santa Clara University 2010
- Ranked 12th between 500,000 participants in the University Entrance Exam for B.Sc. 2004
- Silver Medal for National Chemistry Olympiad 2003