CURRICULUM VITAE

IOANNIS POULAKAKIS

CONTACT INFORMATION

Department of Mechanical Engineering
University of Delaware
130 Academy Street (205 Spencer Lab)
Newark, DE 19716-3140, U.S.A.

Phone: (+1) 302-831-3563 (office)
Fax: (+1) 302-831-3619 (office)
Email: poulakas@udel.edu
http://research.me.udel.edu/~poulakas/

EDUCATION

2004–2009 **Ph.D. in Electrical Engineering: Systems**
The University of Michigan, Ann Arbor, MI, U.S.A.
Thesis Title: "Stabilizing Monopedal Robot Running:
Reduction-by-Feedback and Compliant Hybrid Zero Dynamics"
Advisor: Professor J. W. Grizzle

2005–2007 **M.S. in Applied Mathematics**
The University of Michigan, Ann Arbor, MI, U.S.A.

2000–2002 **M.Eng. in Mechanical Engineering**
McGill University, Montreal, Canada
Thesis Title: "On the Passive Dynamics of Quadrupedal Running"
Advisors: Professors M. Buehler and E. G. Papadopoulos

1999–2000 **M.S. in Robotics and Automation**
National Technical University of Athens, Athens, Greece
Thesis Title: "Obstacle Avoidance and Nonlinear Control
of Nonholonomic Mobile Manipulators"
Advisor: Professor E. G. Papadopoulos

1995–1999 **Dipl. in Mechanical Engineering** (rank top 5%)
National Technical University of Athens, Athens, Greece
Thesis Title: "Analysis and Control of Robotic Manipulators
Mounted on Nonholonomic Wheeled Vehicles"
Advisor: Professor E. G. Papadopoulos

ACADEMIC EMPLOYMENT

2016–pres. **Associate Professor, University of Delaware, Newark, DE, U.S.A.**
Primary Appointment: Department of Mechanical Engineering
Secondary Appointment: Department of Biomedical Engineering

2010–2016. **Assistant Professor, University of Delaware, Newark, DE, U.S.A.**
Primary Appointment: Department of Mechanical Engineering
Secondary Appointment: Department of Biomedical Engineering

RESEARCH EMPLOYMENT

2009–2010 **Postdoctoral Research Associate, Princeton University, Princeton, NJ, U.S.A.**
Dept. of Mechanical and Aerospace Engineering (with N. Leonard)

2004–2009 **Research Assistant, The University of Michigan, Ann Arbor, MI, U.S.A.**
Dept. of Electrical Engineering and Computer Science (with J.W. Grizzle)

2000–2004 **Research Assistant, McGill University, Montreal, Canada**
Dept. of Mechanical Engineering & Center for Intelligent Machines (with M. Buehler)

1998–2000 **Research Assistant, National Technical University of Athens, Athens, Greece**
Dept. of Mechanical Engineering (with E. G. Papadopoulos)

Teaching Employment

2004–2008 **Graduate Student Instructor, The University of Michigan, Ann Arbor, MI, U.S.A.**
Department of Electrical Engineering and Computer Science

2002–2004 **Teaching Assistant, McGill University, Montreal, QC, Canada**
Department of Mechanical Engineering

Academic Scholarships and Awards

- **Outstanding Paper Award** for the paper *Control of Quadrupedal Bounding with Flexible Torso and Speed Transitions with Sums of Squares Verification*, The First International Symposium on Swarm Behavior and Bio-Inspired Robotics (SWARM), Kyoto, Japan, October 28-30, 2015
- **NSF CAREER Award** for the proposal *Legged Locomotion Across Scales: Closing the Loop Between Task Planning and Motion Control*, National Science Foundation, Washington DC, U.S.A., 2014
- **Dwight F. Benton Fellowship**, College of Engineering, The University of Michigan, Ann Arbor, MI, U.S.A., 2004–2005
- **Doctoral Fellowship**, Electrical Engineering and Computer Science, The University of Michigan, Ann Arbor, MI, U.S.A., 2004–2008
- **R. Tomlinson Doctoral Fellowship**[1], McGill University, Montreal, Canada, 2002–2004
- **Greville Smith Major Scholarship**, McGill University, Montreal, Canada, 2002–2004
- **Fee Waiving Scholarship**, McGill University, Montreal, Canada, Winter semester 2003
- **Dean's Honour List for outstanding M.Eng. Thesis**, McGill University, Montreal, Canada, 2002
- **Award for Academic Achievements**, Hellenic Scholarships Foundation, Montreal, Canada, 2001
- **Thomaidion Award**[2], National Technical University of Athens, Athens, Greece, 2000

Research Interests

- **Biologically-inspired Robots:** The central objective of my research is to *make fundamental contributions to the formal understanding of the functional organization of the mechanisms that support movement in dynamically dexterous robots.* In my research, I employ *legged robots* as

[1] The R. Tomlinson Award is considered the highest recruitment scholarship available at McGill University, available to only six PhD students throughout the university every year.

[2] The Thomaidion Award is awarded to undergraduate students who publish papers in journals or conferences.

a paradigm for such systems. From a system-theoretic perspective, legged locomotion is equivalent to stabilizing distinguished periodic orbits of mechanical systems that are (i) strongly nonlinear, (ii) hybrid in nature, and (iii) inherently underactuated. Compounding the challenges, such systems include compliant members and they feature a multitude of constraints, such as unilateral contact constraints with the environment and actuator saturation limitations. These features bring to the fore a wealth of open research problems in systems and control theory. Providing solutions to these problems will have a far-reaching impact to the study of a host of other engineered and biological systems, which, like legged robots, accomplish their purpose through cyclic interactions with their environment.

- **Decision making dynamics:** My research in this area *aims at offering novel methods that support fast, accurate and robust collective decision making through the exploitation of sensor mobility and information exchange in networks of decision-making units.* Distributed control of networked systems is an important and growing area of research, motivated by rich theory and an abundance of applications, ranging from vehicle networks, to power networks, to synthetic biological networks. Such systems interact with their environment based on noisy measurements of environmental signals made by individual agents. In a network of moving sensors accumulating evidence, the exchange of information has the potential to improve individual decision-making performance, and to render the network more robust to node failures. To realize this potential, efficient metrics for assessing a sensor's capacity to make reliable decisions must be determined. Our research draws upon computational neuroscience models, detection theory, and social network theory to provide such metrics and to develop optimal control policies for sensor motion coordination.

External Research Funding

Summary:

- Total funds raised: **$ 8,539,613**
- Total funds prorated to UD : **$ 2,657,314**
- Total funds prorated to I. Poulakakis: **$ 1,603,624**

Research Group

Current Members:

- **Graduate Students:**
  1. Xin Liu, Ph.D. Candidate, Mechanical Engineering, Sep. 2011 – present
  2. Mohamad S. Motahar, Ph.D. Candidate, Mechanical Engineering, Sep. 2011 – present
  3. Sushant Veer, Ph.D. Candidate, Mechanical Engineering, Sep. 2013 – present
  4. Duanyi Wei[3], Ph.D. Candidate, Mechanical Engineering, Sep. 2013 – present
  5. Anthony Rossi, M.Sc. Student, Mechanical Engineering, Sep. 2014 – present
- **Undergraduate Students:**
  1. Nathanael Haase, Mechanical Engineering, Feb. 2016 – present

[3]Co-advised with Prof. J. Higginson.

Former Members:

- **Graduate Students:**

  1. Qu Cao, Ph.D., Mechanical Engineering, Sep. 2010 – Jan. 2016
     Thesis: *A Modeling and Control Hierarchy of Quadrupedal Running with Torso Compliance*
     Next: Engineer at MathWorks Inc., Natick, MA
  2. Konstantinos Karydis[4], Ph.D., Mechanical Engineering, Sep. 2010 – Nov. 2015
     Thesis: *A Data-Driven Hierarchical Framework for Planning, Navigation, and Control of Uncertain Systems: Applications to Miniature Legged Robots*
     Next: Postdoctoral Research Associate, GRASP Lab, University of Pennsylvania, PA
  3. Yan Liu[5], M.Sc., Mechanical Engineering, Sep. 2011 – May 2014
     Thesis: *Intrinsic Geometric Path Planning for a New Kinematic Locomotion Template*
     Next: Engineer at General Motors (Diagnosis and Prognosis), Warren, MI
  4. Jian Huang, M.Sc. Student, Mechanical Engineering, Sep. 2011 – Jan. 2014
     Thesis: *A Study of Bipedal Walking on Flat Ground and Staircases*
     Next: Engineer at AlphaSense Inc., Wilmington, DE.

- **Undergraduate Students:**

  1. William Scott, Mechanical Engineering, Oct. 2010–May 2011
     Next: Ph.D. student at Princeton University, Princeton, NJ.
  2. Nathan Giguere, Mechanical Engineering, Jun. 2012–Sep. 2013
     Next: Ph.D. student at the University of Delaware, Newark, DE.
  3. Alexander Revell, Mechanical Engineering, Jan. 2013–Feb. 2014
     Next: Product Development Engineer at Unilife Corporation, Paoli, PA.
  4. Anthony Rossi, Mechanical Engineering, June 2012 – Aug. 2014
     Next: M.Sc. student at the University of Delaware, Newark, DE.
  5. John Koshy, Mechanical Engineering, June 2012 – Dec. 2013
     Next: Ph.D. student at the University of Delaware, Newark, DE.
  6. Melissa Lauten, Mechanical Engineering, Feb. 2014 – May 2014
     Next: Engineer at Ford Motor Company, Dearborn, MI.
  7. Austin Crouse, Mechanical Engineering, Feb. 2014 – May 2015
     Next: Engineer at Gore, Newark, DE.

Visting Scholars:

- **Graduate Students:**

  1. Anthom van Rijn, M.Sc. Student, Mechanical Engineering, Eindhoven University of Technology, Eindhoven, Netherlands; Sep. 2014 – Nov. 2014.

[4]Co-advised with Prof. H. G. Tanner.
[5]Co-advised with Prof. H. G. Tanner.

PUBLICATIONS

Summary:

- Hirsch's h-index: 20, over 1520 citations (based on Google Scholar, "Poulakakis")
- The paper [J2] is among the **50 most-cited** papers in the Int. Journal of Robotics Research
- Co-authors that are students are indicated with (*)

Published / In-press Refereed Journals:

[J18] K. Karydis*, **I. Poulakakis**, and H. G. Tanner, "A Navigation and Control Strategy for Miniature Legged Robots," *IEEE Transactions of Robotics (TRO)*, Vol. 33, No. 1, pp. 214-219, February 2017.

[J17] Q. Cao*, **I. Poulakakis**, "Quadrupedal Running with a Flexible Torso: Control and Speed Transitions with Sums-of-Squares Verification," *Artificial Life and Robotics (ALR)*, Vol. 21, No. 4, pp. 384-392, December 2016.

[J16] **I. Poulakakis**, G. F. Young, L. Scardovi, and N. Leonard, "Information Centrality and Ordering of Nodes for Accuracy in Noisy Decision-Making Networks," *IEEE Transactions on Automatic Control*, Vol. 61, No. 4, pp. 1040-1046, April 2016.

[J15] Q. Cao* and **I. Poulakakis**, "On the Energetics of Quadrupedal Running: Predicting the Metabolic Cost of Transport via a Flexible-torso Model," *Bioinspiration and Biomimetics*, Vol. 10, No. 5, 056008 (20pp), September 2015.

[J14] K. Karydis*, **I. Poulakakis**, J. Sun*, and H. G. Tanner, "Probabilistically Valid Stochastic Extensions of Deterministic models for Systems with Uncertainty," *International Journal of Robotics Research*, Vol. 34, No. 10, pp. 1278–1295, August 2015.

[J13] K. Karydis*, Y. Liu*, **I. Poulakakis**, and H. G. Tanner, "A Template Candidate for Miniature Legged Robots in Quasi-static Motion," *Autonomous Robots*, Vol. 38, No. 2, pp. 193-209, February 2015.

[J12] C. Pahlajani, J. Sun*, **I. Poulakakis**, and H. Tanner, "Performance Bounds for Mismatched Decision Schemes with Poisson Process Observations," *Systems and Control Letters*, Vol. 75, pp. 69–76, January 2015.

[J11] C. D. Pahlajani, J. Sun*, **I. Poulakakis**, H. G. Tanner, "Error Probability Bounds for Nuclear Detection: Improving Accuracy through Controlled Mobility," *Automatica*, Vol. 50, No. 10, pp. 2470–2481, October 2014.

[J10] C. Pahlajani, **I. Poulakakis**, and H. Tanner, "Networked Decision Making for Poisson Processes: Application to Nuclear Detection," *IEEE Transactions on Automatic Control*, Vol. 59, No. 1, pp. 193–198, January 2014.

[J9] Q. Cao* and **I. Poulakakis**, "Quadrupedal Bounding with a Segmented Flexible Torso: Passive Stability and Feedback Control," *Bioinspiration and Biomimetics*, Vol. 8, No. 4, 046007 (16pp), December 2013.

[J8] K. Sreenath, H.-W. Park, **I. Poulakakis**, and J. W. Grizzle, "Embedding Active Force Control within the Compliant Hybrid Zero Dynamics to Achieve Stable, Fast Running on MABEL," *International Journal of Robotics Research*, Vol. 32, No. 3, pp. 324–345, March 2013.

[J7] K. Sreenath, H.-W. Park, **I. Poulakakis**, and J. W. Grizzle, "A Compliant Hybrid Zero Dynamics Controller for Stable, Efficient and Fast Bipedal Walking on MABEL," *International Journal of Robotics Research*, Vol. 30, No. 9, pp. 1170–1193, August 2011.

[J6] J. A. Smith, **I. Poulakakis**, M. Trentini, and I. Sharf, "Bounding with Active Wheels and Liftoff Angle Velocity Adjustment," *International Journal of Robotics Research*, Vol. 29, No. 4, pp. 414–427, April 2010.

[J5] **I. Poulakakis**, and J. W. Grizzle, "The Spring Loaded Inverted Pendulum as the Hybrid Zero Dynamics of an Asymmetric Hopper," *IEEE Transactions on Automatic Control*, Vol. 54, No. 8, pp. 1779–1793, August 2009.

[J4] **I. Poulakakis**, E. Papadopoulos, and M. Buehler, "On the Stability of the Passive Dynamics of Quadrupedal Running with a Bounding Gait," *International Journal of Robotics Research*, Vol. 25, No. 7, pp. 669–687, July 2006.

[J3] E. Papadopoulos, I. Papadimitriou, and **I. Poulakakis**, "Polynomial–based Obstacle Avoidance Techniques for Nonholonomic Mobile Manipulator Systems," *Journal of Robotics and Autonomous Systems*, Vol. 51, No. 4, pp. 229–247, June 2005.

[J2] **I. Poulakakis**, J. A. Smith, and M. Buehler, "Modeling and Experiments of Untethered Quadrupedal Running with a Bounding Gait: The Scout II Robot," *International Journal of Robotics Research*, Vol. 24, No. 4, pp. 239–256, April 2005. (This paper is among the **50 most cited papers in the International Journal of Robotics Research**; source: `http://ijr.sagepub.com/`; accessed: April 15, 2016)

[J1] E. Papadopoulos, **I. Poulakakis**, and I. Papadimitriou, "On Path Planning and Obstacle Avoidance for Nonholonomic Mobile Manipulators: A Polynomial Approach," *International Journal of Robotics Research*, Vol. 21, No. 4, pp. 367–383, April 2002.

Refereed Book Chapters:

[B2] **I. Poulakakis**, J. A. Smith, and M. Buehler, "On the Dynamics of Bounding and Extensions Towards the Half–Bound and the Gallop Gaits," contributed chapter in *Adaptive Motion of Animals and Machines*, H. Kimura, K. Tsuchiya, A. Ishiguro, and H. Witte (Eds.), pp. 79–88, Springer–Verlag, 2005.

[B1] S. Talebi, **I. Poulakakis**, E. Papadopoulos, and M. Buehler, "Quadruped Robot Running With a Bounding Gait," contributed chapter in *Experimental Robotics VII*, D. Rus, and S. Singh, (Eds.), pp. 281–289, Lecture Notes in Control and Information Sciences Series, Springer–Verlag, 2001.

Published / In-press Conference Proceedings (peer-reviewed based on their entirety):

[C36] M. S. Motahar*, S. Veer*, and **I. Poulakakis**, "Composing Limit Cycles for Motion Planning of 3D Bipedal Walkers," in *Proceedings of the IEEE Conference on Decision and Control (CDC)*,

Las Vegas, NV, U.S.A., December 12–14, 2016. (7 pages) Accepted.

[C35] C. D. Pahlajani, I. Yadav*, H. G. Tanner, and **I. Poulakakis**, "Assessing Decision Making Accuracy for Networked Nuclear Detection," in *International Symposium on Distributed Autonomous Robotic Systems (DARS)*, London, U.K., November 7–9, 2016. (12 pages) Accepted.

[C34] S. Veer*, M. S. Motahar*, and **I. Poulakakis**, "Local Input-to-State Stability of Dynamic Walking Under Persistent External Excitation using Hybrid Zero Dynamics," in *Proceedings of the American Control Conference (ACC)*, Boston, MA, U.S.A., July 6–8, 2016. (6 pages).

[C33] X. Liu*, and **I. Poulakakis**, "On the Stability of Symmetric Quadrupedal Bounding Gaits via Factored Poincaré Maps," in *Proceedings of the American Control Conference (ACC)*, Boston, MA, U.S.A., July 6–8, 2016. (6 pages).

[C32] X. Liu*, and **I. Poulakakis**, "On the Energetics of a Switchable Parallel Elastic Actuator Design for Monopedal Running," in *Proceedings of the IEEE Conference on Robotics and Biomimetics (ROBIO)*, Zhuhai, China, December 6–9, 2015. (6 pages).

[C31] X. Liu*, C. Semini, and **I. Poulakakis**, "Active Compliance Hybrid Zero Dynamics Control of Bounding on HyQ," in *Proceedings of the IEEE Conference on Robotics and Biomimetics (ROBIO)*, Zhuhai, China, December 6–9, 2015. (6 pages).

[C30] D. Myrisiotis, **I. Poulakakis**, and E. G. Papadopoulos, "On the Effects of Design Parameters on Quadruped Robot Gaits," in *Proceedings of the IEEE Conference on Robotics and Biomimetics (ROBIO)*, Zhuhai, China, December 6–9, 2015. (6 pages).

[C29] Q. Cao*, E. G. Papadopoulos, and **I. Poulakakis**, "Control of Quadrupedal Bounding with Flexible Torso and Speed Transitions with Sums of Squares Verification," in the *International Symposium on Swarm Behavior and Bio-Inspired Robotics (SWARM)*, Kyoto, Japan, October 28-30, 2015. (8 pages).

[C28] M. S. Motahar*, S. Veer*, J. Huang*, and **I. Poulakakis**, "Integrating Dynamic Walking and Arm Impedance Control for Cooperative Transportation," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, September 28–October 02, 2015. (7 pages).

[C27] S. Veer*, M. S. Motahar*, and **I. Poulakakis**, "On the Adaptation of Dynamic Walking to Persistent External Forcing using Hybrid Zero Dynamics Control," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, September 28–October 02, 2015. (7 pages).

[C26] Q. Cao*, A. T. van Rijn*, and **I. Poulakakis**, "On the Control of Gait Transitions in Quadrupedal Running," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, September 28 –October 02, 2015. (6 pages).

[C25] X. Liu*, A. Rossi*, and **I. Poulakakis**, "SPEAR: A Monopedal Robot with Switchable Parallel Elastic Actuator," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, September 28 –October 02, 2015. (6 pages).

[C24] K. Karydis*, Y. Liu*, **I. Poulakakis**, and H. G. Tanner, "Navigation of Miniature Legged

Robots Using a New Template," in *Proceedings of the IEEE Mediterranean Conference on Control and Automation (MED)*, Torremolinos, Spain, June 16–19, 2015. (6 pages).

[C23] J. Sun*, **I. Poulakakis** and H. G. Tanner, "Active Sensor Networks for Nuclear Detection," in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, Seattle, WA, May 26–30, 2015. (6 pages).

[C22] Q. Cao* and **I. Poulakakis**, "On the Energetics of Quadrupedal Bounding With and Without Torso Compliance," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Chicago, IL, U.S.A., September 14-18, 2014. (7 pages).

[C21] K. Karydis*, D. Zarrouk, **I. Poulakakis**, R. Fearing, and H. G. Tanner, "Planning with the STAR(s)," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Chicago, IL, U.S.A., September 14–18, 2014. (6 pages).

[C20] C. Pahlajani, J. Sun*, **I. Poulakakis**, and H. B. Tanner, "Error Probabilities and Threshold Selection in Networked Decision Making," in *Proceedings of the IEEE Conference on Decision and Control (CDC)*, Florence, Italy, December 10–13, 2013. (6 pages)

[C19] Q. Cao* and **I. Poulakakis**, "On the Passive Stability and Feedback Control of Quadrupedal Bounding with a Flexible Torso," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Tokyo, Japan, November 3–7, 2013. (8 pages)

[C18] C. Pahlajani, **I. Poulakakis**, and H. B. Tanner, "Decision Making in a Sensor Network with Poisson Process Observations," in *Proceedings of the IEEE Mediterranean Conference on Control and Automation (MED)*, Chania, Crete, Greece, June 25–28, 2013. (6 pages)

[C17] K. Karydis*, **I. Poulakakis**, and H. G. Tanner, "Probabilistic Validation of a Stochastic Kinematic Model for an Octapedal Robot," in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, Karlsruhe, Germany, May 6–10, 2013. (6 pages)

[C16] **I. Poulakakis**, L. Scardovi, and N. E. Leonard, "Node Certainty in Collective Decision Making," in *Proceedings of the IEEE Conference on Decision and Control (CDC)*, Maui, HI, U.S.A., December 10–13, 2012. (6 pages)

[C15] Q. Cao* and **I. Poulakakis**, "Passive Quadrupedal Bounding with a Segmented Flexible Torso," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vilamoura, Algarve, Portugal, October 7–12, 2012. (7 pages)

[C14] K. Karydis*, **I. Poulakakis**, and H. G. Tanner, "A Switching Kinematic Model of an Octapedal Robot," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vilamoura, Algarve, Portugal, October 7–12, 2012. (6 pages)

[C13] K. Sreenath, H.-W. Park, **I. Poulakakis**, and J. W. Grizzle, "Design and Experimental Implementation of a Compliant Hybrid Zero Dynamics Controller for Walking on MABEL," in *Proceedings of the IEEE Conference on Decision and Control (CDC)*, Atlanta, GA, U.S.A., December 15–17, 2010. (8 pages)

[C12] **I. Poulakakis**, L. Scardovi, and N. E. Leonard, "Coupled Stochastic Differential Equations and Collective Decision Making in the Two-Alternative Forced-Choice Task," in *Proceedings*

of the American Control Conference (ACC), Baltimore, MD, U.S.A., June 30– July 2, 2010. (6 pages)

[C11] **I. Poulakakis**, "Spring Loaded Inverted Pendulum Embedding: Extensions toward the Control of Compliant Running Robots," in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, Anchorage, AK, U.S.A., May 3–8, 2010. (6 pages)

[C10] **I. Poulakakis**, and J. W. Grizzle, "Modeling and Control of the Monopedal Robot Thumper," in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, Kobe, Japan, May 12–17, 2009. (8 pages)

[C9] **I. Poulakakis**, and J. W. Grizzle, "Monopedal Running Control: SLIP Embedding and Virtual Constraint Controllers," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, San Diego, U.S.A., October 29–November 2, 2007. (8 pages)

[C8] **I. Poulakakis**, and J. W. Grizzle, "Formal Embedding of the Spring Loaded Inverted Pendulum in an Asymmetric Hopper," in *Proceedings of the European Control Conference (ECC)*, Kos, Greece, July 2–5, 2007. (8 pages)

[C7] J. A. Smith, and **I. Poulakakis**, "Rotary Gallop in the Untethered Quadrupedal Robot Scout II," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vol. 3, pp. 2556–2561 Sendai, Japan, September 28–October 2, 2004. (6 pages)

[C6] **I. Poulakakis**, J. A. Smith, and M. Buehler, "Experimentally Validated Bounding Models for the Scout II Quadruped Robot," in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, Vol. 3, pp. 2595–2600, New Orleans, U.S.A., April 26–May 1, 2004. (6 pages)

[C5] **I. Poulakakis**, E. Papadopoulos, and M. Buehler, "On the Stable Passive Dynamics of Quadrupedal Running," in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, Vol. 1, pp. 1368–1373, Taipei, Taiwan, September 14–19, 2003. (6 pages)

[C4] E. Papadopoulos, and **I. Poulakakis**, "Planning and Obstacle Avoidance for Mobile Robots," in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, Vol. 4, pp. 3967–3972, Seoul, Korea, May 21–26, 2001. (6 pages)

[C3] E. Papadopoulos, and **J. Poulakakis**, "Planning and Model Based Control for Mobile Manipulators," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vol. 3, pp. 1810–1815, Takamatsu, Japan, October 30–November 5, 2000. (6 pages)

[C2] E. Papadopoulos, and **J. Poulakakis**, "Trajectory Planning and Control for Mobile Manipulator Systems," in *Proceedings of the IEEE Mediterranean Conference on Control and Automation (MED)*, Patra, Greece, July 17–19, 2000. (6 pages)

[C1] E. Papadopoulos, and **J. Poulakakis**, "On Motion Planning of Nonholonomic Mobile Robots," in *Proceedings of the 31st International Symposium on Robotics (ISR)*, pp. 77–82, Montreal, Canada, May 14–16, 2000. (6 pages)

Refereed Conference Proceedings (peer-reviewed based on extended abstract):

[CA8] K. Karydis*, A. Stager*, H. G. Tanner, and **I. Poulakakis**, "Template-Based Navigation for Miniature Legged Robots," in *International Symposium on Experimental Robotics (ISER)*, Tokyo, Japan, October 3–6, 2016.

[CA7] D. Wei*, **I. Poulakakis**, and J. S. Higginson, "Human-Exoskeleton Hybrid Model to Produce Stable Gait through Inter-limb Coordination," in *The 39th Annual Meeting of the American Society of Biomechanics*, Columbus, OH, August 5–8, 2015.

[CA6] I. Kontolatis, **I. Poulakakis**, and E. G. Papadopoulos, "Quadruped leg design principles for handling slopes or high-speed running," in *ECCOMAS Thematic Conference on Multibody Dynamics*, Barcelona, Catalonia, Spain, June 29–July 3, 2015.

[CA5] **I. Poulakakis**, "Quadrupedal Running with Torso Compliance," in *Robotics 2014: Science and Systems*, University of California, Berkeley, CA, July 12–16, 2014.

[CA4] Q. Cao* and **I. Poulakakis**, "Self-Stable Bounding with a Flexible Torso," in *International Symposium of Adaptive Motion in Animals and Machines (AMAM)*, Darmstadt, Germany, March 11–14, 2013.

[CA3] X. Liu* and **I. Poulakakis**, "On the Control of Quadrupedal Bounding," in *International Symposium of Adaptive Motion in Animals and Machines (AMAM)*, Darmstadt, Germany, March 11–14, 2013.

[CA2] **I. Poulakakis**, J. A. Smith, and M. Buehler, "On the Dynamics of Bounding and Extensions Towards the Half–Bound and the Gallop Gaits," in the *International Symposium of Adaptive Motion in Animals and Machines (AMAM)*, Kyoto, Japan, March 4–8, 2003.

[CA1] **I. Poulakakis**, J. Smith, E. Papadopoulos, and M. Buehler, "Opportunities for Adaptation and Learning in Dynamically Stable Legged Robots," in *Proceedings of the 11th Yale Workshop on Adaptive and Learning Systems*, Center for Systems Science, Yale University, pp. 129–134, New Haven, CT, U.S.A., June 4–6, 2001.

Book Reviews:

[BR1] J. W. Grizzle and **I. Poulakakis**, "Delft Pneumatic Bipeds, by Martijn Wisse and Richard Q. van der Linde, Springer Tracts in Advanced Robotics, Vol. 34, 2007, ISBN 978-3-540-72807-8," Book Review, *Control Systems Magazine*, Vol. 28, No. 4, pp.99–101, August 2008.

Theses:

[T4] **I. Poulakakis**, *Stabilizing Monopedal Robot Running: Reduction-by-Feedback and Compliant Hybrid Zero Dynamics*, Ph.D. Thesis, The University of Michigan, Ann Arbor, MI, USA, 2008.

[T3] **I. Poulakakis**, *On the Passive Dynamics of Quadrupedal Running*, M. Eng. Thesis, McGill University, Montreal, QC, Canada, 2002. (120 pages, in English)

[T2] **I. Poulakakis**, *Obstacle Avoidance and Nonlinear Control of Nonholonomic Mobile Manipulators*, Postgraduate Specialization Thesis, National Technical University of Athens, Athens,

Greece, 2001. (104 pages, in Greek)

[T1] **I. Poulakakis**, *Analysis and Control of Robotic Manipulators Mounted on Nonholonomic Wheeled Vehicles*, Diploma Thesis, Department of Mechanical Engineering, National Technical University of Athens, Athens, Greece, 1999. (150 pages, in Greek)

Invited Research Presentations

A. Workshops, Tutorials and Conferences

[A11] **Probabilistically Valid Models of Miniature Legged Robots for Motion Planning Tasks**
Invited presentation: *Workshop on Miniature Legged Robots*
Robotics 2015: Science and Systems (RSS)
Sapienza University of Rome, Rome, Italy, Jul. 13–17, 2015

[A10] **Canonical Models for Legged Locomotion Across Scales**
Invited presentation: *Int. Symp. of Adaptive Motion in Animals and Machines (AMAM)*
Massachusetts Institute of Technology (MIT), Cambridge, MA, Jun. 21–25, 2015
Invited by Prof. S. Kim

[A9] **A Nonlinear Control Design Approach to Dynamically-stable Running Robots**
Invited presentation: *Workshop on Central Pattern Generators for Locomotion Control*
IEEE Int. Conf. on Robotics and Automation (ICRA), Seattle, WA, May 26–30, 2015
Invited by Prof. A. Ijspeert

[A8] **Quadrupedal Running with Torso Compliance**
Invited presentation: *Workshop on Dynamic Locomotion*
Robotics 2014: Science and Systems (RSS)
University of California, Berkeley, CA, Jul. 12–16, 2014
Invited by Prof. A. Ames and Prof. K. Sreenath

[A7] **Reduced-order Models for Bounding and their Implications to the Control of Robotic Quadrupeds**
Invited presentation: *Workshop on the Design and Control of High-Performance Hydraulic Robots*
IEEE Int. Conf. on Robotics and Automation (ICRA), Karlsruhe, Germany, May 6–10, 2013
Invited by Dr. C. Semini and Prof. J. Buchli

[A6] **Hybrid Zero Dynamics Control of Legged Robots**
Tutorial presentation: *Int. Symp. of Adaptive Motion in Animals and Machines (AMAM)*
Technical University of Darmstadt, Darmstadt, Germany, Mar. 11–14, 2013
Invited by Prof. A. Seyfarth

[A5] **Collective Decision Making in the Two-Alternative Forced-Choice Task: A Coupled Stochastic Differential Equations Model**
Invited presentation: *Workshop on Combinatorial Neurodynamics – Part I*
SIAM Conf. on Applications of Dynamical Systems (DS), Snowbird, UT, May 22–26, 2011
Invited by Prof. A. Morozov

[A4] **Control Theory and Legged Robots: Constructive Control Tools that Respect Plant Dy-**

namics
Tutorial presentation: *Science and Engineering Lectures III, German National Academic Foundation (Studienstiftung des Deutschen Volkes)*
Wannseeforum, Berlin, Germany, Mar. 25, 2010
Invited by Prof. J. Reger and Prof. A. Seyfarth

[A3] **Quadrupedal Running Robots: Achieving Complex Tasks with Simple Control Laws**
Tutorial presentation: *Science and Engineering Lectures III, German National Academic Foundation (Studienstiftung des Deutschen Volkes)*
Wannseeforum, Berlin, Germany, Mar. 25, 2010
Invited by Prof. J. Reger and Prof. A. Seyfarth

[A2] **Feedback Control of Bipedal Robot Locomotion**
Tutorial presentation: *Analysis and Design of Nonlinear Control Systems: A four-day control event on the occasion of the 65th birthday of Prof. Alberto Isidori*
Imperial College, University of London, London, UK, May 13-16, 2008
Invited by Prof. A. Astolfi

[A1] **On the Passive Dynamics of Scout II**
Seminar presentation: *Computational Neuromechanics Seminar*
University of Michigan, Ann Arbor, MI, Jun. 17-19, 2002
Invited by Prof. D. E. Koditschek

B. Universities, Institutes, and Industry

[B16] **Legged Robots Across Scales: Template Models for Integrating Motion Planning and Locomotion Control**
Invited talk: *Mechanical Engineering Seminar, City College of New York*
New York, NY, Nov. 19, 2015
Invited by Prof. I. Andreopoulos

[B15] **Legged Robots Across Scales: Integrating Motion Planning and Control through Canonical Locomotion Models**
Invited talk: *Robotics Seminar, Massachusetts Institute of Technology*
Cambridge, MA, Apr. 28, 2015
Invited by Prof. R. Tedrake

[B14] **Legged Robots Across Scales: Integrating Motion Planning with Locomotion Control**
Invited talk: *Electrical and Computer Engineering Seminar, University of Minnesota*
Minneapolis, MN, Mar. 4, 2015
Invited by Prof. T. Georgiou

[B13] **Canonical Models for Legged Locomotion: Stability and Motion Planning**
Invited talk: *Mechanical Engineering Seminar, Villanova University*
Villanova, PA, Dec. 11, 2014
Invited by Prof. V. Gajic

[B12] **Collective Evidence Accumulation in Two Alternative Forced Choice Decision Making Tasks**

Invited talk: *Cognitive Science Program, University of Delaware*
Newark, DE, May 17, 2013.
Invited by Prof. H. G. Tanner

[B11] **Running Robots and Springs**
Invited talk: *Center for Composite Materials, University of Delaware*
Newark, DE, Apr. 25, 2012
Invited by Mr. S. Sharma

[B10] **Robot Running and Springs: Feedback Control Synthesis Harnessing Compliance**
Invited talk: *Applied Dynamics Seminar, University of Maryland*
College Park, MD, Oct. 27, 2011
Invited by Prof. T. Murphy

[B9] **Coupled Stochastic Differential Equations and Collective Decision Making**
Invited talk: *Institute for Automation and Systems Engineering, Technical University of Ilmenau*
Ilmenau, Germany, Mar. 30, 2010
Invited by Prof. J. Reger

[B8] **Monopedal and Quadrupedal Running Robots: Experiments, Models and Control Tools**
Invited talk: *Institute for Sport Sciences, Friedrich Schiller University of Jena*
Jena, Germany, Mar. 29, 2010
Invited by Prof. A. Seyfarth

[B7] **Control of Compliant Running Robots through Reduction-by-Feedback**
Invited talk: *Mechanical Engineering Special Seminar Series, University of Delaware*
Newark, DE, Jan. 27, 2010.
Invited by Prof. S. G. Advani.

[B6] **Control of Compliant Running Robots through Reduction-by-Feedback**
Invited talk: *Foundation for Research and Technology (FORTH)*
Crete, Greece, Sept. 3, 2009.
Invited by Dr. D. Tsakiris.

[B5] **Control of Compliant Running Robots through Reduction-by-Feedback**
Invited talk: *RIKEN BSI-Toyota Collaboration Center*
Nagoya, Japan, May 21, 2009.
Invited by Prof. H. Kimura and Dr. S. Shimoda.

[B4] **Control Theory and Legged Robots: Constructive Control Tools that Respect Plant Dynamics**
Invited talk: *Center for Control, Dynamical Systems, and Computation (CCCG), University of California, Santa Barbara*
Santa Barbara, CA, Apr. 9, 2009
Invited by Prof. A. Teel.

[B3] **Feedback Control of Monopedal Robot Running**
Invited talk: *Mechanical and Aerospace Engineering Special Seminar Series, Princeton University*
Princeton, NJ, U.S.A., Oct. 23, 2008.

Invited by Prof. N. E. Leonard and Prof. P. J. Holmes.

[B2] **Feedback Control of Monopedal Robot Running**
Invited talk: *GRASP Special Seminar, GRASP Laboratory, University of Pennsylvania*
Philadelphia, PA, Oct. 14, 2008.
Invited by Prof. V. Kumar.

[B1] **Dynamic Locomotion and Scout II**
Invited talk: *Tomlinson Retreat, McGill University*
Montreal, Canada, May 30, 2003.
Invited by Dean M. Crago.

Publicity, Press and Live Robot Demonstrations

10. Shaping the Potential of Legged Robots in Real-Life Applications
UD Day in DC: Reception of the University of Delaware in Washington, DC, March 25, 2015
`http://www.udel.edu/udaily/2015/mar/ud-day-in-dc-032715.html`

9. Poulakakis receives NSF award to develop planning strategies for animal-inspired robots
Article in UDaily, April 24, 2014 [Online]
`http://www.udel.edu/udaily/2014/apr/nsf-poulakakis-042414.html`

8. Remote network radiation sensing
Article in the Mechanical Engineering Magazine 2014 [Online]
`http://www.me.udel.edu/magazines/ME_2014-Newsletter.pdf`

7. Pushing the envelope: Making robots useful in the real-world
Article in the Mechanical Engineering Magazine 2013 [Online]
`http://www.me.udel.edu/magazines/ME_2013-Newsletter.pdf`

6. Driver's Ed for robots: UD joins research team teaching robots to respond in disaster emergencies
Article in UDaily, October 24, 2012 [Online]
`http://www.udel.edu/udaily/2013/oct/robots-emergencies-102412.html`

5. Running robots: Systematic control strategies for four-legged machines
Article in the Mechanical Engineering Magazine 2012 [Online]
`http://www.me.udel.edu/magazines/ME_2012-Newsletter.pdf`

4. Running robots: Professor investigates control strategies in four-legged running robots
Article in UDaily, January 24, 2012 [Online]
`http://www.udel.edu/udaily/2012/jan/poulakakis-robots-012412.html`

3. The Scout II Quadruped Robot
Live Robot Demonstration at the 2nd International Symposium of Adaptive Motion in Animals and Machines (AMAM), Kyoto, Japan, March 4-8, 2003.

2. Four Legged Running Robot: Scout II
Live Robot Demonstration at the 11th PRECARN-IRIS Conference, Ottawa, Canada, June

4-5, 2001.

1. Running with Four and Six Legs: The Scout II and RHex Robots
   Live Robot Demonstration, Canal Z, "Technofolie", Montreal, Canada, February 16, 2001

Instruction and Course Development

A. Undergraduate Courses

[A1] **Instructor (Spring 2015)** **MEEG 467: Applied Controls (New Course)**
University of Delaware, Newark, DE

Course Information: A *new* three-credit course offered for the first time in Spring 2015 to junior and senior undergraduate students from Mechanical Engineering: 24 students. The objective of this course is to help the students develop a practical appreciation for the components of a mechatronic system, to learn to apply simple controllers on real systems and to expand their knowledge in different operating systems and programming environments used in robotics and controls.
Topics Covered: The class is divided into three phases. Phase I - mechatronics: provides a basic knowledge on the components of a robotic system (DC motors and motor amplifiers, encoders, input/output devices) and implements open-loop controllers on an Arduino-based robot. Phase II - feedback control: provides essential information on signals and filtering (Fourier series and transforms, simple analogue filters) and on the basics of feedback systems using MATLAB (P, PD and PI controllers, transient and steady-state response, specifications in the time and frequency domains, benefits of feedback). Phase III - application to the feedback control of a Crazyflie quadcopter.

[A2] **Instructor (Fall 2012–2014)** **MEEG 311: Vibration and Control (Lecture)**
University of Delaware, Newark, DE

Course Information: A three-credit course offered to junior and senior undergraduate students from the Mechanical Engineering Department: 64 students in Fall 2012, 119 students in Fall 2013, 100 students in Fall 2014. The students attend lectures twice per week, complete weekly problem sets, do individual dynamic simulation problems using Matlab, and take three examinations.
Topics Covered: Dynamic Modeling: Linear and nonlinear systems, linearization; Single degree-of-freedom systems, free and damped vibration, forced vibration; Laplace Transforms. Closed-loop systems: Time responses, time domain specifications; PID controllers; Stability; Root locus techniques for analysis and synthesis of control systems; Frequency response: performance analysis and lead and lag compensator design.

[A3] **Instructor (Fall 2011-2014)** **MEEG 312: Vibration and Control (Lab)**
University of Delaware, Newark, DE

Course Information: An laboratory course that reinforces the theory discussed in MEEG311 via experiments. The course is offered to junior and senior undergraduate students of the Mechanical Engineering Department: 118 students in Fall 2011, 64 students in Fall 2012, 119 students in Fall 2013, 100 students in Fall 2014. The students form teams and attend four laboratory sessions, during which they perform experiments and collect data, which are then processed and documented in four Laboratory Reports that are written individually by each student. The students reinforce professional skills related to the analysis and communication

of technical information.
Topics Covered: The lab exercises cover (i) system and parameter identification, (ii) time response of dynamical systems to forcing inputs, (iii) development and testing of controllers, (iv) Frequency response of linear dynamical systems, (v) controller designs.

[A4] **Teaching Assistant (Winter 2006)** **EECS 306: Signals and Systems II**
University of Michigan, Ann Arbor, MI

Course Information: The course is offered to junior undergraduate students from the Electrical Engineering and Computer Science Department: 35 students in Winter 2006. I was teaching weekly two-hour tutorials and holding office hours. Furthermore, I have developed practical examples to illustrate fundamental concepts in signals and systems and help the students appreciate the power of mathematical techniques used in such engineering applications.
Topics Covered: Continuous-time signals and systems. Linear time-invariant systems. Fourier Series. Fourier Transform. Laplace Transform. Bode and Nyquist plots. Applications to Communications, Control and Signal Processing.

[A5] **Teaching Assistant (Fall 2002, 2004)** **MECH 412: Dynamics of Systems**
McGill University, Montreal, Canada

Course Information: The course is offered to senior undergraduate students from the Mechanical Engineering Department: 50 students in Fall 2002, 47 students in Fall 2004. In addition to teaching weekly tutorials and holding office hours, I developed and corrected homework assignments and exams. I focused on providing the mechanical engineering undergraduate students with a more intuitive understanding of the dynamics of mechanical and electrical systems.
Topics Covered: Modeling of physical systems by lumped-parameter linear elements. Unified treatment of mechanical, fluid, electrical, and thermal devices and systems. State space, formulation of state equations, analytical and numerical solutions. Time and frequency response methods. Dynamic response specifications. Stability. Elementary feedback control systems. Extensive use of engineering examples.

B. Graduate Courses

[B1] **Instructor (Fall 2015)** **MEEG 667/867: Linear Feedback Control Systems Design**
University of Delaware, Newark, DE

Course Information: This course combines classical and modern approaches to feedback control to obtain a powerful and insightful design and analysis methodology. The primary emphasis is on the implications that the mathematical equations have for design, rather than on their derivation. The major focus of the course is on multiple input, multiple output (MIMO) systems; nevertheless, the course discusses many new and useful results for single input, single output (SISO) systems.
Topics Covered: The course is a continuation of MEEG 467/624 and its topics include pole placement and observer design, integral control for multivariable systems, transmission zeros, optimal linear regulator, Kalman filter as an optimal observer, frequency domain concepts from classical control and their multivariable extensions (singular value "gains", design tradeoffs and limitations, nonminimum phase zeros, Bode sensitivity and gain/phase integrals), classical properties of LQ regulators (gain and phase margins – root locus, cheap control, loop transfer recovery).

[B2] **Instructor (Spring 2015)** **MEEG 867: Advanced Nonlinear Control (New Course)**
University of Delaware, Newark, DE

Course Information: A three-credit course offered to graduate students from the Mechanical Engineering Department. The students attend lectures twice per week, complete problem sets, and read and present papers on applications of the theory to various systems with the focus being legged robots.
Topics Covered: The course is a continuation of MEEG 873 and it is divided in two phases. Phase I – Nonlinear state variable feedback design: Topics include linearization, feedback linearization, partial feedback linearization, backstepping, passivity-based control, control Lyapunov functions. Phase II – An introduction to geometric control theory: Topics include manifolds, distributions, integrability, decompositions of nonlinear systems, coordinate systems, zero dynamics. Applications of the theory are discussed, focusing on dynamically-stable walking and running robots.

[B3] **Instructor (Spring 2014)** **MEEG 873: Applied Nonlinear Control**
University of Delaware, Newark, DE

Course Information: A three-credit course offered to graduate students from the Mechanical Engineering Department: 7 students in Spring 2014. The students attend lectures twice per week, complete problem sets, do individual dynamic simulation problems using Matlab, and take two examinations.
Topics Covered: The course is roughly 50% mathematical basics, 50% stability theory. The core topics include: (i) A review of concepts from basic topology and mathematical analysis; (ii) Second-order systems (state-space, equilibrium points, limit cycles, phase portrait analysis); (ii) Fundamental theory (existence and uniqueness of solutions of ODEs); (iii) State space stability theory (First and Second methods of Lyapunov for time invariant and time varying systems); (iv) Input-to-state stability; (v) Input-output stability.

[B4] **Instructor (Spring 2011–2013)** **MEEG 467/624: Control of Dynamic Systems**
University of Delaware, Newark, DE

Course Information: A three-credit course offered to senior undergraduate and graduate students from the Mechanical, Electrical and Chemical Engineering Departments: 10 undergraduate and graduate students in Spring 2011, 22 undergraduate and graduate students in Fall 2012, 28 undergraduate and graduate students in Fall 2013. The course teaches students how to use linear state-space systems theory to solve engineering problems. An objective of this course is to train senior undergraduates and first year graduate students in formal reasoning, so that they can overcome the difficulties associated with using mathematics to analyze the behavior of engineering systems.
Topics Covered: The students use fundamental concepts from linear algebra and differential equations to analyze the temporal evolution of linear systems and synthesize control laws using state or output feedback in order to achieve stability and other control specifications. Topics include: State-space analysis of linear dynamical systems. Solution of state-space equations and analysis of structural system properties based on eigenvalues and eigenvectors. Similarity transformations and decompositions. Lyapunov stability. Observability and controllability. State feedback control design.

[B5] **Teaching Assistant (Fall 2005-2008)** **EECS 560: Linear Systems Theory**
University of Michigan, Ann Arbor, MI

Course Information: I was delivering weekly two-hour recitation sessions, holding regular

office hours, and teaching some of the lectures. In addition, I have compiled a set of problems to provide first year graduate students with a basic background in linear algebra and help them use fairly abstract ideas from vector spaces and linear operators to analyze properties of mechanical and electrical systems.
Topics Covered: System modeling and representation. Linear algebra fundamentals. Solution of d/dt x(t) = A(t) x(t) and the exponential of a matrix. Some results on numerical linear algebra. Controllability and observability for time-invariant systems. Kalman Canonical Decomposition. Comments on Realization Theory. Stability à la Lyapunov. Pole placement theorem and stabilizability. Observers and dynamic output feedback, integral control, disturbance regulation.

University Activities

Mechanical Engineering Department Committees

- **Standing Committees:**
  1. Member; Mechanical Engineering Publicity Committee, Sep. 2013–Dec. 2016.
  2. Member; Mechanical Engineering Undergraduate Studies Committee, Sep. 2013–Sep. 2014.
  3. Chair; Mechanical Engineering Seminar Committee, Sep. 2012–Aug. 2013.
  4. Member; Mechanical Engineering Undergraduate Laboratory Committee, Sep. 2011–Aug. 2013.
  5. Member; Mechanical Engineering Laboratory Safety Committee, Sep. 2010–Aug. 2012.
- **Ad-Hoc Committees:**
  1. Member; Mechanical Engineering Faculty Hiring Committee, Oct. 2014–Mar. 2015.
  2. Member; Mechanical Engineering Faculty Hiring Committee, Oct. 2013–Mar. 2014.

Student Degree Committees as Chair or Co-chair

- **Ph.D. Defense Committee Chair or Co-chair for three students:** Xin Liu (ME, December 2016); Qu Cao (ME, January 2016); Konstantinos Karydis (ME, November 2015).
- **Ph.D. Proposal Defense Committee Chair or Co-chair for six students:** Sushant Veer (ME, February 2016); Duanyi Wei (ME, January 2016); Xin Liu (ME, January 2014); Mohamad S. Motahar (ME, January 2014); Konstantinos Karydis (ME, January 2013); Qu Cao (ME, December 2012).
- **M.S. Defense Committee Chair or Co-chair for two students:** Yan Liu (ME, April 2014); Jian Huang (ME, January 2014)

Student Degree Committees as Member

- **Ph.D. Defense Committee Member for eight students:** Prasanna Kannappan (ME, December 2016); Jianxin Sun (ME, March 2016); Joshua Bryson (ME, December 2015); Jie Fu (ME, November 2013); Shridhar Shah (ME, July 2013); Chengkun Zhang (ME, December 2012); Anantharaman Gopalakrishnan (ME, November 2012); Xi Chen (ME, September 2012).

- **Ph.D. Proposal Defense Committee Member for fifteen students:** Kevin Eckenhoff (ME, February 2017); Saurabh Arora (ME, April 2015); Joshua Bryson (ME, May 2014); Reza Khoeilar (ME, February 2014); Jianxin Sun (ME, January 2014); Prasanna Kannappan (ME, December 2012); Jie Fu (ME, December 2011); Shridhar Shah (ME, November 2011); Daniel Ragonesi (ME, March 2011); Chengkun Zhang (ME, January 2011); Anantharaman Gopalakrishnan (ME, December 2010).
- **M.S. Defense Committee Member for nine students:** Saurabh Arora (ME, April 2016); Reza Khoeilar (ME, December 2014); Daniel Ragonesi (ME, August 2014) Daniel Baechle (ME, April 2013); Luis Valbuena Reyes (ME, November 2012); Adithya Boddu (ME, January 2012); Varsha Bhambhani (ME, December 2011); Chetan Rawal (ME, April 2011).
- **Senior Thesis Committee Member for one student:** Benjamin Hockman (ME, April 2013).

Professional Activities

Workshop Organization

1. Workshop on Legged and Multi-modal Locomotion, *Proceedings of the IEEE Mediterranean Conference on Control and Automation (MED)*, Athens, Greece, Jun. 21-24, 2016.
2. Workshop on Miniature Legged Robots, *Robotics: Science and Systems Conference (RSS)*, Sapienza University of Rome, Rome, Italy, Jul. 13-17, 2015

Conference Organization

1. Advisory Committee Member, *International Symposium on Swarm Behavior and Bio-Inspired Robotics (SWARM)*, Kyoto, Japan, October 30–November 1, 2017.
2. Program Committee Member, *Robotics 2017: Science and Systems*, Massachusetts Institute of Technology, Cambridge, MA, U.S.A., July 12–16, 2017.
3. Associate Editor, *IEEE International Conference on Robotics and Automation (ICRA)*, Stockholm, Sweden, May 16–21, 2016.
4. Advisory Committee Member, *International Symposium on Swarm Behavior and Bio-Inspired Robotics (SWARM)*, Kyoto, Japan, October 28–30, 2015.
5. Associate Editor, *IEEE International Conference on Robotics and Automation (ICRA)*, Seattle, WA, May 26–30, 2015.
6. Program Committee Member, *Robotics 2014: Science and Systems*, University of California, Berkeley, Berkeley, CA, U.S.A., July 12–16, 2014.
7. Associate Editor, *IEEE International Conference on Robotics and Automation (ICRA)*, Hong Kong, China, May 31–June 7, 2014.
8. Associate Editor, *IEEE International Conference on Robotics and Automation (ICRA)*, Karlsruhe, Germany, May 6–10, 2013.
9. Associate Editor, *IEEE International Conference on Robotics and Automation (ICRA)*, St. Paul, MN, U.S.A., May 14–17, 2012.
10. Program Committee Member, *Robotics 2011: Science and Systems*, University of Southern California, Los Angeles, CA, U.S.A., June 27–30, 2011.

11. Program Committee Member, *Robotics 2005: Science and Systems*, Massachusetts Institute of Technology, Cambridge, MA, U.S.A., June 8–11, 2005.

Proposal Reviewer

1. Reviewer, National Science Foundation (NSF), U.S.A., 2011, 2012, 2015
2. Reviewer, Army Research Office (ARO), U.S.A., 2013
3. Reviewer, Dutch Technology Foundation (STW), Netherlands, 2013

Paper Reviewer

- **Journals (more than one review):**
  - IEEE Proceedings
  - IEEE Transactions on Automatic Control (TAC)
  - IEEE Transactions on Control Systems Technology (TCST)
  - IEEE Transactions on Control of Network Systems (TCNS)
  - Automatica
  - SIAM Journal on Control and Optimization (SICON)
  - Optimization and Engineering (OPTE)
  - International Journal of Robotics Research (IJRR)
  - IEEE Robotics and Automation Magazine (RAM)
  - IEEE Transactions on Robotics (TRO)
  - IEEE Robotics and Automation Letters (RA-L)
  - IEEE/ASME Transactions on Mechatronics (TMECH)
  - IEEE Transactions on Automation Science and Engineering (TASE)
  - Autonomous Robots
  - Robotica
  - Advanced Robotics
  - ASME Journal of Dynamic Systems, Measurement and Control (JDSMAA)
  - Journal of Systems and Control Engineering (JSCE)
  - International Journal of Advanced Robotic Systems (IJARS)
  - Mechanism & Machine Theory
  - Bionspiration & Biomimetics (B&B)
  - Applied Bionics and Biomechanics (ABBI)
- **Conferences (more than one review):**
  - IEEE International Conference on Robotics and Automation (ICRA)
  - IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
  - IEEE/RAS International Conference on Humanoid Robots (ICHR)
  - IEEE Conference on Decision and Control (CDC)

  - American Control Conference (ACC)
  - European Control Conference (ECC)

Society Memberships

- Institute for Electrical and Electronics Engineers (IEEE)
- Technical Chamber of Greece (TEE)