

Kaveh Akbari Hamed

Assistant Professor

Department of Mechanical Engineering, Virginia Tech
Hybrid Dynamic Systems and Robot Locomotion Laboratory

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Research

I am an assistant professor in the Department of Mechanical Engineering at Virginia Tech. My primary academic interests span control theory, robotics, optimization, dynamical systems, machine learning, and cyber-physical systems. My research goal is to establish a firm foundation that will transform state-of-the-art methods for designing resilient and intelligent control algorithms for a wide range of hybrid dynamical systems. These systems include, but are not limited to, 1) autonomous robots for disaster response and industrial applications, 2) cooperative multiagent systems with decentralized and distributed control policies, 3) walking and running robots with human/animal morphology, 4) complex systems, and 5) wearable robots like prostheses and orthoses to improve the quality of life for persons with disabilities. My research has a clear path from theory to experiments to advance two specific objectives: 1) Creating algorithms to systematically design robust and intelligent controllers for high-dimensional and complex hybrid dynamical systems; and 2) Transferring the control framework into practice with highly dynamic robotic systems in my research laboratory. These algorithms advance knowledge in the design of feedback controllers for dynamical models arising from robot locomotion. The theoretical innovations also offer a unique opportunity to advance robotic legged locomotion, bio-inspired robotic technologies, robot-assisted walking, human-robot interaction, and high-tech tools for disaster response.

Education

○ Postdoctoral Research Fellow in Electrical Engineering (Control Engineering)

Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI, USA, January 2012 to August 2014

- Advisor: Prof. Jessy W. Grizzle (University of Michigan, USA)

○ Ph.D. in Electrical Engineering (Control Engineering)

Electrical Engineering Department, Sharif University of Technology, January 2007 to June 2011

- Advisors: Prof. Nasser Sadati (Sharif University of Technology)
- Co-Advisors: Prof. William A. Gruver (Simon Fraser University, Canada) and Prof. Guy A. Dumont (The University of British Columbia, Canada)
- GPA: **4/4**
- Ph.D. Thesis Grade: **Excellent**

○ M.S. in Electrical Engineering (Control Engineering)

Electrical Engineering Department, Sharif University of Technology, September 2004 to September 2006

○ B.S. in Electrical Engineering (Electronic Engineering)

University of Tabriz, September 2000 to June 2004

Professional Experience

- **Assistant Professor**
Department of Mechanical Engineering, Virginia Tech, August 2018 to present
- **Assistant Professor**
Department of Mechanical Engineering, San Diego State University, August 2014 to August 2018
- **Postdoctoral Research Fellow**
Electrical Engineering and Computer Science Department, University of Michigan, January 2012 to August 2014
- **Graduate Student Research Assistant**
Electrical Engineering Department, Sharif University of Technology, January 2007 to June 2011

Funding and Projects

(a) Summary of External Funds

- Total funds raised: \$2,492,555
- Total funds prorated to VT: \$1,562,587
- Total funds prorated to K. Akbari Hamed at VT: \$1,127,490

(b) Active Projects

- NSF Award CMMI #1923216/1923239: *Collaborative Research: Intelligent and Agile Robotic Legged Locomotion in Complex Environments: From Planning to Safety and Robust Control*, **Lead PI: K. Akbari Hamed**, Caltech PI: A. D. Ames, 09/01/19-08/31/22, \$584,483.00 (PI Akbari Hamed's component: \$242,543.00)
- NSF Award ECCS #1924617/1924526: *NRI: FND: COLLAB: Hierarchical, Safe, and Distributed Feedback Control of Multiagent Legged Robots*, **Lead PI: K. Akbari Hamed**, Caltech PI: A. D. Ames, 09/15/19-08/31/22, \$749,823.00 (PI Akbari Hamed's component: \$374,823.00)
- NSF Award CMMI #1906727: *Control of Dynamically Coupled Agile Legged Robots and Bioinspired Robotic Tails*, PI: Bentzvi, **Co-PI: K. Akbari Hamed**, 06/01/19-05/31/22, \$396,036.00 (Co-PI Akbari Hamed's component: \$166,070.00)
- NSF Award CSE/CNS #2128948: *FW-HTF-P: Inspector Assistant Robot for Future Construction Progress Monitoring*, PI: K. Afsari, Co-PIs: **K. Akbari Hamed**, and R. Patrick, 10/01/2021-09/30/2022, \$150,000 (Co-PI Akbari Hamed's component: \$54,869)

(c) Completed Projects

- NSF Award CMMI #1637704/1854898: *NRI: Decentralized Feedback Control Design for Cooperative Robotic Walking with Application to Powered Prosthetic Legs*, **PI: K. Akbari Hamed**, Co-PI: R. D. Gregg, 09/01/16-08/31/20, \$612,213.00 (PI Akbari Hamed's component: \$366,483.00)

Honors and Awards

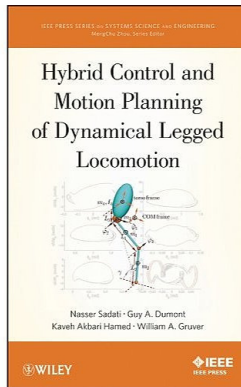
- **TEDx Speaker**, TEDxPearlStreet, Washington, DC, July 2020
Link: https://youtu.be/_XJqtbiqVRo
- Elected full member of Sigma Xi Scientific Society, 2020
- Ranked **1st** according to GPA among Ph.D. students of Electrical Engineering, major of control, Sharif University of Technology
- Ranked **16th** among more than 10,000 students in the national entrance exam for graduate studies in Electrical Engineering in Iran, 2004

- Ranked 1st according to GPA among B.S. students of Electrical Engineering, University of Tabriz

Publications

Books

- B.1** N. Sadati, G. A. Dumont, **K. Akbari Hamed**, and W. A. Gruver, *Hybrid Control and Motion Planning of Dynamical Legged Locomotion*, Series on Systems Science and Engineering, Wiley-IEEE Press, ISBN: 978-1-118-31707-5, 272 pages, Hoboken, NJ, USA, October 2012



Peer-reviewed Journal Papers

- J.1** R. T. Fawcett, A. Pandala, A. D. Ames, and **K. Akbari Hamed**, "Robust stabilization of periodic gaits for quadrupedal locomotion via QP-based virtual constraint controllers," *IEEE Control Systems Letters*, Under Review, September 2021
- J.2** J. Kim and **K. Akbari Hamed**, "Cooperative locomotion via supervisory predictive control and distributed nonlinear controllers," *ASME Journal of Dynamic Systems, Measurement, and Control*, Under Review, May 2021
- J.3** V. R. Kamidi, J. C. Horn, R. D. Gregg, and **K. Akbari Hamed**, "Distributed controllers for human-robot locomotion: A scalable approach based on decomposition and hybrid zero dynamics," *IEEE Control Systems Letters*, vol. 5, issue 6, pp. 1976-1981, December 2021
- J.4** R. T. Fawcett, A. Pandala, J. Kim, and **K. Akbari Hamed**, "Real-time planning and nonlinear control for quadrupedal locomotion with articulated tails," *ASME Journal of Dynamic Systems, Measurement, and Control*, 143(7), 071004, February 2021 (Impact Factor: 1.466)
- J.5** W. Ma, N. Csomay-Shanklin, S. Kolathaya, **K. Akbari Hamed**, and A. D. Ames, "Coupled control Lyapunov functions for interconnected systems, with application to quadrupedal locomotion," *IEEE Robotics and Automation Letters*, vol. 6, issue 2, pp. 3761-3768, April 2021 (Impact Factor: 3.608)
- J.6** **K. Akbari Hamed**, J. Kim, and A. Pandala, "Quadrupedal locomotion via event-based predictive control and QP-based virtual constraints," *IEEE Robotics and Automation Letters*, vol. 5, no. 3, pp. 4463-4470, July 2020 (Impact Factor: 3.608)
- J.7** J. C. Horn, A. Mohammadi, **K. Akbari Hamed**, and R. D. Gregg, "Nonholonomic virtual constraint design for variable-incline bipedal robotic walking," *IEEE Robotics and Automation Letters*, vol. 5, issue 2, pp. 3691-3698, April 2020 (Impact Factor: 3.608)
- J.8** **K. Akbari Hamed**, V. R. Kamidi, W-L. Ma, A. Leonessa, and A. D. Ames, "Hierarchical and safe motion control for cooperative locomotion of robotic guide dogs and humans: A hybrid systems approach," *IEEE Robotics and Automation Letters*, pp. 56-63, September 2019 (Impact Factor: 3.608)

- J.9 K. Akbari Hamed** and A. D. Ames, "Nonholonomic hybrid zero dynamics for the stabilization of periodic orbits: Application to underactuated robotics walking," *IEEE Transactions on Control Systems Technology*, vol. 28, issue 6, November 2020 (Impact Factor: 4.883)
- J.10 K. Akbari Hamed**, B. Safaee, and R. D. Gregg, "Dynamic output controllers for exponential stabilization of periodic orbits for multi-domain hybrid models of robotic locomotion," *ASME Journal of Dynamic Systems, Measurement, and Control*, vol. 141, 121011-1-121011-15, December 2019 (Impact Factor: 1.466)
- J.11 K. Akbari Hamed** and R. D. Gregg, "Decentralized event-based controllers for robust stabilization of hybrid periodic orbits: Application to underactuated 3D bipedal walking," *IEEE Transactions on Automatic Control*, vol. 64, no. 6, pp. 2266-2281, June 2019 (Impact Factor: 5.093)
- J.12** J. C. Horn, A. Mohammadi, **K. Akbari Hamed**, and R. D. Gregg, "Hybrid zero dynamics of bipedal robots under nonholonomic virtual constraints," *IEEE Control Systems Letters*, vol. 3, issue 2, pp. 386-391, January 2019
- J.13 K. Akbari Hamed** and R. D. Gregg, "Decentralized feedback controllers for robust stabilization of periodic orbits of hybrid systems: Application to bipedal walking," *IEEE Transactions on Control Systems Technology*, vol. 25, issue 4, pp. 1153-1167, July 2017 (Impact Factor: 4.883)
- J.14 K. Akbari Hamed** and J. W. Grizzle, "Reduced-order framework for exponential stabilization of periodic orbits on parameterized hybrid zero dynamics manifolds: Application to bipedal locomotion," *Nonlinear Analysis: Hybrid Systems*, vol. 25, pp. 227-245, August 2017 (Impact Factor: 5.266) (**Invited Paper**)
- J.15 K. Akbari Hamed**, B. G. Buss, and J. W. Grizzle, "Exponentially stabilizing continuous-time controllers for periodic orbits of hybrid systems: Application to bipedal locomotion with ground height variations," *The International Journal of Robotics Research*, vol. 35, issue 8, pp. 977-999, August 2016 (Impact Factor: 6.134)
- J.16 K. Akbari Hamed** and J. W. Grizzle, "Event-based stabilization of periodic orbits for underactuated 3D bipedal robots with left-right symmetry," *IEEE Transactions on Robotics*, vol. 30, issue 2, pp. 365-381, April 2014 (Impact Factor: 6.483)
- J.17** A. Ramezani, J. W. Hurst, **K. Akbari Hamed**, and J. W. Grizzle, "Performance analysis and feedback control of ATRIAS, a 3D bipedal robot," *ASME Journal of Dynamic Systems, Measurement, and Control*, DS-12-1421, October 2013 (Impact Factor: 1.466)
- J.18 K. Akbari Hamed**, N. Sadati, W. A. Gruver, and G. A. Dumont, "Stabilization of periodic orbits for planar walking with non-instantaneous double support phase," *IEEE Transactions on Systems, Man, and Cybernetics, Part A*, vol. 42, issue 3, pp. 685-706, May 2012 (Impact Factor: 5.131)
- J.19 K. Akbari Hamed**, N. Sadati, W. A. Gruver, and G. A. Dumont, "Exponential stabilisation of periodic orbits for running of a three-dimensional monopodal robot," *IET Control Theory and Applications*, vol. 5, issue 11, pp. 1304-1320, July 2011 (Impact Factor: 3.526)
- J.20** N. Sadati, G. A. Dumont, **K. Akbari Hamed**, and W. A. Gruver, "Two-level control scheme for stabilisation of periodic orbits for planar monopodal running," *IET Control Theory and Applications*, vol. 5, issue 13, pp. 1528-1543, August 2011 (Impact Factor: 3.526)
- J.21** R. Ansari, M. R. Feyzi, **K. Akbari Hamed**, N. Sadati, Y. Yasaei and S. Ouni, "Input-output linearisation of a fourth-order input-affine system describing the evolution of a three-phase/switch/level (Vienna) rectifier," *IET Power Electronics*, vol. 4, issue 8, pp. 867-883, September 2011 (Impact Factor: 2.839)
- J.22** N. Sadati, **K. Akbari Hamed**, W. A. Gruver, and G. A. Dumont, "Radial basis function network for exponential stabilization of periodic orbits for planar bipedal walking," *IET Electronics Letters*, vol. 47, issue 12, June 2011 (Impact Factor: 1.343)

- J.23** N. Sadati, **K. Akbari Hamed**, G. A. Dumont, and W. A. Gruver, "Nonholonomic motion planning based on optimal control for flight phases of planar bipedal running," *IET Electronics Letters*, vol. 47, issue 20, September 2011 (Impact Factor: 1.343)
- J.24** **K. Akbari Hamed**, N. Sadati, W. A. Gruver, and G. A. Dumont, "Continuous-time update laws with radial basis step length for control of bipedal locomotion," *IET Electronics Letters*, vol. 46, issue 21, October 2010 (Impact Factor: 1.343)

Peer-reviewed Conference Papers

- C.1** R. T. Fawcett, A. Pandala, A. D. Ames, and **K. Akbari Hamed**, "Robust stabilization of periodic gaits for quadrupedal locomotion via QP-based virtual constraint controllers," *American Control Conference (ACC)*, Under Review, September 2021
- C.2** V. R. Kamidi, J. C. Horn, R. D. Gregg, and **K. Akbari Hamed**, "Distributed controllers for human-robot locomotion: A scalable approach based on decomposition and hybrid zero dynamics," *American Control Conference (ACC)*, Accepted to Appear, January 2021
- C.3** W. Ma, N. Csomay-Shanklin, S. Kolathaya, **K. Akbari Hamed**, and A. D. Ames, "Coupled control Lyapunov functions for interconnected systems, with application to quadrupedal locomotion," *IEEE International Conference on Robotics and Automation (ICRA)*, Accepted to Appear, February 2021
- C.4** A. Pandala, V. R. Kamidi, and **K. Akbari Hamed**, "Decentralized control schemes for stable quadrupedal locomotion: A decomposition approach from centralized controllers," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 3975-3981, Las Vegas, NV, October 2020
- C.5** J. Martin, V. R. Kamidi, A. Pandala, R. Fawcett, and **K. Akbari Hamed**, "Exponentially stabilizing and time-varying virtual constraint controllers for dynamic quadrupedal bounding," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 3914-3921, Las Vegas, NV, October 2020
- C.6** **K. Akbari Hamed**, V. R. Kamidi, A. Pandala, W. Ma, and A. D. Ames, "Distributed feedback controllers for stable cooperative locomotion of quadrupedal robots: A virtual constraint approach," *American Control Conference (ACC)*, Denver, CO, pp. 5314-5321, July 2020
- C.7** J. C. Horn, A. Mohammadi, **K. Akbari Hamed**, and R. D. Gregg, "Nonholonomic Virtual Constraint Design for Variable-Incline Bipedal Robotic Walking," *IEEE International Conference on Robotics and Automation (ICRA)*, Accepted to Appear, Paris, France, June 2020
- C.8** W-L. Ma, **K. Akbari Hamed**, and A. D. Ames, "First steps towards full model based motion planning and control of quadrupeds: A hybrid zero dynamics approach," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 5498-5503, Macau, China, November 2019
- C.9** **K. Akbari Hamed**, W. Ma, and A. D. Ames, "Dynamically stable 3D quadruped walking with multi-domain hybrid system models and virtual constraint controllers," *American Control Conference (ACC)*, pp. 4588-4595, Philadelphia, USA, July 2019
- C.10** **K. Akbari Hamed**, A. D. Ames, and R. D. Gregg, "Observer-based feedback controllers for exponential stabilization of hybrid periodic orbits: Application to underactuated bipedal walking," *American Control Conference (ACC)*, pp. 1438-1445, Milwaukee WI, June 2018
- C.11** **K. Akbari Hamed**, R. D. Gregg, and A. D. Ames, "Exponentially stabilizing controllers for multi-contact 3D bipedal locomotion," *American Control Conference (ACC)*, pp. 2210-2217, Milwaukee WI, June 2018
- C.12** **K. Akbari Hamed** and R. D. Gregg, "Decentralized feedback controllers for exponential stabilization of hybrid periodic orbits: Application to robotic walking," *American Control Conferences (ACC)*, pp. 4793-4800, Boston, MA, July 2016 (**Invited Paper**)

- C.13** B. G. Buss, **K. Akbari Hamed**, B. A. Griffin, and J. W. Grizzle, "Experimental results for 3D bipedal robot walking based on systematic optimization of virtual constraints," *American Control Conferences (ACC)*, pp. 4785-4792, Boston, MA, July 2016 (**Invited Paper**)
- C.14** **K. Akbari Hamed**, and J. W. Grizzle, "Iterative robust stabilization algorithm for periodic orbits of hybrid dynamical systems: Application to bipedal running," *IFAC Conference on Analysis and Design of Hybrid Systems (ADHS)*, pp 161-168, October 2015 (**Invited to be submitted as a journal paper**)
- C.15** **K. Akbari Hamed**, B. G. Buss, and J. W. Grizzle, "Continuous-time controllers for stabilizing periodic orbits of hybrid systems: Application to an underactuated 3D bipedal robot," *IEEE Conference on Decision and Control (CDC)*, Los Angeles, CA, USA, pp. 1507-1513, December 2014
- C.16** B. G. Buss, A. Ramezani, **K. Akbari Hamed**, B. A. Griffin, K. S. Galloway, and J. W. Grizzle, "Preliminary walking experiments with underactuated 3D bipedal robot MARLO," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Chicago, IL, USA, pp. 2529-2536, September 2014
- C.17** **K. Akbari Hamed** and J. W. Grizzle, "Robust event-based stabilization of periodic orbits for hybrid systems: Application to an underactuated 3D bipedal robot," *American Control Conference (ACC)*, Washington, DC, USA, pp. 6206-6212, 2013
- C.18** N. Sadati and **K. Akbari Hamed**, "CPG based controller for a 5-link planar biped robot," *IEEE International Conference on Mechatronics*, Kumamoto, Japan, pp. 1-6, May 2007
- C.19** N. Sadati and **K. Akbari Hamed**, "Neural control of a fully actuated biped robot," *IEEE International Conference on Robotics and Biomimetics*, Kunming, China, pp. 1299-1304, December 2006
- C.20** N. Sadati and **K. Akbari Hamed**, "Neural control of an underactuated biped robot," *IEEE-RAS International Conference on Humanoid Robot*, Genova, Italy, pp. 593-598, December 2006

Book Chapters

- BC.1** N. Sadati, G. A. Dumont, and **K. Akbari Hamed**, *Design of a Neural Controller for Walking of a 5-Link Planar Biped Robot via Optimization*, Human-Robot Interaction, Daisuke Chugo (Ed.), ISBN: 978-953-307-051-3, InTech, pp. 267-288, February 2010

Theses

- T.1** **K. Akbari Hamed**, *Design of Continuous Time-Invariant Controllers for Exponential Stabilization of Periodic Walking and Running Locomotion in Planar Bipedal Robots*, Ph.D. dissertation, Sharif University of Technology, June 2011
- T.2** **K. Akbari Hamed**, *Simulation and Intelligent Control of Central Pattern Generators in Spinal Cord for Bipedal Robots*, M.Sc. dissertation, Sharif University of Technology, September 2006

Theses Advised

- ST.1** R. T. Fawcett, *Real-Time Planning and Nonlinear Control for Robust Quadrupedal Locomotion with Tails*, M.S. Thesis, Advisor: **K. Akbari Hamed**, Mechanical Engineering, Virginia Tech, July 2021
- ST.2** J. B. Martin, *Design of Time-Varying Hybrid Zero Dynamics Controllers for Exponential Stabilization of Agile Quadrupedal Locomotion*, M.S. Thesis, Advisor: **K. Akbari Hamed**, Mechanical Engineering, Virginia Tech, October 2020

Workshops

- W.1** **K. Akbari Hamed**, "Hierarchical and nonlinear feedback control of legged robots: From hybrid systems to planning and robust control," Workshop on Impact-Aware Robotics, *IEEE/RSJ International Conference on Intelligent Robots and Systems*, October 2021

- W.2 K. Akbari Hamed**, B. G. Buss, and J. W. Grizzle, "Continuous-Time Controllers for Robust Stabilization of 3D Bipedal Walking," *Dynamic Locomotion RSS Workshop 2014*, UC Berkeley, CA, July 2014
- W.3 J. W. Grizzle**, A. Ramezani, B. Buss, B. Griffin., **K. Akbari Hamed**, and K. S. Galloway, "Progress on controlling MARLO, an Atrias-series 3D underactuated bipedal robot," *Dynamic Walking 2013*, Pittsburgh, Pennsylvania, 2013

Invited Talks and Presentations

- P.1 TEDx Pearl Street Talk**, July 10, 2020, How Robot Armies Will Save Our Future Cities, Link: https://youtu.be/_XJqtbiqVRo (**Invited Speaker**)
- P.2 K. Akbari Hamed**, "Hierarchical and nonlinear feedback control of legged robots: From hybrid systems to planning and robust control," Workshop on Impact-Aware Robotics, IEEE/RSJ International Conference on Intelligent Robots and Systems, October 2021 (**Invited Speaker**)
- P.3 K. Akbari Hamed**, "Decentralized control algorithms for cooperative legged locomotion: A hybrid systems approach," NSF workshop on Human-Friendly Robots, University of Texas at San Antonio, May 2019 (**Invited Talk**)
- P.4 K. Akbari Hamed**, "Decentralized resilient control algorithms for robust stabilization of hybrid dynamical systems: Application to robotic walking", Department of Mechanical Engineering, Virginia Tech, 2018
- P.5 K. Akbari Hamed**, "Decentralized resilient control algorithms for robust stabilization of cyber-physical systems: Application to autonomous and rehabilitation robotic walking", Department of Aerospace and Mechanical Engineering, University of Notre Dame, 2018
- P.6 K. Akbari Hamed**, "Decentralized resilient control algorithms for robust stabilization of hybrid dynamical systems: Application to robotic walking", Department of Electrical and Computer Engineering, University of Central Florida, 2018
- P.7 K. Akbari Hamed**, "Decentralized resilient control algorithms for robust stabilization of hybrid dynamical systems: Application to robotic walking", Department of Mechanical and Industrial Engineering, The University of Iowa, 2018
- P.8 K. Akbari Hamed**, "Decentralized resilient control algorithms for robust stabilization of hybrid dynamical systems: Application to robotic walking", University of Nevada Reno, Department of Mechanical Engineering, 2018
- P.9 K. Akbari Hamed**, "Centralized and decentralized feedback control design for robust stabilization of hybrid periodic orbits: Application to robotic walking", Department of Mechanical Engineering, University of Wisconsin-Madison, 2017
- P.10 K. Akbari Hamed**, "Centralized and decentralized feedback control design for robust stabilization of hybrid periodic orbits: Application to robotic walking", Department of Computer Engineering, University of California, Santa Cruz, 2017
- P.11 K. Akbari Hamed**, "Centralized and decentralized feedback control design for robust stabilization of hybrid periodic orbits: Application to robotic walking", Department of Mechanical Engineering, Rice University, 2017
- P.12 K. Akbari Hamed**, "Continuous-time controllers for robust stabilization of periodic orbits for hybrid dynamical systems: Application to bipedal walking and running", University of Texas at Dallas, 2015
- P.13 K. Akbari Hamed**, "Robust Dynamical Legged Locomotion Through Hybrid Control and Optimization", San Diego State University, San Diego, CA, 2014

Google Scholar

Citations: 803, h-index: 14, and i10-index: 17

Editorial Board

- Editor for the IEEE RAS/EMBS International Conference for Biomedical Robotics and Biomechanics (BioRob) 2020 and 2021
- Associate Editor for the American Control Conference (ACC) 2020-2022
- Associate Editor for the IEEE Conference on Decision and Control (CDC) 2020 and 2021
- Associate Editor for the IEEE International Conference on on Robotics and Automation (ICRA) 2021
- Associate Editor for the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2020

Program Committee

- Robotics, Science and Systems (RSS) 2017 and 2018

Session Chair

- Chair for the 2021 ICRA session on “Legged Robots II”, June 2021
- Chair for the 2020 IROS session on “Passive Walking”, October 2020
- Co-chair for the 2018 ACC session on “Stability of Hybrid Systems”, Milwaukee Wi, June 2018
- Co-chair for the 2014 CDC session on “Stability of Hybrid Systems”, Los Angeles, CA, December 2014

Professional Service

- Member, IEEE
- Elected full member of Sigma Xi Scientific Society, 2020
- Member, IEEE Control Systems Society
- Member, IEEE Robotics and Automation Society
- Member, IEEE Technical Committee on Hybrid Systems

Teaching Experience

- TE.1** Developer and Organizer, **SS: Feedback Control of Dynamic Legged Locomotion (ME-6984)**, Graduate course, Department of Mechanical Engineering, Virginia Tech
- TE.2** Instructor, **Controls Engineering (ME-3534)**, Senior level undergraduate course, Department of Mechanical Engineering, Virginia Tech
- TE.3** Instructor, **System Dynamics (ME-3514)**, Senior level undergraduate course, Department of Mechanical Engineering, Virginia Tech

Press

- P.1** Virginia Tech’s terrifying touchdown robot wants to do push-ups, not take over the world, **The Washington Post**, October 12, 2019
- P.2** Virginia Tech researchers aim to give robots bio-inspired gaits, *Virginia Tech*, September 27, 2019

- P.3** How Virginia Tech's pushup robot could one day help people with disabilities, *WSLS 10 News*, October 1, 2019
- P.4** Virginia Tech finds star on football field: Push-up pumping robot, *WDBJ7*, October 3, 2019
- P.5** Behold, Virginia Tech's football team has a robot that does pushups when they score, *Mashable*, September 28, 2019
- P.6** A Leg Up for Prosthetics, *SDSU NewsCenter*, December 7, 2016
- P.7** MARLO an underactuated 3D bipedal robot with passive prosthetic feet, *IEEE Spectrum*, December 6 2013
- P.8** No Big Deal, Just a Robot Walking Around Campus, *The Atlantic*, December 4, 2013
- P.9** For door-to-door delivery, robots must improve gait, *The Business of Robotics*, December 4 2013
- P.10** Google's robotics properties and U of M's walking robot, *examiner*, December 4 2013
- P.11** Two-legged robot walks outside at U-M, Michigan Engineering, *Michigan Engineering*, December 3, 2013
- P.12** Two-legged robot walks outside at U-Michigan, *EECS News, University of Michigan*, December 4 2013
- P.13** Walk the Robot - Preliminary Outdoor Walking with Underactuated Bipedal Robot MARLO, *futurescope*, December 5 2013
- P.14** The University of Michigan's newest two-legged robot has taken its first steps outside, *Frequency*, December 4 2013

Student Advising

Current Graduate Students

- Vinay R Kamidi (Ph.D. Candidate at Virginia Tech)
- Abhishek Pandala (Ph.D. Candidate at Virginia Tech)
- Jeeseop Kim (Ph.D. Candidate at Virginia Tech)
- Basit Muhammad Imran (Ph.D. Candidate at Virginia Tech)
- Leila Amanzadeh (Ph.D. Student at Virginia Tech)
- Randy Fawcett (Ph.D. Candidate at Virginia Tech)

Former Graduate Students

- Randy Fawcett (M.S. Student at Virginia Tech)
- Joseph Martin (M.S. Student at Virginia Tech)

Journal Reviewer

- IEEE Transactions on Automatic Control
- IEEE Transactions on Control Systems Technology
- IEEE Control Systems Letters
- Automatica
- IEEE Transactions on Control of Network Systems

- SIAM Journal of Control and Optimization
- ASME Journal of Dynamic Systems, Measurement, and Control
- International Journal of Robotics Research
- IEEE Transactions on Robotics
- IEEE Robotics and Automation Letters
- IEEE Transactions on Systems, Man and Cybernetics
- IEEE/ASME Transactions on Mechatronics
- IEEE Transactions on Neural Networks
- IET Control Theory and Applications
- Robotica
- Mechatronics, a journal of IFAC
- Journal of Intelligent & Robotic Systems

Conference Reviewer

- American Control Conference (ACC)
- IEEE International Conference on Decision and Control (CDC)
- 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
- IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)
- Robotics: Science and Systems (RSS)

Professional Skills

- Control Theory
- Robotics
- Cyber-Physical Systems
- Distributed Control
- Autonomous Robots
- Wearable and Rehabilitation Robots
- Robot Locomotion
- Multiagent Systems
- Hybrid Dynamical Systems
- Optimization
- Nonlinear and Robust Control

Graduate Courses

- Nonlinear Control
- Adaptive Control
- Robot Control
- Robust Control
- Optimal Control
- Multi-Variable Control
- Model Predictive Control
- Digital Control

- Linear System Theory
- Estimation Theory and Optimal Filters
- Linear and Nonlinear Programming
- Theory of Advanced Differential Equations and Dynamical Systems
- Differential Geometry
- Fuzzy Logic and its Applications
- Artificial Neural Networks and Their Applications
- Digital Signal Processing
- Stochastic Processes

Computer Skills

MATLAB, C/C++, Simulink, Stateflow, xPC Target, dSpace, LabVIEW, Arduino, and Raspberry Pi