

ROBERT D. GREGG IV

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POSITIONS

Associate Professor, University of Michigan Department of Robotics Department of Electrical Engineering and Computer Science Department of Mechanical Engineering	2019 – Present
Associate Director for Graduate Education, University of Michigan Robotics Institute	2020 – 2022
Eugene McDermott Professor, University of Texas at Dallas	2018 – 2019
Assistant Professor, University of Texas at Dallas Department of Bioengineering Department of Mechanical Engineering	2013 – 2019
Adjunct Assistant Professor, UT Southwestern Medical Center Prosthetics-Orthotics Program	2014 – 2019
Research Scientist, Rehabilitation Institute of Chicago Center for Bionic Medicine	2012 – 2013

EDUCATION

Postdoctoral Fellow, Rehabilitation Institute of Chicago Center for Bionic Medicine	2010 – 2012
Postdoctoral Fellow, Northwestern University Department of Mechanical Engineering	2010 – 2012
PhD, University of Illinois at Urbana-Champaign Department of Electrical and Computer Engineering <i>Dissertation:</i> “Geometric Control and Motion Planning for 3D Bipedal Locomotion” <i>Advisor:</i> Mark W. Spong, PhD	Aug 2010
MS, University of Illinois at Urbana-Champaign Department of Electrical and Computer Engineering	Dec 2007
BS (cum laude), University of California – Berkeley Department of Electrical Engineering and Computer Sciences	May 2006

RESEARCH INTERESTS

Wearable Robots, Legged Robots, Prosthetics & Orthotics, Bipedal Locomotion, Nonlinear Control Theory, Rehabilitation Engineering

HONORS AND AWARDS

Personal:

- *IEEE Transactions on Robotics* Best Paper Award Honorable Mention, 2020.
- Moore Inventor Fellows Finalist, Gordon and Betty Moore Foundation, 2020.
- Forchheimer Prize Paper Finalist, International Society for Prosthetics and Orthotics, 2019.
- Provost's Award for Faculty Excellence in Undergrad Research Mentoring, UT Dallas, 2018.
- Eugene McDermott Professorship, University of Texas at Dallas, 2018.
- ICRA Conference Editorial Board Best Associate Editor Award, 2018.
- Bioengineering Undergraduate Teaching Award, University of Texas at Dallas, 2017-18.
- Bioengineering Graduate Student Mentoring Award, University of Texas at Dallas, 2017-18.
- Technology Inventors Award Finalist, Tech Titans, Technology Assoc for North Texas, 2017.
- NSF CAREER Award, Directorate for Engineering, National Science Foundation, 2017.
- Jonsson School Junior Faculty Research Award, University of Texas at Dallas, 2016.
- IEEE Senior Member, Institute of Electrical & Electronics Engineers, 2016.
- Excellence in Biomedical Research Award, Department of Bioengineering, UT Dallas, 2014.
- NIH Director's New Innovator Award, National Institutes of Health, 2013.
- Career Award at the Scientific Interface, Burroughs Wellcome Fund, 2012.
- Best Technical Paper Award, *CLAWAR Conference*, 2011.
- Engineering into Medicine Postdoctoral Fellowship, Northwestern University, 2010.
- O. Hugo Schuck Award (Best Paper), IFAC American Automatic Control Council, 2009.
- Best Student Paper Award, *American Control Conference*, Seattle, WA, 2008.
- Warren Dere Design Award, Department of EECS, UC Berkeley, 2007.
- First Place, NATCAR Intercollegiate Design Contest, UC Davis, 2006.
- Arthur M. Hopkin Award, Department of EECS, UC Berkeley, 2006.
- Christie Senior Research Award, California Alumni Association, UC Berkeley, 2006.

Trainees:

- Thomas Kevin Best, Towner Prize for Distinguished Academic Achievement, 2024.
- Shihao Cheng, Best Student Paper Award, *IEEE Int. Conf. Intelligent Robots & Systems*, 2023.
- Emily Keller, NSF Graduate Research Fellowship, 2023.
- Shihao Cheng, Rackham Predoctoral Fellowship, University of Michigan, 2023.
- José Montes Perez, NIH Diversity Supplement Award (on R01EB031166), 2022.
- Thomas Kevin Best, NSF Graduate Research Fellowship, 2022.
- Daphna Raz, NIH F31 Ruth L. Kirschstein Predoctoral Individual Fellowship (F31EB032745), 2022.
- Roberto Leo Medrano, NIH Diversity Supplement Award (on R01HD094772), 2021.
- Nikhil Divekar, Rackham Predoctoral Fellowship, University of Michigan, 2021.
- Emma Reznick, Best Paper Award Nominee, *IEEE Int. Conf. Biomed. Robot. Biomechatronics*, 2020.
- Nikhil Divekar, Best Student Paper Award Nominee, *IEEE Int. Conf. Biomed. Robot. Biomechatronics*, 2020.

- Emma Reznick, Best Student Poster Award, *Int. Society of Prosthetics & Orthotics (ISPO) Canada, RehabWeek*, 2019.
- Emma Reznick, Best Abstract Award, *Int. Society of Prosthetics & Orthotics (ISPO) Canada, RehabWeek*, 2019.
- David Quintero, David Daniel Thesis Award, Jonsson School of Engineering and Computer Science, UT Dallas, 2019.
- Siavash Reza zadeh, BME Department Staff Research Impact Award, UT Dallas, 2018.
- Chris Nesler, BME Department Staff Undergraduate Research Mentoring Award, UT Dallas, 2018.
- Nikhil Divekar, Jonsson Family Graduate Fellowship in Bioengineering, Jonsson School of Engineering and Computer Science, UT Dallas, 2018.
- Edgar Bolivar, Best Student Robotics Paper Award, *ASME Dyn Sys Control Conf*, 2017.
- Ge Lv, Louis Beecherl Jr. Graduate Fellowship, Jonsson School of Engineering and Computer Science, UT Dallas, 2017-18.
- Saurav Kumar, Best Student Paper Award Finalist, *IEEE Conf Control Tech & App*, 2017.
- Rafi Ayub, NSF Graduate Research Fellowship, National Science Foundation, 2017.
- Ge Lv, Best Student Paper Award, *IEEE Conf Decision & Control*, Osaka, Japan, 2015.
- Dario Villarreal, Jonsson Family Graduate Fellowship in Bioengineering, Jonsson School of Engineering and Computer Science, UT Dallas, 2015.
- David Allen, Excellence in Education Doctoral Fellowship, Jonsson School of Engineering and Computer Science, UT Dallas, 2015.
- Hanqi “Leon” Zhu, Founder’s Distinguished Graduate Fellowship, UT Dallas, 2015.
- Kyle Embry, Excellence in Education Doctoral Fellowship, Jonsson School of Engineering and Computer Science, UT Dallas, 2014.
- David Quintero, Excellence in Education Doctoral Fellowship, Jonsson School of Engineering and Computer Science, UT Dallas, 2013.
- Dario Villarreal, Conacyt Graduate Fellowship, CONACYT, Mexico, 2013.

RESEARCH FUNDING

Active:

1. **R. Gregg** (PI), “Controlling Locomotion over Continuously Varying Activities for Agile Powered Prosthetic Legs,” National Institutes of Health/NICHHD (R01HD094772), 12/01/23—11/30/28, \$3,067,774. Percentile: 8%.
2. **R. Gregg** (PI), “Continuously-Variable Impedance Control System for Walking on the Latest Ossur PowerKnee Hardware,” Ossur Inc., 05/2023—04/2024, \$113,478.
3. **R. Gregg** (PI), “Understanding Personalized Control with Modular Powered Orthoses,” National Institutes of Health/NIBIB (3R01EB031166-01W1), 09/01/22—08/31/24, \$164,560.
4. **R. Gregg** (PI), “Enhancing Voluntary Motion in Broad Patient Populations with Modular Powered Orthoses,” National Institutes of Health/NIBIB (R01EB031166), 09/22/21—09/21/24, \$1,767,419.
5. **R. Gregg** (UM PI), E. Rouse (UM Co-PI), and E. Rombokas (UW/Lead PI), “NRI: INT: Collaborative Research: An Open-Source Framework for Continuous Torque Control of Intuitive Robotic Prosthetic Legs,” National Robotics Initiative 2.0, National Science Foundation (CMMI-2024237), 10/01/20—09/30/24, \$1,500,000 (\$940,000 UM share).

Completed:

1. **R. Gregg** (PI), “Controlling Robot-Assisted Locomotion with Extended Kalman Filter Estimates of Phase and Activity,” National Institutes of Health/NICHHD (3R01HD094772-04S1), 06/01/21–11/30/23, \$173,722.
2. **R. Gregg** (PI), “Controlling Locomotion over Continuously Varying Activities for Agile Powered Prosthetic Legs,” National Institutes of Health/NICHHD (R01HD094772), 09/01/18—11/30/2023, \$2,227,090. Percentile: 9%.
3. **R. Gregg** (PI), “CAREER: Recovering and Enhancing Natural Locomotion in Changing Conditions with Powered Lower-Limb Prostheses and Orthoses,” National Science Foundation (CMMI-1652514 → 1949869), 09/01/17–08/31/23, \$500,000.
4. **R. Gregg** (UM/Lead PI), S. Rezazadeh (Co-PI), and E. Rouse (UM PI), “NRI: FND: COLLAB: Optimal Design of Robust Compliant Actuators for Ubiquitous Co-Robots,” National Robotics Initiative 2.0, National Science Foundation (CMMI-1830360 → 1953908), 09/15/18–08/31/22, \$750,000 (\$431,244 Gregg share).
5. **R. Gregg** (UM PI), H. Geyer (CMU PI), and E. Rouse (UM/Lead PI), “NRI: FND: COLLAB: An Open-Source Robotic Leg Platform that Lowers the Barrier for Academic Research,” National Robotics Initiative 2.0, National Science Foundation (CMMI-1734600 → 1949346), 10/01/17–09/30/22, \$749,054 (\$193,000 Gregg share).
6. N. Gans (PI) and **R. Gregg** (Co-PI), “Time-Invariant, Multi-Objective Extremum Seeking Control for Model-Free Auto-Tuning of Powered Prosthetic Legs,” National Science Foundation (CMMI-1728057 → 2040335), 09/01/17–08/31/22, \$373,483.
7. K. Hamed (SDSU PI) and **R. Gregg** (UTD PI), “NRI: Decentralized Feedback Control Design for Cooperative Robotic Walking with Application to Powered Prosthetic Legs,” National Robotics Initiative, National Science Foundation (CMMI-1637704 → 1854898), 09/01/16–08/31/20, \$612,213 (\$245,730 Gregg share).
8. **R. Gregg** (PI), “Phase-Based Control of Locomotion for High-Performance Prostheses and Orthoses,” NIH Director’s New Innovator Award, National Institutes of Health/NICHHD (DP2HD080349), 09/30/13–06/30/18, \$2,295,000. Impact Score: 18.
9. **R. Gregg** (PI), “From Machine to Biomimetic Control in Robot-Assisted Walking,” Career Award at the Scientific Interface, Burroughs Wellcome Fund, 07/01/12–12/31/20, \$500,000.

PEER-REVIEWED JOURNAL ARTICLES

1. T. K. Best, G. C. Thomas, S. R. Ayyappan, **R. Gregg**, and E. Rouse, “A Compensated Open-Loop Impedance Controller Evaluated on the Second Generation Open-Source Leg Robotic Prosthesis,” *IEEE/ASME Trans Mechatronics*, Under review.
2. I. Harris, E. Rouse, **R. Gregg**, and G. Thomas, “A Control Framework for Accurate Mechanical Impedance Rendering with Series-Elastic Joints in Prosthetic Applications,” *IEEE Robotics & Automation Letters*, Under review.
3. J. Lin, **R. Gregg**, and P. Shull, “Improving Task-Invariant Energy Shaping Control of Powered Exoskeletons with Task/Gait Classification,” *IEEE Robotics & Automation Letters*, Under review.
4. N. Divekar, G. Thomas, A. Yerva, H. Frame, and **R. Gregg**, “A Task-Adaptive Knee Exoskeleton Mitigates Quadriceps Fatigue During Lifting-Lowering and Multi-Terrain Carrying,” Under review.
5. J. Lin, N. Divekar, V. Peddinti, G. Thomas, and **R. Gregg**, “A Modular Framework for Task-Invariant, Energy Shaping Control of Lower-Limb Exoskeletons,” *IEEE Trans. Control Systems Tech.*, Under review.

6. D. Le, S. Cheng, **R. Gregg**, and M. Ghaffari, "Transfer Learning for Efficient Intent Prediction in Lower-Limb Prosthetics: A Strategy for Limited Datasets," *IEEE Robotics & Automation Letters*, 2024.
7. T-W. Hsu, **R. Gregg**, and G. Thomas, "Robustification of Bayesian-Inference-Based Gait Estimation for Lower-limb Wearable Robots," *IEEE Robotics & Automation Letters*, 2024.
8. S. Cheng, C. Laubscher, and **R. Gregg**, "Automatic Stub Avoidance for a Powered Prosthetic Leg on Stairs and Obstacles," *IEEE Trans. Biomedical Eng.*, 2023.
9. R. Cortino, T. K. Best, and **R. Gregg**, "Data-Driven Phase-Based Control of a Powered Knee-Ankle Prosthesis for Variable-Incline Stair Ascent and Descent," *IEEE Trans Medical Robotics & Bionics*, 2023.
10. C. Welker, T. K. Best, **R. Gregg**, "Improving Sit/Stand Loading Symmetry and Timing Through Unified Variable Impedance Control of a Powered Knee-Ankle Prosthesis," *IEEE Trans Neural Systems Rehab Eng*, 2023.
11. R. Medrano, G. Thomas, E. Rouse, and **R. Gregg**, "Real-Time Gait Phase and Task Estimation for Controlling Powered Ankle Exoskeletons on Extremely Uneven Terrain," *IEEE Trans Robotics*, 2023.
12. T. K. Best, C. Welker, E. Rouse, and **R. Gregg**, "Data-Driven Variable Impedance Control of a Powered Knee-Ankle Prosthesis for Adaptive Speed and Incline Walking," *IEEE Trans Robotics*, 2023.
13. E. Reznick, C. G. Welker, and **R. D. Gregg**, "Predicting Individualized Joint Kinematics over Continuous Variations of Walking, Running, and Stair Climbing," *IEEE Open J Engineering in Medicine & Biology*, 2023.
14. S. Cheng, E. Bolivar-Nieto, C. Gonzalez Welker, and **R. Gregg**, "Modeling the Transitional Kinematics Between Variable-Incline Walking and Stair Climbing," *IEEE Trans Medical Robotics & Bionics*, 4(3): 840-851, 2022.
15. R. L. Medrano, G. Thomas, E. Rouse, and **R. Gregg**, "Analysis of the Bayesian Gait-State Estimation Problem for Lower-Limb Exoskeleton Configurations," *IEEE Robotics & Automation Letters*, 2022.
16. S. Kumar, O. Makarenkov, **R. Gregg**, and N. Gans, "Stability of Time-Invariant Extremum Seeking Control for Limit Cycle Minimization," *IEEE Trans Automatic Control*, 2022.
17. J. Lin, N. Divekar, G. Thomas, and **R. Gregg**, "Optimally Biomimetic Passivity-Based Control of a Lower-Limb Exoskeleton over the Primary Activities of Daily Life," *IEEE Open Journal of Control Systems*, 2022. Special Issue on Intersection of Machine Learning with Control.
18. C. Nesler, G. Thomas, N. Divekar, E. Rouse, and **R. Gregg**, "Enhancing Voluntary Motion with Modular, Backdrivable, Powered Hip and Knee Orthoses," *IEEE Robotics & Automation Letters*, 2022.
19. T. Elery, E. Reznick, S. Shearin, K. McCain, **R. Gregg**, "Design and Initial Validation of a Multiple Degree-of-Freedom Joint for an Ankle-Foot Orthosis," *ASME Journal of Medical Devices*, 2022.
20. J. Horn and **R. Gregg**, "Nonholonomic Virtual Constraints for Control of Powered Prostheses Across Walking Speeds," *IEEE Trans Control Systems Tech*, 2021.
21. E. Reznick, K. Embry, R. Neuman, E. Bolivar, N. Fey, and **R. Gregg**, "Lower-Limb Kinematics and Kinetics During Continuously Varying Human Locomotion," *Scientific Data*, 2021.
22. S. Cheng, E. Bolivar, and **R. Gregg**, "Real-Time Activity Recognition with Instantaneous Characteristic Features of Thigh Kinematics," *IEEE Trans Neural Sys Rehab Eng*, 2021.
23. E. Bolivar, T. Summers, **R. Gregg**, and S. Rezazadeh, "A Convex Optimization Framework for Robust-Feasible Series Elastic Actuators," *Mechatronics*, 2021.
24. G. Lv, J. Lin, and **R. Gregg**, "Trajectory-Free Control of Lower-Limb Exoskeletons Through Underactuated Total Energy Shaping," *IEEE Access*, 2021.

25. M. Yeatman and **R. Gregg**, "Using Energy Shaping and Regulation for Limit Cycle Stabilization, Generation, and Transition in Simple Locomotive Systems," *ASME J Computational and Nonlinear Dynamics*, 2021.
26. D. Allen, R. Little, J. Laube, J. Warren, W. Voit, and **R. Gregg**, "Towards an Ankle-Foot Orthosis Powered by a Dielectric Elastomer Actuator," *Mechatronics*, 2021.
27. H. Zhu, C. Nesler, N. Divekar, V. Peddinti, and **R. Gregg**, "Design Principles for Compact, Backdrivable Actuation in Partial-Assist Powered Knee Orthoses," *IEEE/ASME Trans Mechatronics*, 2021.
28. J. Lin, N. Divekar, G. Lv, and **R. Gregg**, "Optimal Task-Invariant Energetic Control for a Knee-Ankle Exoskeleton," *IEEE Control Systems Letters*, 5(5): 1711-1716, 2021.
29. R. Macaluso, K. Embry, D. Villarreal, and **R. Gregg**, "Parameterizing Human Locomotion Across Quasi-Random Treadmill Perturbations and Inclines," *IEEE Trans Neural Sys Rehab Eng*, 29: 508-516, 2021.
30. K. Embry and **R. Gregg**, "Analysis of Continuously Varying Kinematics for Prosthetic Leg Control Applications," *IEEE Trans Neural Sys Rehab Eng*, 29: 262-272, 2021.
31. V. Kamidi, J. Horn, **R. Gregg**, and K. Hamed, "Distributed Controllers for Human-Robot Locomotion: A Scalable Approach Based on Decomposition and Hybrid Zero Dynamics," *IEEE Control Systems Letters*, 2020.
32. T. Elery, S. Rezazadeh, E. Reznick, L. Gray, and **R. Gregg**, "Effects of a Powered Knee-Ankle Prosthesis on Transfemoral Amputee Hip Compensations: A Case Series," *IEEE Trans Neural Sys Rehab Eng*, 28(12): 2944-2954, 2020.
33. S. Kumar, M. Zwall, E. Bolivar, **R. Gregg**, and N. Gans, "Extremum Seeking Control for Stiffness Auto-Tuning of a Quasi-Passive Ankle Exoskeleton," *IEEE Robotics & Automation Letters*, 5(3): 4604-4611, 2020.
34. T. Elery, S. Rezazadeh, C. Nesler, and **R. Gregg**, "Design and Validation of a Powered Knee-Ankle Prosthesis with High-Torque, Low-Impedance Actuators," *IEEE Transactions on Robotics*, 36(6): 1649-1668, 2020. **Best Paper Award Honorable Mention**
35. J. Horn, A. Mohammadi, K. Hamed, and **R. Gregg**, "Nonholonomic Virtual Constraint Design for Variable-Incline Bipedal Robotic Walking," *IEEE Robotics & Automation Letters*, 5(2): 3691-3698, 2020.
36. S. Kumar, A. Mohammadi, D. Quintero, S. Rezazadeh, N. Gans, and **R. Gregg**, "Extremum Seeking Control for Model-Free Auto-Tuning of Powered Prosthetic Legs," *IEEE Trans Control Systems Technology*, 28(6): 2120-2135, 2020.
37. S. Rezazadeh, D. Quintero, N. Divekar, E. Reznick, L. Gray, and **R. Gregg**, "A Phase Variable Approach for Improved Rhythmic and Non-Rhythmic Control of a Powered Knee-Ankle Prosthesis," *IEEE Access*, 7(1): 109840-109855, 2019.
38. K. Hamed, B. Safaee, and **R. 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*, 141(12): 121011, 2019.
39. D. Allen, E. Bolivar, S. Farmer, W. Voit, and **R. Gregg**, "Mechanical Simplification of Variable Stiffness Actuators Using Dielectric Elastomer Transducers," *Actuators*, 8(2): 1-19, 2019. Special Issue on New Materials and Designs for Soft Actuators.
40. M. Yeatman, G. Lv, and **R. Gregg**, "Decentralized Passivity-Based Control with a Generalized Energy Storage Function for Robust Biped Locomotion," *ASME Journal of Dynamic Systems, Measurement, and Control*, 141(10): 101007, 2019.

41. E. Bolivar, S. Rezazadeh, and **R. Gregg**, "Minimizing Energy Consumption and Peak Power of Series Elastic Actuators: A Convex Optimization Framework for Elastic Element Design," *IEEE/ASME Transactions on Mechatronics*, 24(3):1334-1345, 2019.
42. A. Mohammadi and **R. Gregg**, "Variable Impedance Control of Powered Knee Prostheses Using Human-Inspired Algebraic Curves," *ASME Journal of Computational and Nonlinear Dynamics*, 14(10): 101007, 2019. Special Issue on Nonlinear and Computational Dynamics in Biomedical Applications.
43. J. Horn, A. Mohammadi, K. Hamed, and **R. Gregg**, "Hybrid Zero Dynamics of Bipedal Robots Under Nonholonomic Virtual Constraints," *IEEE Control Systems Letters*, 3(2): 386-391, 2019.
44. K. Hamed and **R. Gregg**, "Decentralized Event-Based Controllers for Robust Stabilization of Hybrid Periodic Orbits: Application to Underactuated 3D Bipedal Walking," *IEEE Trans Automatic Control*, 64(6): 2266-2281, 2019.
45. K. Embry, D. Villarreal, R. Macaluso, and **R. Gregg**, "Modeling the Kinematics of Human Locomotion over Continuously Varying Speeds and Inclines," *IEEE Trans Neural Sys Rehab Eng*, 26(12): 2342-2350, 2018.
46. D. Quintero, E. Reznick, D. Lambert, S. Rezazadeh, L. Gray, and **R. Gregg**, "Intuitive Clinician Control Interface for a Powered Knee-Ankle Prosthesis: A Case Study," *IEEE Journal of Translational Engineering in Health and Medicine*, 6(1): 1-9, 2018.
47. G. Lv, H. Zhu, and **R. Gregg**, "On the Design and Control of Highly Backdrivable Lower-limb Exoskeletons," *IEEE Control Systems Magazine*, 38(6): 88-113, 2018.
48. D. Quintero, D. Villarreal, D. Lambert, S. Kapp, and **R. Gregg**, "Continuous-Phase Control of a Powered Knee-Ankle Prosthesis: Amputee Experiments Across Speeds and Inclines," *IEEE Trans Robotics*, 34(3): 686-701, 2018.
49. G. Lv and **R. Gregg**, "Underactuated Potential Energy Shaping with Contact Constraints: Application to a Powered Knee-Ankle Orthosis," *IEEE Trans Contr Sys Tech*, 26(1): 181-193, 2018.
50. D. Quintero, A. Martin, and **R. Gregg**, "Toward Unified Control of a Powered Prosthetic Leg: A Simulation Study," *IEEE Trans Control Systems Technology*, 26(1): 305-312, 2018.
51. A. Martin and **R. Gregg**, "Stable, Robust Hybrid Zero Dynamics Control of Powered Lower-Limb Prostheses," *IEEE Trans Automatic Control*, 62(8): 3930-3942, 2017.
52. K. Hamed and **R. Gregg**, "Decentralized Feedback Controllers for Robust Stabilization of Periodic Orbits of Hybrid Systems: Application to Bipedal Walking," *IEEE Trans Control Systems Technology*, 25(4): 1153-1167, 2017.
53. D. Villarreal, H. Poonawala, and **R. Gregg**, "A Robust Parameterization of Human Gait Patterns Across Phase-Shifting Perturbations," *IEEE Trans Neural Sys Rehab Eng*, 25(3): 265-278, 2017.
54. R. Ayub, D. Villarreal, **R. Gregg**, and F. Gao, "Evaluation of Transradial Body-Powered Prostheses Using a Robotic Simulator," *Prosthetics Orthotics Int*, 41(2): 194-200, 2017.
55. A. Plauché, D. Villarreal, and **R. Gregg**, "A Haptic Feedback System for Phase-Based Sensory Restoration in Above-Knee Prosthetic Leg Users," *IEEE Trans Haptics*, 9(3): 421-426, 2016.
56. D. Villarreal, D. Quintero, and **R. Gregg**, "A Perturbation Mechanism for Investigations of Phase-Dependent Behavior in Human Locomotion," *IEEE Access*, 4: 893-904, 2016.
57. A. Martin and **R. Gregg**, "Incorporating Human-like Walking Variability in an HZD-Based Bipedal Model," *IEEE Trans Robotics*, 32(4): 943-948, 2016. Special Issue on Movement Science for Humans and Humanoids: Methods and Applications.
58. A. Martin, D. Villarreal, and **R. Gregg**, "Characterizing and Modeling the Joint-level Variability in Human Walking," *J Biomechanics*, 49(14): 3298-3305, 2016.

59. **R. Gregg**, T. Lenzi, L. Hargrove, and J. Sensinger, "Virtual Constraint Control of a Powered Prosthetic Leg: From Simulation to Experiments with Transfemoral Amputees," *IEEE Trans Robotics*, 30(6): 1455-1471, 2014.
60. **R. Gregg**, E. Rouse, L. Hargrove, and J. Sensinger, "Evidence for a Time-Invariant Phase Variable in Human Ankle Control," *PLoS ONE*, 9(2): e89163, 2014.
61. **R. Gregg** and J. Sensinger, "Towards Biomimetic Virtual Constraint Control of a Powered Prosthetic Leg," *IEEE Trans Control Systems Technology*, 22(1): 246-254, 2014.
62. A. Degani, A. Long, S. Feng, B. Brown, **R. Gregg**, H. Choset, M. Mason, and K. Lynch, "Design and Open-Loop Control of the ParkourBot, a Dynamic Climbing Robot," *IEEE Trans Robotics*, 30(3): 705-718, 2014.
63. **R. Gregg** and L. Righetti, "Controlled Reduction with Unactuated Cyclic Variables: Application to 3D Bipedal Walking with Passive Yaw Rotation," *IEEE Trans Automatic Control*, 58(10): 2679-2685, 2013.
64. E. Rouse, **R. Gregg**, L. Hargrove, and J. Sensinger, "The Difference Between Mechanical Stiffness and Quasi-Stiffness in the Context of Biomechanical Modeling," *IEEE Trans Biomed Eng*, 60(2): 562-568, 2013.
65. **R. Gregg**, Y. Dhaher, A. Degani, and K. Lynch, "On the Mechanics of Functional Asymmetry in Bipedal Walking," *IEEE Trans Biomed Eng*, 59(5): 1310-1318, 2012.
66. **R. Gregg**, A. Tilton, S. Candido, T. Bretl, and M. Spong, "Control and Planning of 3D Dynamic Walking with Asymptotically Stable Gait Primitives," *IEEE Trans Robotics*, 28(6): 1415-1423, 2012.
67. **R. Gregg** and M. Spong, "Reduction-Based Control of Three-Dimensional Bipedal Walking Robots," *Int J Robotics Research*, 29(6): 680-702, 2010.

PEER-REVIEWED CONFERENCE PROCEEDINGS

1. S. Zhao, K. Walters, J. Montes-Perez, and **R. Gregg**, "Design and Validation of a Modular, Backdrivable Ankle Exoskeleton," submitted to *IEEE Int Conf Biomedical Robotics & Biomechatronics (BioRob)*, 2024.
2. A. Lee, C. Laubscher, T. K. Best, and **R. Gregg**, "Towards a Unified Approach for Continuously-Variable Impedance Control of Powered Prosthetic Legs over Walking Speeds and Inclines," to appear in *IEEE Int Conf Robotics & Automation*, 2024.
3. S. Cheng, C. Laubscher, and **R. Gregg**, "Controlling Powered Prosthesis Kinematics over Continuous Transitions Between Walk and Stair Ascent," in *IEEE Int Conf Intelligent Robots & Systems*, 2023. **Best Student Paper Award**
4. T. K. Best, C. Laubscher, R. Cortino, S. Cheng, and **R. Gregg**, "Improving Amputee Endurance over Activities of Daily Living with a Robotic Knee-Ankle Prosthesis: A Case Study," in *IEEE Int Conf Intelligent Robots & Systems*, 2023. **Best Application Paper Award Finalist**
5. K. Walters, G. Thomas, J. Lin, and **R. Gregg**, "An Energetic Approach to Task-Invariant Ankle Exoskeleton Control," in *IEEE Int Conf Intelligent Robots & Systems*, 2023.
6. J. Montes-Perez, G. Thomas, and **R. Gregg**, "Effects of Personalization on Gait-State Tracking Performance Using Extended Kalman Filters," in *IEEE Int Conf Intelligent Robots & Systems*, 2023.
7. J. Zhang, J. Lin, V. Peddinti, and **R. Gregg**, "Optimal Energy Shaping Control for a Backdrivable Hip Exoskeleton," in *American Control Conf*, 2023.

8. E. Keller, C. Laubscher, and **R. Gregg**, “Gait Event Detection with Proprioceptive Force Sensing in a Powered Knee-Ankle Prosthesis: Validation over Walking Speeds and Slopes,” in *IEEE Int Conf Robotics & Automation*, 2023.
9. C. Welker, T. K. Best, and **R. Gregg**, “Data-Driven Variable Impedance Control of a Robotic Knee-Ankle Prosthesis for Sit, Stand, and Walk with Minimal Tuning,” *IEEE Int Conf Intelligent Robots & Systems*, 2022.
10. R. Cortino, E. Bolivar, T. K. Best, and **R. Gregg**, “Stair Ascent Phase-Variable Control of a Powered Knee-Ankle Prosthesis,” in *IEEE Int Conf Robotics & Automation*, 2022.
11. S. Guo, **R. Gregg**, and E. Bolivar, “Convex Optimization for Spring Design of Parallel Elastic Actuators,” in *American Control Conf*, 2022.
12. G. Thomas and **R. Gregg**, “An Energy Shaping Exoskeleton Controller for Human Strength Amplification,” in *IEEE Conf Decision & Control*, 2021.
13. P. Kannapan, D. Garmire, and **R. Gregg**, “EMMA: Earthworm Mimetic Manipulator Architecture for Access-Constrained Environments,” in *Int Conf Advanced Robotics*, 2021.
14. E. Bolivar, G. Thomas, E. Rouse, and **R. Gregg**, “Convex Optimization for Spring Design in Series Elastic Actuators: From Theory to Practice,” in *IEEE Int Conf Intelligent Robots & Systems*, 2021.
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18. E. Reznick, K. Embry, and **R. Gregg**, “Predicting Individualized Joint Kinematics over a Continuous Range of Slopes and Speeds,” in *IEEE Int. Conf. Biomedical Robotics Biomechatronics*, 2020.
19. G. Lv, H. Xing, J. Lin, **R. Gregg**, and C. Atkeson, “A Task-Invariant Learning Framework of Lower-Limb Exoskeletons for Assisting Human Locomotion,” in *American Control Conf.*, 2020.
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21. H. Zhu, C. Nesler, N. Divekar, M. Ahmad, and **R. Gregg**, “Design and Validation of a Partial-Assist Knee Orthosis with Compact, Backdrivable Actuation,” in *IEEE Int Conf on Rehab Robotics*, pp. 917-924, 2019.
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23. J. Lin, G. Lv, and **R. Gregg**, “Contact-Invariant Total Energy Shaping for Powered Exoskeletons,” in *American Control Conference*, 2019.
24. S. Kumar, A. Mohammadi, **R. Gregg**, and N. Gans, “Limit Cycle Minimization by Time-Invariant Extremum Seeking Control,” in *American Control Conference*, 2019.
25. A. Mohammadi, S. Fakoorian, J. Horn, D. Simon, and **R. Gregg**, “Hybrid Nonlinear Disturbance Observer Design for Underactuated Bipedal Robots,” in *IEEE Conf. Decision & Control*, 2018.
26. S. Rezazadeh, D. Quintero, N. Divekar, and **R. Gregg**, “A Phase Variable Approach to Volitional Control of Powered Knee-Ankle Prostheses,” in *IEEE Int Conf Intelligent Robots & Systems*, Spain, 2018. (46.7% acceptance rate)

27. A. Mohammadi and **R. Gregg**, “Human-Inspired Algebraic Curves for Wearable Robot Control,” in *ASME Dynamic Systems & Control Conference*, 2018.
28. T. Elery, S. Rezazadeh, C. Nesler, J. Doan, H. Zhu, and **R. Gregg**, “Design and Benchtop Validation of a Powered Knee-Ankle Prosthesis with High-Torque, Low-Impedance Actuators,” in *IEEE Int Conf Robotics & Automation*, Brisbane, Australia, pp. 2788-2795, 2018. (41% acceptance rate)
29. M. Yeatman, G. Lv, and **R. Gregg**, “Passivity-Based Control with a Generalized Energy Storage Function for Robust Bipedal Walking,” in *American Control Conference*, Milwaukee, WI, 2018.
30. K. Hamed, **R. Gregg**, and A. Ames, “Exponentially Stabilizing Controllers for Multi-Contact 3D Bipedal Locomotion,” in *American Control Conference*, Milwaukee, WI, 2018.
31. K. Hamed, A. Ames, and **R. Gregg**, “Observer-Based Feedback Controllers for Exponential Stabilization of Hybrid Periodic Orbits: Application to Underactuated Bipedal Walking,” in *American Control Conference*, Milwaukee, WI, 2018.
32. D. Allen, S. Farmer, **R. Gregg**, and W. Voit, “Stretchable conductive fabric simplifies manufacturing of low-resistance dielectric-elastomer-system electrodes,” *SPIE Electroactive Polymer Actuators and Devices*, 2018.
33. E. Bolivar, S. Rezazadeh, and **R. Gregg**, “A General Framework for Minimizing Energy Consumption of Series Elastic Actuators with Regeneration,” in *ASME Dynamic Systems & Control Conf*, Virginia, pp. V001T36A005, 2017. **Best Student Robotics Paper Award**
34. A. Mohammadi, J. Horn, and **R. Gregg**, “Removing Phase Variables from Biped Robot Parametric Gaits,” in *IEEE Conf on Control Tech & Applications* (Invited Session on Robotic Locomotion Control), Hawaii, pp. 834-840, 2017.
35. S. Kumar, A. Mohammadi, N. Gans, and **R. Gregg**, “Automatic Tuning of Virtual Constraint-Based Control Algorithms for Powered Knee-Ankle Prostheses,” in *IEEE Conf on Control Tech & Applications* (Invited Session on Robotic Locomotion Control), Hawaii, pp. 812-818, 2017. **Best Student Paper Award Finalist**.
36. D. Quintero, D. Lambert, D. Villarreal, and **R. Gregg**, “Real-Time Continuous Gait Phase and Speed Estimation from a Single Sensor,” in *IEEE Conf on Control Tech & Applications* (Invited Session on Robotic Locomotion Control), Hawaii, pp. 847-852, 2017.
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51. A. Martin and **R. Gregg**, "Hybrid Invariance and Stability of a Feedback Linearizing Controller for Powered Prostheses," in *Amer Control Conf*, pp. 4670-4676, 2015.
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65. **R. Gregg**, T. Bretl, and M. Spong, “Asymptotically Stable Gait Primitives for Planning Dynamic Bipedal Locomotion in Three Dimensions,” in *IEEE Int Conf Robotics & Automation*, Anchorage, AK, pp. 1695–1702, 2010.
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67. **R. Gregg** and M. Spong, “Reduction-Based Control of Branched Chains: Application to Three-Dimensional Bipedal Torso Robots,” in *IEEE Conf Decision & Control*, Shanghai, China, pp. 8166–8173, 2009.
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69. A. Ames, **R. Gregg**, and M. Spong, “A Geometric Approach to Three-Dimensional Hipped Bipedal Robotic Walking,” in *IEEE Conf Decision & Control*, New Orleans, LA, pp. 5123–5130, 2007.
70. A. Ames and **R. Gregg**, “Stably Extending Two-Dimensional Bipedal Walking to Three Dimensions,” in *American Control Conf*, New York, NY, pp. 2848-2854, 2007.
71. A. Ames, **R. Gregg**, E. Wendel, and S. Sastry, “Towards the Geometric Reduction of Controlled Three-Dimensional Bipedal Robotic Walkers,” in *Workshop on Lagrangian & Hamiltonian Methods for Nonlinear Control*, Nagoya, Japan, 2006.
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CONFERENCE ABSTRACTS

1. C. Laubscher, T. K. Best, R. Cortino, S. Cheng, and **R. Gregg**, “Multi-Activity Endurance of Transfemoral Amputee Users with a Powered Knee-Ankle Prosthesis,” *Dynamic Walking Conference*, 2023.
2. T. K. Best, C. Welker, E. Rouse, and **R. Gregg**, “A Convex Optimization Approach for Phase Variable Impedance Control of Knee-Ankle Prostheses,” *Dynamic Walking Conference*, 2022.
3. **R. Gregg**, “Controlling Locomotion over Continuously Varying Activities for Agile Powered Prosthetic Legs,” *Dynamic Walking Conference*, 2022.
4. J. Lin, N. Divekar, and **R. Gregg**, “Task-Invariant Control of Backdrivable Knee Exoskeletons for Partial Assistance,” *Dynamic Walking Conference*, 2022.
5. T. K. Best, E. Rouse, and **R. Gregg**, “Continuous Phase-Varying Impedance Control of a Knee-Ankle Prosthesis for Incline Walking,” *Dynamic Walking Conference*, 2021.

6. S. Cheng, E. Bolivar, and **R. Gregg**, "Real-Time Lower-Limb Activity Recognition with Instantaneous Characteristic Features of Thigh Kinematics," *Dynamic Walking Conference*, 2021.
7. R. Cortino, E. Bolivar, and **R. Gregg**, "Towards Phase-Variable Control of Stair Ascent of Powered Knee-Ankle Prostheses," *Dynamic Walking Conference*, 2021.
8. J. Perez, G. Thomas, and **R. Gregg**, "Low-Dimensional Individualized Continuous-Task Joint Kinematic Modelling," *Dynamic Walking Conference*, 2021.
9. E. Reznick and **R. Gregg**, "Investigating Gait Individuality Across Ambulation Modes," *Dynamic Walking Conference*, 2021.
10. E. Bolivar, K. Embry, T. Elery, E. Reznick, and **R. Gregg**, "Powered knee-ankle prostheses for community ambulation: controlling locomotion over continuously varying activities," *NIH Rehabilitation Research 2020: Envisioning a Functional Future Conference*, 2020.
11. G. Thomas, J. Lin, N. Divekar, C. Nesler, and **R. Gregg**, "Task-Invariant Assistance using Backdrivable, Powered Orthoses," *Rehabilitation Research 2020: Envisioning a Functional Future Conference*, 2020.
12. S. Kumar, O. Makarenkov, **R. Gregg**, and N. Gans, "Time-Invariant Extremum Seeking Control," in *American Control Conference*, 2020.
13. M. Yeatman, S. Rezazadeh, and **R. Gregg**, "Energy Shaping and Tracking for Natural Limit Cycles in Hybrid Systems," *Dynamic Walking Conference*, 2020.
14. N. Divekar and **R. Gregg**, "Design and Validation of a Backdrivable Powered Knee Orthosis for Partial Assistance of Lower Limb Musculature," *Dynamic Walking Conference*, 2020.
15. R. Neuman, K. Embry, E. Reznick, **R. Gregg**, and N. Fey, "Stair Inclination Angle Significantly Affects Walking Kinematics Over Specific Regions of Gait Cycle During Ascending and Descending Tasks," *Biomedical Engineering Society*, 2019.
16. N. Divekar, C. Nesler, and **R. Gregg**, "Feasibility of a task-invariant control scheme for a knee-ankle exoskeleton designed for stroke rehabilitation," *International Society of Prosthetics & Orthotics (ISPO) Canada/RehabWeek*, 2019.
17. E. Reznick and **R. Gregg**, "Intuitive Clinician Control Interface for a Powered Knee-Ankle Prosthesis: A Case Study," *International Society of Prosthetics & Orthotics (ISPO) Canada/RehabWeek*, 2019.
18. **R. Gregg**, "Phase-based control of locomotion for high-performance prostheses and orthoses," in *NIH Director's High-Risk High-Reward Research Symp*, Bethesda, MD, 2018.
19. **R. Gregg**, "Continuously parameterizing the timing and task adaptations of human locomotion for the control of powered prosthetic legs," in *World Congress Biomech*, 2018.
20. S. Rezazadeh and **R. Gregg**, "Using holonomic and nonholonomic parameterizations to control powered multi-joint prosthetic legs," in *Dynamic Walking Conf*, 2018.
21. S. Kumar, A. Mohammadi, N. Gans, and **R. Gregg**, "Extremum seeking control for model-free auto-tuning of powered prosthetic legs," in *IEEE Int Conf Robotics & Automation*, 2018.
22. S. Rezazadeh and **R. Gregg**, "Towards a robust control paradigm for steady-state and transient walking with active transfemoral prostheses," in *IEEE Int Conf Intelligent Robots & Systems*, 2017.
23. E. Bolivar, S. Rezazadeh, and **R. Gregg**, "How much energy can really be saved using series elastic actuators?," in *IEEE Int Conf Intelligent Robots & Systems*, 2017.
24. S. Rezazadeh and **R. Gregg**, "A constructive framework for control of anthropomorphic biped systems," in *Dynamic Walking Conf*, 2016.
25. A. Martin, D. Villarreal, and **R. Gregg**, "Adding variability to a moderately-complex human walking model," in *Dynamic Walking Conf*, 2016.

26. A. Martin, D. Villarreal, K. Embry, **R. Gregg**, “Relationship between socket forces and center of pressure location for transfemoral amputees,” in *American Society of Biomech*, 2016.
27. **R. Gregg**, “High-performance control of powered prosthetic legs with human-inspired phase variables,” in *NIH Director’s High-Risk High-Reward Research Symp*, Bethesda, MD, 2015.
28. D. Quintero, A. Martin, and **R. Gregg**, “Giving up the finite state machine in the control of lower-limb wearable robots?”, in *Workshop on Rehabilitation Robotics and Human-Robot Interaction, IEEE Int Conf Robotics & Automation*, Seattle, WA 2015.
29. **R. Gregg**, “Virtual constraint control of a powered prosthetic leg: experiments with transfemoral amputees,” in *Dynamic Locomotion Workshop, Robotics: Science & Systems*, Berkeley, CA, 2014.
30. D. Villarreal and **R. Gregg**, “Phase-based control of locomotion for high-performance prostheses and orthoses,” in *Neural Interfaces Conf*, Dallas, TX, 2014.
31. **R. Gregg**, “Phase-based control of locomotion for high-performance prostheses and orthoses,” in *NIH Director’s High-Risk High-Reward Research Symp*, Bethesda, MD, 2013.
32. **R. Gregg**, E. Rouse, L. Hargrove, and J. Sensinger, “The hypothesis of feedback pattern generation in human locomotion,” in *Dynamic Walking Conf*, Pittsburgh, PA, June 2013.
33. **R. Gregg** and J. Sensinger, “From machine to biomimetic control of powered prosthetic legs,” in *Dynamic Walking Conf*, Pensacola, FL, May 2012.

BOOK CHAPTERS

1. D. Villarreal and **R. Gregg**, “Controlling a Powered Transfemoral Prosthetic Leg Using a Unified Phase Variable,” in *Wearable Robots: Systems and Applications*, 1st edition, New York, NY: Elsevier, 2019, pp. 487.
2. A. Ames, **R. Gregg**, E. Wendel, and S. Sastry, “On the Geometric Reduction of Controlled Three-Dimensional Bipedal Robotic Walkers,” in *Lagrangian & Hamiltonian Methods for Nonlinear Control*, ser. Lecture Notes in Control and Information Sciences, vol. 366. Nagoya, Japan: Springer, 2007, pp. 183-196.

UNREFEREED MAGAZINE ARTICLES

1. **R. Gregg**, L. Hargrove, and J. Sensinger, “Challenges for Control Research: Control of Powered Prosthetic Legs,” *The Impact of Control Technology*, 2nd ed., T. Samad and A.M. Annaswamy (eds.), IEEE Control Systems Society, 2014, available at www.ieeecss.org.
2. D. Hoelzle, A. Ford, **R. Gregg**, M. Johnson, and J. Kemmerer, “Symposium on Emerging Topics in Control and Modeling: Biomedical Systems [Conference Reports],” *IEEE Control Systems Magazine*, 30(6): 132-134, 2010.

PATENTS

1. **R. Gregg**, J. Lin, N. Divekar, G. Thomas, “Limb-Assistive Device with Energy Shaping,” U.S. Patent Application, 2023.
2. **R. Gregg**, S. Cheng, C. Laubscher, “Powered Lower Limb Assistive Device with Obstacle Avoidance,” U.S. Patent Application, 2023.
3. **R. Gregg**, R. Cortino, and T.K. Best, “Powered Prosthesis with Hybrid Controller for Stair Locomotion,” U.S. Patent Application, 2023.

4. **R. Gregg**, T.K. Best, and C. Welker, “Powered Prosthesis with Improved Sit-Stand Transitions,” U.S. Patent Application, 2023.
5. **R. Gregg** et al., “Prosthesis with Adaptive Speed and Incline Impedance Control,” U.S. Patent Application, 2023.
6. **R. Gregg** and G. Lv, “Total Energy Shaping for Task-Invariant Control of Exoskeletons,” U.S. Patent Application, 2018.
7. **R. Gregg** and H. Zhu, “Powered Orthosis with Combined Motor and Gear Technology,” U.S. Patent Application, 2018.
8. **R. Gregg**, G. Lv, and H. Zhu, “Torque Control Methods and Devices for Powered Orthosis,” U.S. Patent, 2024.
9. **R. Gregg** et al., “Powered Prosthesis with Torque Dense, Low Ratio Actuation,” U.S. Patent No. US20230398003A1, 2023.
10. **R. Gregg** and H. Zhu, “Lower Limb Powered Orthosis with Low Ratio Actuation,” U.S. Patent No. US11497641B2, 2022.
11. **R. Gregg** et al., “Series Elastic Actuator with Electrically Modulated Stiffness,” U.S. Patent No. US10870202B2, 2020.
12. **R. Gregg**, D. Quintero, A. Martin, and D. Villarreal, “Systems and Methods for Prosthetic Device Control,” U.S. Patent No. US10792170B2, 2020.
13. **R. Gregg** and J. Sensinger, “Effective Shape Controller for Lower Limb,” U.S. Patent No. US10314723B2, June 2019.

INVITED PRESENTATIONS

1. Workshop on State of the Art in Robotic Leg Prostheses, *IEEE Int Conf Intelligent Robots & Systems*, Detroit, MI, Oct 2023.
2. Grizzle Fest, University of Michigan, Ann Arbor, MI, May 2023.
3. Departmental Seminar, Mechanical Science and Engineering, University of Illinois, Urbana-Champaign, IL, April 2022.
4. Aerodynamics and Control Seminar, Imperial College, London, UK, March 2022.
5. Workshop on Challenges and Opportunities of Human-Robot Symbiosis: from Wearable Robots to Neurorobotics, *IEEE Int Conf Intelligent Robots & Systems*, Prague, Czech Republic, 2021.
6. Minisymposium on Energy Shaping Control and its Applications, *SIAM Conference on Applications of Dynamical Systems*, Portland, OR, May 2021.
7. Workshop on Fielding Legged Robots off the Beaten Path, *American Control Conf*, New Orleans, LA, May 2021.
8. Workshop on State of the Art in Robotic Leg Prostheses, *IEEE Int Conf Intelligent Robots & Systems*, Oct 2020.
9. Invited Speaker, *Int Conf on Control, Automation and Systems*, Busan, Korea, Oct 2020.
10. Seminar, Robotics Institute, Carnegie Mellon University, Pittsburgh, PA, Sept 2020.
11. Mini-Symposium on Augmented Neural Prostheses, *IEEE Engineering in Medicine & Biology Conf*, Montreal, Canada, July 2020.
12. Workshop on Extremum Seeking Control in Biomedical Applications, *American Control Conf*, June 2020.
13. Workshop on Advances in Lower-limb Dynamic Prostheses for Agile and Dynamic Walking, *IEEE Int Conf Robotics & Automation*, Paris, France, May 2020.
14. Amputation Care ECHO, Walter Reed National Military Medical Center, Apr 2020.

15. Invited Speaker, International Society for Prosthetics & Orthotics (ISPO Canada) Conference, *RehabWeek*, Toronto, Canada, June 2019.
16. Invited Speaker, *Orthotics & Prosthetics Innovative Technologies Conference*, Ann Arbor, MI, May 2019.
17. Seminar, University of Texas Arlington Research Institute, Arlington, TX, Mar 2019.
18. Mini-Workshop on Cross-Disciplinary Communication and Collaboration in CPHS Research, *IFAC Conference on Cyber-Physical & Human Systems*, Dec 2018.
19. Departmental Seminar, Mechanical Engineering, University of Washington, Seattle, WA, Dec 2018.
20. Graduate Seminar, Mechanical Engineering, Texas A&M University, Nov 2018.
21. Robotics Seminar, University of Michigan, Ann Arbor, MI, Nov 2018.
22. Seminar, Burke Neurological Institute / Cornell University, White Plains, NY, Oct 2018.
23. Keynote Speaker, “Continuously parameterizing the timing and task adaptations of human locomotion for the control of powered prosthetic legs,” *World Congress of Biomechanics*, Dublin, Ireland, July 2018.
24. *NIH High-Risk High-Reward Research Symposium*, National Institutes of Health, Bethesda, MD, June 2018.
25. Departmental Seminar, Mechanical Eng, University of North Carolina Charlotte, April 2018.
26. *WearRAcon*, Wearable Robotics Association, Scottsdale, AZ, March 2018.
27. GRASP Seminar, University of Pennsylvania, Philadelphia, PA, February 2018.
28. Controls Seminar, University of Michigan, Ann Arbor, MI, February 2018.
29. Keynote Speaker, “When Will Wearable Robots Enable Mobility in the Home and Community?”, *Bridging the Gap*, School of Occupational Therapy, Texas Woman's University, Denton, TX, Oct 2017.
30. Workshop on Human Movement Understanding for Humanoids and Wearable Robots, *IEEE Int Conf Intelligent Robots & Systems*, Vancouver, Canada, Sept 2017.
31. Workshop on Adaptive Control Methods in Assistive Technologies, *IEEE Int Conf Intelligent Robots & Systems*, Vancouver, Canada, Sept 2017.
32. *Annual Meeting of the Texas Chapter of the American Academy of Orthotists and Prosthetists*, Dallas, TX, Aug 2017.
33. Workshop on the Mechanics of Human Locomotion and the Development of Wearable Robotic Systems, *IEEE Int Conf Robotics & Automation*, Singapore, May 2017.
34. Graduate Seminar, Computer Science & Engineering, Texas A&M University, Feb 2017.
35. Advanced Platform Technology Center Lecture Series, Cleveland Clinic and Cleveland Department of Veteran Affairs, Dec 2016.
36. Departmental Seminar, Applied Physiology & Wellness, Southern Methodist Univ, Nov 2016.
37. Departmental Seminar, Mechanical Engineering, Vanderbilt University, Nov 2016.
38. Workshop on Assistive Robotic Devices for Dynamic Locomotion, *Robotics: Science & Systems*, Ann Arbor, MI, June 2016.
39. BME-RIC Seminar, Rehabilitation Institute of Chicago / Northwestern University, March 2016.
40. *WearRAcon*, Wearable Robotics Association, Phoenix, AZ, February 2016.
41. Robotics Seminar, Mechanical Engineering, Northwestern University, January 2016.
42. Departmental Seminar, Mechanical Engineering, University of Texas, Austin, TX, Sept 2015.
43. Exoskeleton Control Theory Sprint, Special Operations Command (SOCOM), Tampa, FL, July 2015.
44. Departmental Seminar, Mechanical Engineering, University of Washington, Seattle, WA, June 2015.
45. Keynote Speaker, “Innovation in Prosthetic and Orthotic Technology for Improved Healthcare,” *Health Research Alliance Meeting* (American Heart Association), Dallas, TX, March 2015.
46. Departmental Seminar, Physical Medicine & Rehabilitation, University of Texas Southwestern Medical Center, Dallas, TX, February 2015.
47. Departmental Seminar, Physical Medicine & Rehabilitation, Children's Medical Center of Dallas, Dallas, TX, January 2015.

48. Departmental Seminar, Aerospace & Mechanical Engineering, University of Notre Dame, Notre Dame, IN, January 2015.
49. Texas Biorobotics Workshop, *ASME Dyn Sys Control Conf*, San Antonio, TX, October 2014.
50. *Burroughs Wellcome Fund Scientific Interfaces Symposium*, San Diego, CA, October 2014.
51. Dynamic Locomotion Workshop, *Robotics: Science & Systems*, Berkeley, CA, July 2014.
52. Keynote Speaker, "Initial Steps from Robot Locomotion to High-Performance Prostheses and Orthoses," *Annual Meeting Texas Assoc Orthotists & Prosthetists*, Dallas, TX, Apr 2014.
53. Departmental Seminar, Mechanical Engineering, Michigan State University, East Lansing, MI, Mar 2014.
54. *Texas Systems Day*, Texas A&M University, College Station, TX, March 2014.
55. Departmental Seminar, Computer Science and Engineering, University of Texas at Arlington, Arlington, TX, February 2014.
56. Departmental Seminar, Electrical and Computer Engineering, University of Illinois at Chicago, Chicago, IL, February 2013.
57. Controls Seminar, Coordinated Science Lab, University of Illinois, Urbana, IL, Feb 2013.
58. Controls Seminar, University of Waterloo, Canada, May 2012.
59. Departmental Seminar, Bioengineering, University of Texas, Dallas, TX, February 2012.
60. Departmental Seminar, Institute of Automatic Control Engineering, Technical University of Munich, Germany, March 2011.
61. Departmental Seminar, Mechanical and Aerospace Engineering, University of Florida, Gainesville, FL, January 2011.
62. *Dynamic Walking Conference*, "Control and Planning with Asymptotically Stable Gait Primitives," Cambridge, MA, July 2010.
63. Workshop on 20 Years of Passivity-Based Control: Theory and Applications, *IEEE Conference on Decision and Control*, Shanghai, China, December 2009.

ADVISING AND MENTORING

Research Staff:

University of Michigan

1. Emily Klinkman, MS, Research Engineer, 2023-Present
2. Hannah Frame, MS, Research Engineer, 2021-2023
→ Nike Sport Research Lab
3. Vamsi Peddinti, MS, Research Engineer, 2018-2022
→ Embedded Systems Engineer, Micron Technology
4. Chris Nesler, MS, Research Engineer, 2016-2021
→ PhD student, University of Michigan

University of Texas at Dallas

5. Amanda Coldren, MPO (Northwestern), Research Orthotist, 2018
→ Prosthetics Resident, UT Southwestern Medical Center
6. Emma Reznick, BA (Colorado College), Postbaccalaureate Researcher, 2017-2018
→ PhD student, University of Michigan
7. Aaron Plauche, MS (UT Dallas), Research Engineer, 2015-2016
→ Mobile Robotics Design Engineer, Bastian Robotics
8. Yonatan Chatzinoff, BS (UT Dallas), Research Engineer, 2014-2015
→ UT Southwestern Medical Center

Postdoctoral Fellows:

University of Michigan

1. Ernesto Hernandez, PhD (U Illinois Chicago), Postdoc, 2024-Present
2. Nikhil Divekar, PhD (UMich), Postdoc, 2023-Present
3. Curt Laubscher, PhD (Cleveland State), Postdoc, 2022-Present
4. Gray Thomas, PhD (UT Austin), Postdoc → Research Investigator, 2019-2023
→ **Assistant Professor**, Texas A&M University
5. Jianping Lin, PhD (Michigan), Postdoc, 2021-2022
→ Postdoc, Shanghai Jiao Tong University
6. Cara Gonzalez Welker (Stanford), Postdoc, 2021-2022
→ **Assistant Professor**, University of Colorado, Boulder
7. Edgar Bolivar, PhD (UT Dallas), Postdoc, 2019-2021
→ **Assistant Professor**, University of Notre Dame

University of Texas at Dallas

8. Siavash Rezazadeh, PhD (University of Alberta), Research Scientist, 2015-2019
→ **Assistant Professor**, University of Denver
9. Alireza Mohammadi, PhD (University of Toronto), Postdoc, 2016-2018
→ **Assistant Professor**, University of Michigan—Dearborn
10. Anne Martin, PhD (Notre Dame), Postdoc, 2014-2015
→ **Assistant Professor**, Penn State University
11. Akshay Nanjangud, PhD (UC Davis), Postdoc, 2013-2015
→ **Faculty**, CMR Institute of Tech, India

PhD Students:

University of Michigan

1. C. Andrew Seelhoff (ME), Rackham Merit Fellow, 2023-present
2. Katharine Walters (ROB), NSF GRFP Fellow, 2022-present
3. Albert Lee (ROB), 2022-present
4. Duong Le (ROB), 2022-present (co-advised by Prof. Maani Ghaffari)
5. Jose Montes Perez (ROB), 2022-present
6. Emily Keller (ROB), NSF GRFP Fellow, 2021-present
7. Shihao Cheng (ROB), Rackham Predoctoral Fellow, 2021-present
8. Christopher Nesler (ROB), 2021-present (co-advised by Prof. Elliott Rouse)
9. Thomas Kevin Best (ROB), NSF GRFP Fellow, 2020-present (co-advised by Prof. Elliott Rouse)
10. Ross Cortino (ROB), 2020-present
11. Emma Reznick (PhD-ROB 2023), Dissertation: *Understanding Individuality in Human Locomotion for Configuring Powered Prosthetic Legs*
→ Postdoc, Hospital for Special Surgery
12. Nikhil Divekar (PhD-ROB 2023), Rackham Predoctoral Fellow, Dissertation: *Task-Invariant Control and Pre-clinical Validation of Partial Assist Exoskeletons*
→ Postdoc, University of Michigan
13. Jianping Lin (PhD-ROB 2021), Dissertation: *Optimal Task-Invariant Energetic Control for Powered Exoskeletons*
→ Postdoc, Shanghai Jiao Tong University

University of Texas at Dallas

14. Jonathan Horn (PhD-ME 2020), Dissertation: *Nonholonomic Virtual Constraints for Bipedal Locomotion*
→ Jacobs Engineering Group

15. Mark Yeatman (PhD-ME 2020), Dissertation: *Energy and Passivity Based Control for Bipedal and Assistive Walking Devices*
→ Senior Controls Engineer, OxeFit
16. Kyle Embry (PhD-ME 2020), Excellence in Education Fellow, Dissertation: *Kinematic Modeling for Control of Agile Powered Prosthetic Legs over Continuously Varying Speeds and Inclines*
→ **Research Assistant Professor**, Northwestern University and Shirley Ryan Ability Lab
17. Saurav Kumar (PhD-EE 2020, co-advised by Prof. Nicholas Gans), Dissertation: *Extremum Seeking Control for Autonomous Periodic Systems with Applications to Lower-Limb Wearable Robots*
→ Postdoc, Carnegie Mellon University
18. Hanqi Zhu (PhD-EE 2020), McDermott Graduate Fellow, Dissertation: *Design of a Highly Backdrivable, Powered Lower Limb Orthosis for Improved Human Interaction*
→ CEO/Founder, Enhanced Robotics
19. Toby Elery (PhD-ME 2020), Dissertation: *Design and Implications of a Robotic Prosthetic Leg with Low-Impedance Actuation*
→ Principal Mechanical Engineer, Toyota North America
20. David Allen (PhD-ME 2020, co-advised by Prof. Walter Voit), Excellence in Education Fellow, Dissertation: *Design Principles for Using Dielectric Elastomer Transducers in Actuation Systems*
→ Structural Engineer, Lockheed Martin
21. Edgar Bolivar (PhD-ME 2019), Dissertation: *Robust Energy-Efficient Design of Series Elastic Actuators*
→ Postdoc, University of Michigan → **Assistant Professor**, University of Notre Dame
22. Ge Lv (PhD-EE 2018), Louis Beecherl Jr. Graduate Fellow, Dissertation: *Energy Shaping Control of Powered Lower-Limb Exoskeletons for Assistance of Human Locomotion*
→ Postdoc, Carnegie Mellon University → **Assistant Professor**, Clemson University
23. David Quintero (PhD-ME 2018), Excellence in Education Fellow, Dissertation: *Virtual Constraint Control of Powered Prosthetic Legs: Unifying the Gait Cycle*
→ **Assistant Professor**, San Francisco State University
24. Dario Villarreal (PhD-BME 2017), Conacyt Graduate Fellow, Dissertation: *Investigations of a Unified Phase Variable in Human Locomotion for Applications in Powered Prostheses*
→ **Assistant Professor**, Southern Methodist University

MS Students Supported:

University of Michigan

1. Robbie Frei (ROB), NSF GRFP Fellow, 2022-present

University of Texas at Dallas

2. Aaron Plauché (MS-ME 2015), Thesis: *A Haptic Feedback System for Phase-Based Sensory Restoration in Above-Knee Prosthetic Leg Users* → Mobile Robotics Design Engineer, Bastian Robotics
3. Mohammad Taha Ahmad (MS-EE 2019) → Systems Control Engineer, Rheem Manufacturing
4. Ryan Little (MS-ME 2020), Thesis: *Manufacturing Methods for Medium-Volume Production of Planar Dielectric Elastomer Actuators* → Optex Systems, Inc.
5. Emma Reznick (MS-BME 2020), Thesis: *Individualizing a Powered Prosthetic Leg Over Continuously Varying Tasks* → PhD student, University of Michigan
6. Nikhil Divekar (MS-BME 2020) → PhD student, University of Michigan

Undergraduate Research Awardees:

University of Texas at Dallas

1. Kayla Shepodd (BS-ME), 2019 ECS Award → Mechanical Engineer, SpaceX
2. Sara Borboa (BS-ME), 2018 Clark Scholar and 2019 UTD Award
3. Maaz Mian (BS-BME), 2018 Clark Scholar

4. Mira Jambusaria (BS-ECE), 2017 National Merit LEADER Scholar
5. Maximillian Virani (BS-BME), 2017 National Merit LEADER Scholar
6. Caleb Ho (BS-ME), 2017 Clark Scholar
7. Zelig Barber (BS-BME), 2016 Clark Scholar
8. Jack Doan (BS-ECE), 2016 UTD Award → Engineer, Rockwell Collins
9. Rebecca Macaluso (BS-BME), 2015 and 2016 UTD Award → Analyst, Toyota North America
10. Daniel Lambert (BS-ECE), 2015 UTD Award and Fall 2016 ECS Award
11. Calvin Stence (BS-ME), 2015 Clark Scholar and Spring 2016 ECS Award
12. Rafi Ayub (BS-BME), 2014 UTD Award → Ph.D. student / NSF GRFP Fellow, Stanford University
13. Toby Elery (BS-ME), 2014 ECS Award → Ph.D. student, UT Dallas
14. Pritam Shah (BS-ME), 2013 UTD Award

Undergraduate Senior Design Teams:

University of Texas at Dallas

1. Variable Stiffness Ankle-Foot Orthosis, sponsor: UTD SERVICE Lab, 2018-19
2. Orthosis and Prosthesis Testing Device, sponsor: UTSW Medical Center, 2017-18
3. Enhanced Design of Robotic Leg, sponsor: UTD Locomotor Control Systems Lab, 2017-18
4. Wearable Ankle Orthosis, sponsor: Texas Instruments, 2015-2016
5. Multi-Degree-of-Freedom Ankle-Foot Orthosis, sponsor: UTSW Medical Center, 2015-2016
6. Wearable Rehabilitation Sensor, sponsor: UTSW/Rithmio, 2014-15 (**1st place project**)
7. Amputee Gait Hip Simulator, sponsor: UTD Locomotor Control Systems Lab, 2014-15
8. Cable-Driven Perturbation Mechanism, sponsor: UTSW Medical Center, 2014
9. Powered Transfemoral Prosthetic Leg, sponsor: UTD Locomotor Control Systems Lab, 2014
10. Upper Limb Prosthetic Simulator, sponsor: UTSW Medical Center, 2013

TEACHING EXPERIENCE

Instructor , University of Michigan	2019 – Present
ROB 501: Mathematics for Robotics (Graduate)	Fa19, Fa20
ROB 599: Robot Modeling and Control (Graduate)	Wn20
ROB 510/MECH/EECS 567: Robot Kinematics and Dynamics (Graduate)	Wn21, Wn22, Wn23
ROB 498: Robot Control (Undergraduate)	Wn24
ROB 415: Advanced Robot Control (Undergraduate)	Fa24

Instructor , University of Texas at Dallas	2013 – 2019
MECH 4310: Systems and Controls (Undergrad)	Sp18
BMEN 4310: Feedback Systems in Biomedical Engineering (Undergrad)	Fa15, Fa17, Fa18
BMEN 6372: Engineering Systems Modeling & Simulation (Graduate)	Sp15, Sp16, Sp17
MECH/EECS 6324: Robot Control (Graduate)	Fa14, Fa16, Sp19
MECH 2330: Dynamics (Undergrad)	Fa13

Co-Instructor , Elgersburg School on Nonlinear Control (short course) Institut für Mathematik, Technical University Ilmaneu, Elgersburg, Germany	Spring 2011
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Graduate Teaching Assistant , Introduction to Robotics University of Illinois, Urbana, IL	Fall 2008
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SCHOLARLY REVIEW

Grant Reviewer/Panelist	2014 – Present
NIH Director’s Early Independence Award Program (DP5)	2023
NIH Director’s New Innovator Award Program (DP2)	2022
NIH Musculoskeletal, Oral, and Skin Sciences: ZRGI MOSS-L (11) B (R41, R43, R44 awards)	2022
National Science Foundation	2021
NIH Musculoskeletal Rehabilitation Sciences (MRS) Study Section (R01 and R21 awards)	2020
National Science Foundation	2019
NIH Musculoskeletal Rehabilitation Sciences (MRS) Study Section (R01 and R21 awards)	2019
NIH Musculoskeletal, Oral, and Skin Sciences: ZRGI MOSS-V50R (R01 awards)	2019
NIH Musculoskeletal, Oral, and Skin Sciences: ZRGI MOSS-D82 (R15 awards)	2019
National Science Foundation	2017
National Science Foundation	2016
NIH NICHD: ZHDI DSR-K (12) I (SBIR R43/R44 awards)	2015
NIH NIBIB: ZEBI OSR-F (M2) S (K awards)	2014
National Science Foundation	2014

Scientific Program Committee Member, IEEE/RSJ Int Conf on Intelligent Robots & Systems 2022

Senior Editor, IROS Conference Paper Review Board 2020 – 2022

Program Committee Member, IEEE Conf on Decision and Control 2021

Associate Editor, IEEE Transactions on Robotics 2015 – 2019

Conference Editorial Board Member, IEEE Control Systems Society 2015 – 2018

Associate Editor (Conferences) 2013 – 2019

IEEE/ASME American Control Conf (2014-18), IEEE Conf Control Tech & Applications (2017), IEEE Conf Decision & Control (2016-18), IEEE Int Conf Robotics & Automation (2014-19), IEEE Int Conf Intelligent Robots & Systems (2013, 2015), ASME Dyn Sys Control Conf (2014-15)

Journal Reviewer 2007 – Present

Annals Biomed Eng, ASME J Applied Mechanics Reviews, ASME J Biomech Eng, ASME J Dyn Sys Meas Control, ASME J Mech Design, ASME J Med Devices, Automatica, Frontiers in Neurorobotics, Frontiers in Neuroscience, IEEE/ASME Trans Mechatronics, IEEE Access, IEEE Control Systems Mag, IEEE Robotics Automation Mag, IEEE Trans Automat Control, IEEE Trans Autom Sci & Eng, IEEE Trans Biomed Eng, IEEE Trans Control Sys Tech, IEEE Trans Medical Robotics & Bionics, IEEE Trans Robotics, IEEE Trans Neural Sys Rehab Eng, Int J Robotics Res, J Biomech, J Intelligent Service Robotics, J NeuroEng Rehab, Mechatronics, Opt Control App Meth, Physica D: Nonlinear Phenom, PLoS ONE, Proceedings of the National Academy of Sciences, Robotica, Science Robotics

Conference Reviewer 2007 – Present

Amer Control Conf, ASME Dyn Sys & Control Conf, IEEE Conf Aut Sci & Eng, IEEE Int Conf Biomed Rob & Biomechatron, IEEE Conf Control Tech & App, IEEE Conf Decision & Control, IEEE Conf Robotics Biomimetics, IEEE Int Conf Eng Med Bio Soc, IEEE Int Conf Humanoid Rob, IEEE Int Conf Intelli Rob & Sys, IEEE Int Conf Rehab Rob, IEEE Int Conf Rob & Aut, IEEE Multiconf Sys & Control, IFAC World Congress, Robotics: Sci & Sys

SCHOLARLY SERVICE

Program Chair, *IEEE/RSJ Int Conf on Intelligent Robots & Systems*, Detroit, MI 2023

Workshops Chair, *IEEE Conference on Control Technology & Applications*, Hawaii 2017

Invited Session Organizer/Chair/Co-Chair

1. Invited Session on Control Theory in Legged Locomotion, *American Control Conf*, 2019
2. Invited Session on Robotic Locomotion Control, *IEEE Conf Control Tech App*, 2017
3. Invited Session on Control Theory in Legged Locomotion, *American Control Conf*, 2016
4. Invited Session on Rehabilitation Robots, *ASME Dyn Sys Control Conf*, 2015 – 2017
5. Invited Session on Control Theory in Medical Rehabilitation, *American Control Conf*, 2014

Workshop Organizer/Chair/Co-Chair

1. State of the Art in Robotic Leg Prostheses: Where We Are and Where We Want to Be, *IEEE Int. Conf. Intelligent Robots and Systems*, 2023
2. State of the Art in Robotic Leg Prostheses: Where We Are and Where We Want to Be, *IEEE Int. Conf. Intelligent Robots and Systems*, 2020
3. Workshop on Extremum Seeking Control in Biomedical Applications, *American Control Conf.*, 2020
4. Texas Bio-Robotics Workshop, *ASME Dynamic Systems & Control Conf.*, 2014
5. Symposium on Control and Modeling of Biomedical Systems, University of Illinois, Urbana, IL, 2010

Meeting Participant

1. National Robotics Initiative Principal Investigator Meeting, Washington, DC, 2016-2021
2. National Academy of Engineering Workshop on Future of Center-Based, Multidisciplinary Engineering Research, Washington, DC, April 2016
3. CCC Workshop on the U.S. National Robotics Roadmap, San Francisco, CA, March 2016
4. U.S. Special Operations Command Exoskeleton Control Theory Sprint, Tampa, FL, 2015

Co-Chair, Technical Committee Manufacturing Automation & Robotic Control 2013 – 2014
IEEE Control Systems Society

UNIVERSITY SERVICE

Graduate Chair, Robotics Institute, University of Michigan 2020 – 2022

Graduate Co-Chair, Robotics Institute, University of Michigan 2019 – 2020

Committee Member, University of Michigan, Ann Arbor, MI 2019 – Present
Robotics: Graduate Academics (2019-22), Executive Committee (2023-present, 2020-22), Search (2023)
Electrical & Computer Engineering: Graduate Academics (2019-20), PhD Admissions Recruiting (2019-20)

Committee Member, University of Texas at Dallas, Richardson, TX 2013 – 2019
Bioengineering: Faculty Search (2013-15), Graduate Recruiting (2014-17), Seminars (2016-18)
Mechanical Engineering: Faculty Search (2017-18), Graduate (2013-14), DSC Area (2013-19)
School of ECS: Executive Council (2018-19)
University: ECS Dean Search (2018-19), Core Facilities (2015)

Graduate Representative, Academic Senate Executive Committee 2008 – 2010

University of Illinois, Urbana, IL

INDUSTRY EXPERIENCE

Intern , The Boeing Company (Phantom Works)	Summer 2008
Intern , SANYO Technology Center, San Jose, CA	Summer 2006
Intern , Hewlett-Packard OuterBay Technologies, Cupertino, CA	Summer 2004

TRAINING AND CERTIFICATIONS

- Certificate Series in Research Administration, University of Texas at Dallas, 2015
- NIH Responsible Conduct of Research (RCR) Training, Northwestern University, 2011

PROFESSIONAL MEMBERSHIPS

- Senior Member, Institute of Electrical & Electronics Engineers (IEEE)
 - Robotics & Automation Society
 - Control Systems Society
 - Engineering in Medicine & Biology Society