

University of Massachusetts Lowell

Comprehensive Professional Vitae

Date: Oct. 5, 2023

NAME: Tingshu Hu

Department: Electrical and Computer Engineering

College: Engineering

Rank: Professor

Fields: Control Systems, Power Electronics, Energy Systems

A. Education and Academic Qualifications

1. Education

- 2001 **Ph.D** in Electrical & Computer Engineering, University of Virginia
- 1988 **MS** in Electrical Engineering, Shanghai Jiao Tong University, China
- 1985 **BS** in Electrical Engineering, Shanghai Jiao Tong University, China

2. Academic Experience

- Sept. 2013- **Professor**, Dept. of Electrical & Computer Engineering
University of Massachusetts Lowell
- 2008-2013 **Associate Professor**, Dept. of Electrical & Computer Engineering
University of Massachusetts Lowell
- 2005-2008 **Assistant Professor**, Dept. of Electrical & Computer Engineering
University of Massachusetts Lowell
- 2004 **Postdoctoral Researcher**, Dept. of Electrical & Computer Engineering
University of California, Santa Barbara
- 2001-2004 **Research Associate**, Dept. of Electrical Engineering
University of Virginia
- 2000 **Graduate Teaching Assistant** Dept. of Electrical Engineering
University of Virginia
- 1999-2000 **Graduate Research Assistant**, Dept. of Electrical Engineering

	University of Virginia
1995-1996	Visiting Scholar , Dept. of Electrical and Electronic Engineering Hong Kong University of Science and Technology, China
1988-1997	Lecturer , Dept. of Automation Shanghai Jiao Tong University, China

B. Professional Activities

1. Professional Association Participation

a. Membership and Services

- 2013-2016 Chair, IEEE Boston Section Control Systems Society
- 2001- Senior Member, Institute of Electrical and Electronics Engineers (IEEE)
- 2005- Member, Sigma XI

b. Services on Editorial Board

- 2014- Associate Editor, Automatica
- 2018 Associate Editor, American Control Conference
- 2001-2006 Associate Editor, Conference Editorial Board of the IEEE Control Systems Society

c. Reviewer for Journals

- Automatica
- IEEE Transactions on Automatic Control
- IEEE Transactions on Circuits and Systems
- IEEE Transactions on Control Systems Technology
- IEEE Transactions on Power Electronics
- IEEE Transactions on Industrial Electronics
- Journal of Power Sources
- International Journal on Robust and Nonlinear Control
- Nano Energy
- Systems & Control Letters
- ASME Journal of Dynamic Systems, Measurement and Control
- International Journal of Control

d. Reviewer for Conferences

- IEEE Conference on Decision and Control
- American Control Conference
- IEEE Conference on Control Applications
- IEEE Multi-conference on Systems and Control

e. Session Chair for Conferences

- 2020 63rd IEEE International Midwest Symposium on Circuits and Systems, Aug 9-12, 2020.
- 2014 American Control Conference
- 2011 American Control Conference
- 2009 American Control Conference
- 2008 IEEE Conference on Decision and Control
- 2007 American Control Conference
- 2006 American Control Conference
- 2004 American Control Conference
- 2004 IEEE Conference on Decision and Control
- 2001 IEEE Conference on Decision and Control
- 2000 IEEE Conference on Decision and Control

f. Grant Proposal Review Panel

- 2022 NSF grant proposal review: Energy, Power, Control and Networks, Mar 31 -Apr. 1
- 2015 NSF grant proposal review panel: CMMI - Control Systems, May 19, 2015 2014*
NSF grant proposal review panel: Energy, Power and Adaptive Systems, April 17-18, 2014
- 2013 NSF grant proposal review panel: Energy, Power and Adaptive Systems, July24-25,
- 2011 NSF grant proposal review panel: Energy, Power and Adaptive Systems, March 17-18, 2011
- 2010 NSF grant proposal review panel: Power, Control and Adaptive Networks
- 2008 NSF grant proposal review panel: Power, Control and Adaptive Networks
- 2007 NSF grant proposal review panel: Power, Control and Adaptive Networks

2. Professional Honors and Awards

- 2007 **Teaching Excellence Awards**, Department of Electrical and Computer Engineering, University of Massachusetts Lowell.

C. Research**1. Grants and Contracts**

- 2022 Toward self-powered systems: Power management for nanogenerators, submitted to NSF, *Declined*.
- 2018 *Low cost high performance LED drivers based on self-oscillating power converters*
OTCV Technology Development Fund FY19 (finalist, not funded).
- 2012 *Control design of power electronic interfaces for optimal performance of renewable energy systems (as sole PI)*,
National Science Foundation, September, 2012 - August, 2015. \$372,409.

2009	<i>Analysis of Nonlinear Oscillations via Lyapunov Approach</i> (as sole PI), National Science Foundation, September, 2009 - August, 2013.	\$286,824
2007	<i>Research experience for undergraduates</i> (as sole PI), National Science Foundation. May - August, 2007	\$6,000
2006	<i>Nonlinear/Switching Control Design for Constrained Control Systems with Application to Magnetic Suspension</i> (as sole PI). National Science Foundation, September, 2006 - August, 2009.	\$240,000
2003	<i>A Generalized Absolute Stability Approach to Dealing with Saturation Nonlinearities: Analysis, Design and Applications to Magnetic Bearing Systems</i> (as co PI). National Science Foundation, September, 2003 - August, 2006	\$350,000
2002	<i>A Continuous Flow Centrifugal Ventricular Assist Device</i> (as co PI) Utah Artificial Heart Institute, October, 2002 - August, 2003	\$385,151

2. Publications

a. Books

2001 **T. Hu** and Z. Lin, *Control Systems with Actuator Saturation: Analysis and Design*, Birkhäuser, Boston, July, 2001. (ISBN: 0-8176-4219-6). (392 pages)

b. Chapters in Book

2023 T Hu, H Wang, D Bamgboje, W Harmon, "Power Management Systems for Triboelectric Nanogenerators", In Handbook of Triboelectric Nanogenerators (pp. 1-34), Springer International Publishing, 2023.

2007 D. Dai, **T. Hu**, A. R. Teel and L. Zaccarian, "Case studies on the control of input-constrained linear plants via output feedback containing an internal deadzone loop," in *Lecture notes in control and information sciences*, Springer, Berlin, 2007.

2005 R. Goebel, **T. Hu** and A. R. Teel, "Dual matrix inequalities in stability and performance analysis of linear differential/difference inclusions," in *Current Trends in Nonlinear Systems and Control*, Birkhäuser, pp. 103-122, 2005.

2002 **T. Hu**, A. N. Pitsillides and Z. Lin, "Null controllability and stabilization of linear systems subject to asymmetric actuator saturation," in *Actuator Saturation Control*, eds., V. Kapila and K.M. Grigoriadis, Dekker, pp. 47-76, 2002.

c. Refereed Journal Publications (published/accepted)

2022 **T. Hu**, H. Wang, W. Harmon, D. Bamgboje, Z.L. Wang, "Recent progress of power management for triboelectric nanogenerators," *IEEE Transaction on Power Electronics*, Vol. 37, No. 8, pp. 9850-9864, 2022. (IF 6.153).

2021 W. Harmon, H. Guo, D. Bamgboje, **T. Hu** and Z. L. Wang, "Timing strategy for boosting energy extraction from triboelectric nanogenerators," *Nano Energy*, 85, p.105956, 2021. (IF 17.881)

2021 M. Tahan, D. O. Bamgboje, and **T. Hu**, "Compensated Single Input Multiple Output Flyback Converter," *Energies*, 14(11), p.3009, 2021.

- 2020 W. Harmon, D. Bamgboje, H. Guo, T. Hu and Z.L. Wang, "Self-driven power management system for triboelectric nanogenerators," *Nano Energy*. May 1. 71, 104642, 2020.
- 2019 D. Bamgboje, W. Harmon, M. Tahan, and T. Hu. "Low Cost High Performance LED Driver Based on a Self-Oscillating Boost Converter." *IEEE Transactions on Power Electronics* 34, no. 10 (2019): 10021-10034.
- 2017 M. Tahan and T. Hu, "Multiple String LED Driver with Flexible and High Performance PWM Dimming Control," *IEEE Transactions on Power Electronics*, vol. 32, No.12, pp. 9293-9306, 2017.
- 2015 L. Devarakonda and **T. Hu**, "Effects of rest time on discharge response and equivalent circuit model for a lead-acid battery," *Journal of Power Sources*, 282, pp. 19-27, 2015.
- 2014 L. Devarakonda and **T. Hu**, "Algebraic method for parameter identification of circuit models for batteries under non-zero initial condition." *Journal of Power Sources*, 268, pp. 928-940, 2014.
- 2014 H. Jung, H. Wang and **T. Hu**, "Control design for robust tracking and smooth transition in power systems with battery/supercapacitor hybrid energy storage devices," *Journal of Power Sources*, 267, pp. 566-575, 2014.
- 2013 **T. Hu**, H. Jung, "Simple algorithms for determining parameters of circuit models for charging/discharging batteries," *Journal of Power Sources*, 233, pp. 14-22, 2013.
- 2013 H. Pham, H. Jung, **T. Hu**, "A state-space approach to modeling and ripple reduction in AC - DC converters," *IEEE Trans. Control Systems Tech.*, 21(5), pp. 1949-1956, 2013.
- 2011 **T. Hu**, H. Jung, "Estimation of magnitude of self-induced oscillations via piece-wise quadratic Lyapunov functions," *IEEE Trans. Circuits and Systems I*, 58(12), pp.2872 - 2881, Dec. 2011.
- 2011 **T. Hu**, B. Zanchi, J. Zhao, "Simple analytical method for determining parameters of discharging batteries," *IEEE Trans. Energy Conversion*, 26(3), pp.787-798, Sept. 2011.
- 2011 Y. Yao, F. Fassinou, **T. Hu**, "Stability and robust regulation of battery driven boost converter with simple feedback," *IEEE Trans. Power Electronics*, 26(9), pp.2614-2626, Sept. 2011.
- 2011 **T. Hu**, "A nonlinear system approach to analysis and design of power electronic converters with saturation and bilinear terms," *IEEE Trans. Power Electronics*, 26(2), pages 399-410, 2011.
- 2010 **T. Hu**, T. Thibideau and A. R. Teel, "A unified Lyapunov approach to analysis of oscillations and stability for systems with piecewise linear elements," *IEEE Transactions on Automatic Control*. 55(12), pages 2864-2869, 2010.
- 2010 **T. Hu** and F. Blanchini, "Non-conservative matrix inequality conditions for stability/stabilizability of linear differential inclusions," *Automatica*, 46(1), pp.190- 196, Jan. 2010.
- 2009 D. Dai, **T. Hu**, A. R. Teel and L. Zaccarian, "Output feedback design for saturated linear plants using deadzone loops," *Automatic*, 45(12), pages 2917-2924, Dec. 2009.
- 2009 M. Massimetti, L. Zaccarian, **T. Hu**, and A. R. Teel, "Linear discrete-time global and regional anti-windup: an LMI approach," *Int. J. of Control*, 82(12), pages 2179 - 2192, Dec. 2009.

- 2009 T. Thibodeau, W. Tong, and **T. Hu**, "Set invariance and performance analysis of linear systems via truncated ellipsoids," *Automatica*, 45(9), Pages 2046-2051, Sept. 2009.
- 2009 D. Dai, **T. Hu**, A. R. Teel and L. Zaccarian, "Piecewise-quadratic Lyapunov functions for systems with deadzones or saturations," *Systems & Control Letters*, 58(5), pp. 365-371, May 2009.
- 2008 **T. Hu**, L. Ma and Z. Lin, "Stabilization of switched systems via composite quadratic functions," *IEEE Transactions on Automatic Control* 53(11), pp. 2571-2585, Dec. 2008.
- 2008 **T. Hu**, A. R. Teel and L. Zaccarian, "Anti-windup synthesis for linear control systems with input saturation: Achieving regional, nonlinear performance," *Automatica*, 44(2), pp. 512-519, Feb. 2008.
- 2008 Z. Lin, M. Glauser, **T. Hu**, P. E. Allaire, "Magnetically suspended balance beam with disturbances: a test rig for non-linear output regulation," *International Journal of Advanced Mechatronic Systems*, 1(1), pp. 2-9, Jan. 2008.
- 2007 **T. Hu** and A. R. Teel, "Characterization of forced vibration for difference inclusions: A Lyapunov approach," *IEEE Transactions on Circuits and Systems - Part I: Fundamental Theory and Applications*, pp. 1367-1379, 54(6), 2007.
- 2007 **T. Hu**, "Nonlinear control design for linear differential inclusions via convex hull of quadratics," *Automatica*, 43(4), pp. 685-692, 2007.
- 2006 **T. Hu**, A. R. Teel and L. Zaccarian, "Stability and performance for saturated systems via quadratic and non-quadratic Lyapunov functions," *IEEE Transactions on Automatic Control*, 51(11), pp. 1770-1786, 2006.
- 2006 R. Goebel, A.R. Teel, **T. Hu** and Z. Lin, "Conjugate convex Lyapunov functions for dual linear differential equations," *IEEE Transactions on Automatic Control*, 51(4), pp. 661-666, 2006.
- 2005 **T. Hu**, Z. Lin, W. Jiang and P. Allaire, "Constrained control design for magnetic bearing systems," *ASME Journal of Dynamic Systems, Measurement and Control*, 127(4), pp. 601-616, 2005. (with address at Umass Lowell)
- 2005 **T. Hu**, R. Goebel, A. R. Teel and Z. Lin, "Conjugate Lyapunov functions for saturated linear systems," *Automatica*, 41(11), pp. 1949-1956, 2005. (with address at Umass Lowell)
- 2005 **T. Hu**, A.R. Teel and Z. Lin, "Lyapunov characterization of forced oscillations," *Automatica*, 41(10), pp. 1723-1735, 2005. (with address at Umass Lowell)
- 2005 **T. Hu** and Z. Lin, "Absolute stability analysis of discrete-time systems with composite quadratic Lyapunov functions," *IEEE Transactions on Automatic control*, 50(6), pp. 781-798, 2005. (with address at Umass Lowell)
- 2005 **T. Hu** and Z. Lin, "Convex analysis of invariant sets for a class of nonlinear systems," *Systems & Control Letters*, 54(8), pp. 729-737, 2005.
- 2004 **T. Hu** and Z. Lin, "Output regulation of linear systems with bounded continuous feedback," *IEEE Transactions on Automatic control*, 49(11), pp. 1941-1953, 2004.
- 2004 **T. Hu**, B. Huang and Z. Lin, "Absolute stability with a generalized sector condition," *IEEE Transactions on Automatic Control*, Vol. 49, pp. 535-548, 2004.
- 2004 **T. Hu**, Z. Lin and P. Allaire, "Power-loss reduction by optimizing current allocation in magnetic bearings," *IEEE Transactions on Magnetics*, 40(5), pp. 1625-1635, 2004.

- 2004 H. Fang, Z. Lin and **T. Hu**, “Analysis and control design of linear systems in the presence of actuator saturation and L2-disturbances,” *Automatica*, 40(7), pp. 1229-1238, 2004.
- 2004 **T. Hu**, Z. Lin and J. Lam, “A unified gradient approach to performance optimization under pole assignment constraint”, *Journal of Optimization Theory and Applications*, July, 2004.
- 2004 **T. Hu** and Z. Lin, “Properties of the composite quadratic Lyapunov functions,” *IEEE Transactions on Automatic Control*, 49(7), pp.1162-1167, 2004.
- 2004 **T. Hu** and Z. Lin, “Controlled invariance of ellipsoids: linear vs nonlinear feedback,” *Systems & Control Letters*, 53, pp. 203-210, 2004.
- 2003 **T. Hu**, Z. Lin and Y. Shamash, “On maximizing the convergence rate for linear systems with input saturation,” *IEEE Transactions on Automatic Control*, 48(7), pp. 1249-1253, 2003.
- 2003 **T. Hu** and Z. Lin, “On the tightness of a recent set invariance condition under actuator saturation,” *Systems & Control Letters*, 49(5), pp. 389-399, 2003.
- 2003 **T. Hu** and Z. Lin, “Composite quadratic Lyapunov functions for constrained control systems,” *IEEE Transactions on Automatic Control*, 48(3), pp. 440-450, March 2003.
- 2002 **T. Hu** and Z. Lin, “Output regulation of general discrete-time linear systems with saturation nonlinearities,” *Int. J. of Robust and Nonlinear Control*, 12(13), pp. 1129-1143, 2002.
- 2002 **T. Hu**, D. Miller and L. Qiu, “Null controllable region of LTI discrete-time systems with input saturation,” *Automatica*, 38(11), pp. 2009-2013, 2002.
- 2002 **T. Hu** and Z. Lin, “On improving performances with continuous feedback laws,” *IEEE Transactions on Automatic Control*, 47(9), pp. 1570-1575, 2002.
- 2002 **T. Hu**, Z. Lin and L. Qiu, “An explicit description of the null controllable regions of linear systems with saturating actuators,” *Systems & Control Letters*, 47(1), pp. 65-78, 2002.
- 2002 **T. Hu** and Z. Lin, “On semi-global stabilizability of anti-stable systems by saturated linear feedback,” *IEEE Transactions on Automatic Control*, 47(7), pp. 1193- 1198, 2002.
- 2002 **T. Hu** and Z. Lin, “Exact characterization of invariant ellipsoids for linear systems with saturating actuators,” *IEEE Transactions on Automatic Control*, 47(1), pp. 164-169, 2002.
- 2002 **T. Hu**, Z. Lin and B. M. Chen, “An analysis and design method for linear systems subject to actuator saturation and disturbance,” *Automatica*, 38(2), pp. 351-359, 2002.
- 2002 **T. Hu**, Z. Lin and B. M. Chen, “Analysis and design for linear discrete-time systems subject to actuator saturation,” *Systems & Control Letters*, 45(2), pp. 97- 112, 2002.
- 2002 Y. Y. Cao, Z. Lin and **T. Hu**, “Stability analysis of linear time-delay systems subject to actuator saturation,” *IEEE Transactions on Circuits and Systems - Part I: Fundamental Theory and Applications*, 49(2), pp. 233-240, 2002.
- 2001 **T. Hu**, Z. Lin and Y. Shamash, “Semi-global stabilization with guaranteed regional performance of linear systems subject to actuator saturation,” *Systems & Control Letters*, 43(3), pp. 203-210, 2001.
- 2001 Z. Lin and **T. Hu**, “Semi-global stabilization of linear system subject to output

- saturation,” *Systems & Control Letters*, 43(3), pp. 211-217, 2001.
- 2001 **T. Hu** and Z. Lin, “A complete stability analysis of planar discrete-time linear systems under saturation,” *IEEE Transactions on Circuits and Systems - Part I: Fundamental Theory and Applications*, 48(6), pp. 710-725, 2001.
- 2001 **T. Hu**, Z. Lin and L. Qiu, “Stabilization of exponentially unstable linear systems with saturating actuators,” *IEEE Transactions on Automatic Control*, 46(6), pp. 973-979, 2001.
- 2001 **T. Hu** and Z. Lin, “Practical stabilization of exponentially unstable linear systems subject to actuator saturation nonlinearity and disturbance,” *Int. J. of Robust and Nonlinear Control*, 11, pp. 555-588, 2001.
- 2000 **T. Hu** and Z. Lin, “On enlarging the basin of attraction for linear systems undersaturated linear feedback,” *Systems & Control Letters*, 40(1), pp. 59-69, 2000.
- 2000 **T. Hu** and Z. Lin, “A complete stability analysis of planar linear systems under saturation,” *IEEE Transactions on Circuits and Systems I: Fundamental Theory and Applications*, 47(4), pp. 498-512, 2000.
- 1999 J. Lam, W.-Y. Yan, and **T. Hu**, “Pole assignment with eigenvalue and stability robustness,” *Int. J. Control*, 72(13), pp. 1165-1174, 1999.
- 1999 **T. Hu** and J. Lam, “Improvement of parametric stability margin under pole assignment,” *IEEE Transactions on Automatic Control*, 44(10), pp. 1938-1942, 1999.
- 1998 **T. Hu** and J. Lam, “On optimizing performance indices with pole assignment constraints,” *Proceedings of IME Part I – Journal of Systems and Control Engineering*, 212, pp. 327-337, 1998.
- 1998 T. Hu and L. Qiu, “On structured perturbation of Hermitian matrices,” *Linear Algebra and Its Applications*, Vol. 275-276, pp. 287-314, 1998.
- 1998 **T. Hu** and L. Qiu, “Controllable regions of linear systems with bounded inputs,” *Systems & Control Letters*, 33, pp. 55-61, 1998.
- 1997 **T. Hu** and L. Qiu, “Complex and real performance radii and their computation,” *Int. J. of Robust and Nonlinear Control*, 7, pp. 187-209, 1997.

d. Refereed Conference Publications

- 2021 D. Bamgboje, W. Harmon and **T. Hu**, “Low Cost Diode-blocked Self-oscillating Boost Converter,” In *IEEE Applied Power Electronics Conference and Exposition (APEC)* (pp. 1854-1858), June 2021
- 2021 D. Bamgboje, W. Harmon and **T. Hu**, “Self-oscillating Buck Converter LED Driver with Indirect Inductor Current Reconstruction,” In *IEEE Applied Power Electronics Conference and Exposition (APEC)* (pp. 1375-1379), June 2021.
- 2018 M. Tahan, D. Bamgboje and T. Hu, “Flyback-based multiple output dc-dc converter with independent voltage regulation,” *IEEE Int. Sym. on Power Electronics for Distributed Generation Systems*, 2018.
- 2018 M. Tahan, D. Bamgboje and T. Hu, “Hybrid control system in an efficient LED driver,” American Control Conference, June 2018.

- 2017 M. Tahan and T. Hu, "High performance multiple string LED driver with flexible and wide range PWM dimming capability," *Applied Power Electronics Conference*, March 2017.
- 2016 H. Wang, M. Tahan, and T. Hu, "Effects of rest time on equivalent circuit model for a Li-ion battery," *American Control Conference*, Boston, July 2016.
- 2015 L. Devarakonda, **T. Hu**, "Effects of rest time on discharge response and equivalent circuit model for Li-ion batteries," *4rd International Symposium on Energy Challenges & Mechanics*, Aberdeen, United Kingdom, August 11-14, 2015.
- 2015 M. Tahan, **T. Hu**, "Speed-sensorless vector control of surface-mounted PMS motor based on modified interacting multiple model EKF," *IEEE Int. Electric Machines & Drives Conf. (IEMDC)*, Coeur d'Alene, Idaho, May 10-13, 2015.
- 2014 L. Devarakonda, H. Wang, **T. Hu**, "Parameter identification of circuit models for lead-acid batteries under non-zero initial conditions," *American Control Conference*, Portland, OR, June 2014.
- 2014 F. Fassinou, H. Wang, L. Devarakonda **T. Hu**, "Observer-based method for reduction of dc-link voltage ripple in two-stage boost inverters," *American Control Conference (ACC)*, Portland, OR, June 2014.
- 2013 H. Jung, C. Conficoni, A. Tilli, **T. Hu**, "Modeling, simulation and control design for power systems driven by battery/supercapacitor hybrid energy storage devices," *American Control Conference*, Washington DC, June, 2013.
- 2010 D. Dai, T. Hu, A. R. Teel, L. Zaccarian, "Output Feedback Synthesis for Sampled-Data System with Input Saturation," *American Control Conference*, 2010.
- 2009 T. Hu, T. Thibodeau and A. R. Teel, "Analysis of oscillation and stability for systems with piecewise linear components via saturation functions," *American Control Conference*, St. Louis, 2009.
- 2009 T. Thibodeau, and T. Hu, "Analysis of linear systems using truncated ellipsoids," *American Control Conference*, St. Louis, 2009.
- 2008 T. Hu, F. Blanchini, "Polyhedral functions, composite quadratic functions, and equivalent conditions for stability/stabilization," *IEEE Conference on Decision and Control*, pp. 5432-5437, Cancun, Mexico, 2008.
- 2008 T. Hu, "Nonlinear Feedback Laws for Practical Stabilization of Systems with Input and State Constraints," *IEEE Conference on Decision and Control*, pp. 3481- 3486, Cancun, Mexico, 2008.
- 2008 D. Dai, R.G. Sanfelice, T. Hu, A.R. Teel, "Analysis of hybrid systems resulting from relay-type hysteresis and saturation: a Lyapunov approach," *IEEE Conference on Decision and Control*, pp. 2764-2769, Cancun, Mexico, 2008.
- 2008 W. Tong, T. Hu, "Improving performance analysis with structures of outputs and constraints," *American Control Conference*, pp. 1092-1097, Seattle, WA, 2008.
- 2007 **T. Hu**, L. Ma and Z. Lin, "Active vibration control for uncertain time-varying systems via output feedback," *American Control Conference*, New York, pp. 5583- 5588, 2007.

- 2007 **T. Hu**, "Switching law construction for discrete-time systems via composite quadratic functions," *American Control Conference, New York*, pp. 675-680, 2007.
- 2007 *D. Dai, T. Hu, A. R. Teel and L. Zaccarian*, "Analysis of systems with saturation/deadzone via piecewise-quadratic Lyapunov functions," *American Control Conference, New York*, pp. 5822-5827, 2007.
- 2006 **T. Hu**, *L. Ma and Z. Lin*, "On several composite quadratic Lyapunov functions for switched systems," *IEEE Conference on Decision and Control, San Diego, CA*, pp. 113-118, 2006.
- 2006 *M. Massimetti, L. Zaccarian, T. Hu, A. R. Teel*, "LMI-based linear anti-windup for discrete time linear control systems," *IEEE Conference on Decision and Control, San Diego, CA*, pp. 6173-6178, 2006.
- 2006 *D. Dai, T. Hu, A. R. Teel, L. Zaccarian*, "Control of saturated linear plants via output feedback containing an internal deadzone loop," *American Control Conference*, pp. 5239-5244, *Minneapolis, MN, June*, 2006.
- 2004 **T. Hu**, *Z. Lin, M. Abel and P. Allaire*, "Human gait modeling: dealing with holonomic constraints," *The 2004 American Control Conference*, pp. 2296-2231, 2004.
- 2002 **T. Hu**, *Z. Lin, W. Jiang and P. Allaire*, "Control of balance beam with magnetic bearings: a linear model approach," *The 8th International Symposium on Magnetic Bearings*, pp. 181-185, *Japan, August*, 2002.
- 2001 **T. Hu**, *Z. Lin, B. Huang, P. Allaire*, "On minimum current biasing and control design for a balanced beam suspended on magnetic bearings," *Proceedings of the 6th International Symposium on Magnetic Suspension Technology (ISMST)*, pp. 410-415, *Turin, Italy, October*, 2001.

d. Patent

1. M. Tahan and T. Hu, "Multichannel LED driver circuitry and dimming method," UML 2017-028, June 2017.

e. Impact of Published Works

The theoretical and computational tools developed in some of the research works have been widely used by researchers. As of Mar. 3, 2022, my total google scholar citation is **7366**. The following are some of the most cited works by google scholar.

- 2001 **T. Hu** and *Z. Lin*, *Control Systems with Actuator Saturation: Analysis and Design*, Birkhäuser, Boston, July, 2001. (ISBN: 0-8176-4219-6). (392 pages) Number of times cited, **1549**.
- 2002 **T. Hu**, *Z. Lin and B. M. Chen*, "An analysis and design method for linear systems subject to actuator saturation and disturbance," *Automatica*, 38(2), pp. 351-359, 2002. Number of times cited, **878**.
- 2003 **T. Hu** and *Z. Lin*, "Composite quadratic Lyapunov functions for constrained control systems," *IEEE Transactions on Automatic Control*, 48(3), pp. 440-450, March 2003. Number of times cited, **318**.

- 2002 **T. Hu**, Z. Lin and B. M. Chen, “Analysis and design for linear discrete-time systems subject to actuator saturation,” *Systems & Control Letters*, 45(2), pp. 97- 112, 2002. Number of times cited, **506**.
- 2002 Y. Y. Cao, Z. Lin and **T. Hu**, “Stability analysis of linear time-delay systems subject to actuator saturation,” *IEEE Transactions on Circuits and Systems - Part I: Fundamental Theory and Applications*, 49(2), pp. 233-240, 2002. Number of times cited, **266**.
- 2004 H. Fang, Z. Lin and **T. Hu**, “Analysis and control design of linear systems in the presence of actuator saturation and L2-disturbances,” *Automatica*, 40(7), pp. 1229-1238, 2004. Number of times cited, **243**.

The following two are the most cited works published after joining Umass Lowell.

- 2006 **T. Hu**, A. R. Teel and L. Zaccarian, “Stability and performance for saturated systems via quadratic and non-quadratic Lyapunov functions,” *IEEE Transactions on Automatic Control*, 51(11), pp. 1770-1786, 2006. Number of times cited, **272**.
- 2008 **T. Hu**, A. R. Teel and L. Zaccarian, “Anti-windup synthesis for linear control systems with input saturation: Achieving regional, nonlinear performance,” *Automatica*, 44(2), pp. 512-519, Feb. 2008. Number of times cited, **212**.
- 2008 **T. Hu**, L. Ma and Z. Lin, “Stabilization of switched systems via composite quadratic functions,” *IEEE Transactions on Automatic Control* 53(11), pp. 2571- 2585, Dec. 2008. Number of times cited, **130**.
- 2007 **T. Hu**, “Nonlinear control design for linear differential inclusions via convex hull of quadratics,” *Automatica*, 43(4), pp. 685-692, 2007. Number of times cited, **93**.

D. Instruction Related Activities

1. Teaching

a. Courses taught at Umass Lowell

Semester	Course Number	Course Title	Enrollment	Level
Spring 2023	EECE2010	Introductory Circuit Theory I (lecture)	46	U
	EECE2010	Introductory Circuit Theory I (recitation)	27	U
Fall 2022	EECE2010	Introductory Circuit Theory I (lecture)	96	U

Semester	Course Number	Course Title	Enrollment	Level
Spring 2022	EECE2010	Introductory Circuit Theory I	36	U
	EECE2010	Introductory Circuit Theory I	15	U
Fall 2021	EECE2010	Introductory Circuit Theory I	96	U
	EECE2010	Introductory Circuit Theory I	20	U
	EECE5130	Control Systems	14	G
Spring 2021	EECE2010	Introductory Circuit Theory I	67	U
	EECE2010	Introductory Circuit Theory I	28	U
	EECE2010	Introductory Circuit Theory I	20	U
Fall 2020	EECE2010	Introductory Circuit Theory I	139	U
	EECE5130	Control Systems	13	3
Spring 2020	EECE2010	Introductory Circuit Theory I	69	U
Fall 2019	EECE2010	Introductory Circuit Theory I	153	U
	EECE5310	Control Systems	13	G
Spring 2019	EECE2010	Introductory Circuit Theory I	58	U
Fall 2018	EECE2010	Introductory Circuit Theory I	118	U
	EECE5130	Control Systems	12	G
Spring 2018	EECE2010	Introductory Circuit Theory I	72	U
Fall 2017	EECE2010	Introductory Circuit Theory I	134	U
	EECE5130	Control Systems	19	G
Spring 2017	EECE2010	Introductory Circuit Theory I	85	U
	EECE2010	Introductory Circuit Theory I	29	U
Fall 2016	EECE2010	Introductory Circuit Theory I	132	U
	EECE5130	Control Systems	17	G
Spring 2016	EECE2010	Introductory Circuit Theory I	60	U
Fall 2015	EECE2010	Introductory Circuit Theory I	112	U
	EECE5130	Control Systems	20	G
Fall 2014	16.201	Intro. Circuit Theory I (Lecture)	126	U
	16.513	Control Systems	29	G
Spring 2014	16.513	Control Systems	44	G
	16.201.101	Introductory Circuit Theory I	57	U
Fall 2013	16.201	Intro. Circuit Theory I (Lecture)	80	U
Spring 2013	16.513	Control Systems	42	G
	16.201	Intro. Circuit Theory I (Lecture)	61	U
Fall 2012	16.201	Intro. Circuit Theory I (Recitation)	19	U
	16.201	Intro. Circuit Theory I (Lecture)	97	U
	16.201	Intro. Circuit Theory I (Recitation)	25	U
Spring 2012	16.201	Intro. Circuit Theory I (Recitation)	16	U
	16.513	Control Systems	33	G
	16.201	Intro. Circuit Theory I (Lecture)	50	U
Fall 2011	16.201	Intro. Circuit Theory I (Recitation)	19	U
	16.201	Intro. Circuit Theory I (Lecture)	92	U
Spring 2011	16.201	Intro. Circuit Theory I (Recitation)	34	U
	16.513	Control Systems	33	G
Fall 2010	16.201	Introductory Circuit Theory I	49	U
	16.201	Introductory Circuit Theory I	51	U
	16.201	Introductory Circuit Theory I	33	U

Semester	Course Number	Course Title	Enrollment	Level
Spring 2010	16.513	Control Systems	34	G
	16.201	Introductory Circuit Theory I	52	U
Fall 2009	16.201	Introductory Circuit Theory I	51	U
	16.201	Introductory Circuit Theory I	32	U
Spring 2009	16.513	Control Systems	39	G
	16.201	Introductory Circuit Theory I	45	U
Fall 2008	16.201	Introductory Circuit Theory I	48	U
	16.201	Introductory Circuit Theory I	46	U
Spring 2008	16.513	Control Systems	34	G
	16.613	Nonlinear Systems	6	G
	16.201	Introductory Circuit Theory I	40	U
Fall 2007	16.201	Introductory Circuit Theory I	21	U
	16.201	Introductory Circuit Theory I	45	U
Spring 2007	16.513	Control Systems	21	G
	16.201	Introductory Circuit Theory I	31	U
Fall 2006	16.201	Introductory Circuit Theory I	17	U
	16.201	Introductory Circuit Theory I	27	U
Spring 2006	16.513	Control Systems	25	G
	16.201	Introductory Circuit Theory I	30	U
Fall 2005	16.413	Linear Feedback Systems	12	U
Spring 2005	16.513	Control Systems	13	G

2. Other Activities and Accomplishments Related to the Instructional Function

a. Capston project advising

- Wind Turbine project (Fall 2022, Spring 2023) : Supervise 6 ECE students
- Entegris project #3 (2018-2019): Develop a test stand with user-friendlyinterfacethatcontrols voltage, temperature and gas flow during ESC testing

b. Ph.D. student research directing

- 2019 – 2022 Mr. William Harmon. Dissertation title: Dissertation topic: Power management systems for triboelectric nanogenerators.
- 2017 – 2019 Mr. David Bamgboje. Dissertation title: High performance power converters for LED driving and energy harvesting
- 2014 – 2017 Mr. Mohammad Tahan, “Multistring LED driver with high efficiency and high performance dimming capability,” passed dissertation defense on Dec. 11, 2017, Graduated in December 2017.
- 2013 –2015 Ms. Lalitha Devarakonda. Battery modeling and investigation on the effect of relaxation time, passed dissertation defense on 10/8/2015. Graduated in Dec. 2015.
- 2011-2014 Mr. Haifeng Wang. Thesis topic: Ripple reduction in dc-ac converter. Gradu- ated in May 2014.
- 2009-2013 Mr. Fidegnon Fassinou. Thesis topic: Modeling and control of power converters at discontinuous conduction mode. Graduated in Dec. 2013.

2010-2013 Mr. Hoeguk Jung. Thesis topic: Modeling and control design of power systems driven by battery/supercapacitor hybrid energy sources. Graduated in May 2013.

2009-2012 Miss Huong Pham. Thesis topic: Minimizing ripples of PWM rectifiers with state feedback. Graduated in Dec 2012.

c. Visiting PhD student

Mr. Christian Conficoni (University of Bologna, Italy). Modeling and control design of power electronic interface for systems with battery/supercapacitor hybrid energy sources. (1/10/12-7/10/12)

d. M.S. student research directing

2017 – Mr. Ahmed Abbaker. Control of DC-DC converters

2014 –2016 Mr. William Harmon. Self-oscillating boost converter with diode-blocked gate winding, defended in 4/7/2016. Will graduate in May 2016.

2014 –2015 Mr. Vamshikrishna Rao Domudala. Single input multiple output high performance LED driver with PWM dimming technique, defended on 12/4/2015. Graduated in Dec. 2015.

2012-* Mr. Khalid Kanane. Starting in Fall 2012.

2008-2010* Miss Yao Yao. Thesis title: Stability and robust regulation for battery driven boost converter with simple feedback (2010)

2007-2009* Mr. Thomas Thibodeau. Thesis title: A Lyapunov approach to controller design of magnetic suspension with two degrees of freedom (2009).

2005-2007* Mr. Liqiang Ma, non-thesis track

2007-2008* Ms. Wenchan Tong. Thesis title: Improving performance analysis with structures of outputs and constraints (2008).

2007-2008* Mr. Tzi-Hao Ye. Thesis title: Modeling and control for a magnetic suspension system (2008).

e. B.S. student research directing

2014 Summer Mr. Thomas Green. Project: Control and design of buck-boost converters. 2010-2011

Mr. Brian Zanchi

2009-2010 Mr. Scott Wilson

2009-2010 Mr. Ryan McGovern

2008 Ms. Julie Bissell

2007 Ms. Jessica Piper

2007 Ms. Olubukola A. Isijola

2007 Mr. John Butterworth

f. Lab Development Activities

2006- The control system lab (in Ball Hall 406) has been developed with the support of National Science Foundation. 6 sets of electronic testing equipment have been installed. Several power electronic converters have been constructed to achieve robust stability and tracking. The lab is also equipped with battery evaluation devices.

E. Service Activities

1. Community Activities Related to Professional Field

2021- ECE Department, Interim Associate chair, since Sept. 2021

2021 - ECE Department, Personnel Committee member

2021 - Open House, Oct. 3, Nov. 14, 2021

2012-* Faculty senator

2008-* Personal committee member for ECE department

2005-* Website development and maintenance for ECE department 2006-

2011* Website maintenance for Emeritus Professor Wunsch 2006* Website development for Assistive Technology Program (ATP)