

Education

Georgia Institute of Technology

ATLANTA, GEORGIA, USA

Doctor of Philosophy in Mechanical Engineering

2013 – 2016

Thesis Title: Input to State Stabilizing Control Lyapunov Functions for Hybrid Systems

Committee: Aaron D. Ames (advisor), Magnus Egerstedt, Patricio Vela, Jonathan Rogers, Jun Ueda

Texas A&M University

COLLEGE STATION, TEXAS, USA

Master of Science in Electrical and Computer Engineering

2010 – 2012

Thesis Title: Bipedal Robotic Walking on Flat-ground, Up-slope and Rough Terrain with Human-Inspired Hybrid Zero Dynamics

National Institute of Technology Karnataka

SURATHKAL, KARNATAKA, INDIA

Bachelor of Technology in Electrical and Electronics Engineering

2004 – 2008

Experience

Indian Institute of Science

BENGALURU, KARNATAKA, INDIA

INSPIRE Faculty Fellow

Jan '18 – present

Working in Robert Bosch Center for Cyber Physical Systems (RBCCPS). I am currently working on real-time safety critical control for various robotic platforms like quadrotors, arms and legged robots.

California Institute of Technology

PASADENA, CALIFORNIA, USA

Postdoctoral Scholar

Jan '17 – Dec '17

Worked with MisoRobotics on the 6-DOF arm project. The goal is to realize direct collocation based trajectory optimization with obstacles. A novel application of this method is with a burger flipping robot. Various tasks like transport, pickup and flipping of burgers can be planned and executed in real-time.

Tejas Networks Ltd.

BENGALURU, KARNATAKA, INDIA

R&D Engineer

Jun '08 – Jun '10

Designed and fabricated two stand alone switching power supplies. Each power supply used a standard buck converter topology with hot swappable, current-voltage monitoring features.

Journal Publications

- [1] S. Kolathaya and A. D. Ames. “Parameter to state stability of control Lyapunov functions for hybrid system models of robots”. In: *Nonlinear Analysis: Hybrid Systems* (2016). ISSN: 1751-570X. DOI: <http://dx.doi.org/10.1016/j.nahs.2016.09.003>.
- [2] A. D. Ames et al. “First steps toward formal controller synthesis for bipedal robots with experimental implementation”. In: *Nonlinear Analysis: Hybrid Systems* 25 (2017), pp. 155–173. ISSN: 1751-570X. DOI: <https://doi.org/10.1016/j.nahs.2017.01.002>. URL: <http://www.sciencedirect.com/science/article/pii/S1751570X1730002X>.
- [3] S. Kolathaya and A. D. Ames. “Input-to-State Safety With Control Barrier Functions”. In: *IEEE Control Systems Letters* 3.1 (2019), pp. 108–113. ISSN: 2475-1456. DOI: [10.1109/LCSYS.2018.2853698](https://doi.org/10.1109/LCSYS.2018.2853698).
- [4] S. Kolathaya et al. “Direct Collocation for Dynamic Behaviors With Nonprehensile Contacts: Application to Flipping Burgers”. In: *IEEE Robotics and Automation Letters* 3.4 (2018), pp. 3677–3684. ISSN: 2377-3766. DOI: [10.1109/LRA.2018.2854910](https://doi.org/10.1109/LRA.2018.2854910).

Conference Publications

- [1] S. N. Y. Kolathaya, B. Kothapalli, and A. D. Ames. “Zeno behavior in electromechanical hybrid systems: From theory to experimental validation”. In: *2012 American Control Conference (ACC)*. June 2012, pp. 2437–2442. DOI: [10.1109/ACC.2012.6315696](https://doi.org/10.1109/ACC.2012.6315696).
- [2] Z. Huihua, S. N. Y. Kolathaya, and A. D. Ames. “Bipedal robotic running with partial hybrid zero dynamics and human-inspired optimization”. In: *2012 IEEE/RSJ International Conference on Intelligent Robots and Systems*. Oct. 2012, pp. 1821–1827. DOI: [10.1109/IRoS.2012.6386241](https://doi.org/10.1109/IRoS.2012.6386241).

- [3] S. N. Y. Kolathaya, M. Pasupuleti, and A. D. Ames. “Human-inspired underactuated bipedal robotic walking with AMBER on flat-ground, up-slope and uneven terrain”. In: *2012 IEEE/RSJ International Conference on Intelligent Robots and Systems*. Oct. 2012, pp. 2478–2483. DOI: [10.1109/IR0S.2012.6386182](https://doi.org/10.1109/IR0S.2012.6386182).
- [4] S. Kolathaya and A. D. Ames. “Achieving Bipedal Locomotion on Rough Terrain through Human-Inspired Control”. In: *10th IEEE International Symposium on Safety Security and Rescue Robotics*. College Station, Texas, USA, Oct. 2012.
- [5] H. Zhao, S. Kolathaya, and A. D. Ames. “Quadratic programming and impedance control for transfemoral prosthesis”. In: *2014 IEEE International Conference on Robotics and Automation (ICRA)*. May 2014, pp. 1341–1347. DOI: [10.1109/ICRA.2014.6907026](https://doi.org/10.1109/ICRA.2014.6907026).
- [6] A. Hereid et al. “Dynamic Multi-domain Bipedal Walking with Atrias Through SLIP Based Human-inspired Control”. In: *Proceedings of the 17th International Conference on Hybrid Systems: Computation and Control*. HSCC '14. Berlin, Germany, 2014, pp. 263–272. ISBN: 978-1-4503-2732-9. DOI: [10.1145/2562059.2562143](https://doi.org/10.1145/2562059.2562143).
- [7] W. L. Ma et al. “Human-inspired walking via unified PD and impedance control”. In: *2014 IEEE International Conference on Robotics and Automation (ICRA)*. May 2014, pp. 5088–5094. DOI: [10.1109/ICRA.2014.6907605](https://doi.org/10.1109/ICRA.2014.6907605). URL: <http://ieeexplore.ieee.org/document/6907605/>.
- [8] S. Kolathaya and A. D. Ames. “Exponential convergence of a unified CLF controller for robotic systems under parameter uncertainty”. In: *2014 American Control Conference*. June 2014, pp. 3710–3715. DOI: [10.1109/ACC.2014.6859407](https://doi.org/10.1109/ACC.2014.6859407). URL: <http://ieeexplore.ieee.org/abstract/document/6859407/>.
- [9] A. D. Ames et al. “First Steps Toward Formal Controller Synthesis for Bipedal Robots”. In: *Proceedings of the 18th International Conference on Hybrid Systems: Computation and Control*. HSCC '15. Seattle, Washington, 2015, pp. 209–218. ISBN: 978-1-4503-3433-4. DOI: [10.1145/2728606.2728611](https://doi.org/10.1145/2728606.2728611).
- [10] S. Kolathaya and A. D. Ames. “Parameter Sensitivity and Boundedness of Robotic Hybrid Periodic Orbits.” In: vol. 48. 27. 2015, pp. 377–382. DOI: [http://dx.doi.org/10.1016/j.ifacol.2015.11.203](https://doi.org/http://dx.doi.org/10.1016/j.ifacol.2015.11.203).
- [11] S. Kolathaya, A. Hereid, and A. D. Ames. “Time dependent control Lyapunov functions and hybrid zero dynamics for stable robotic locomotion”. In: *2016 American Control Conference (ACC)*. July 2016, pp. 3916–3921. DOI: [10.1109/ACC.2016.7525524](https://doi.org/10.1109/ACC.2016.7525524).
- [12] A. Hereid, S. Kolathaya, and A. D. Ames. “Online optimal gait generation for bipedal walking robots using legendre pseudospectral optimization”. In: *2016 IEEE 55th Conference on Decision and Control (CDC)*. 2016, pp. 6173–6179. DOI: [10.1109/CDC.2016.7799218](https://doi.org/10.1109/CDC.2016.7799218).
- [13] W.-L. Ma et al. “Bipedal Robotic Running with DURUS-2D: Bridging the Gap Between Theory and Experiment”. In: *Proceedings of the 20th International Conference on Hybrid Systems: Computation and Control*. HSCC '17. Pittsburgh, Pennsylvania, USA: ACM, 2017, pp. 265–274. ISBN: 978-1-4503-4590-3. DOI: [10.1145/3049797.3049823](https://doi.org/10.1145/3049797.3049823). URL: <http://doi.acm.org/10.1145/3049797.3049823>.
- [14] S. Kolathaya et al. “Direct Collocation for Dynamic Behaviors with Nonprehensile Contacts: Application to Flipping Burgers”. In: *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems*. 2018. DOI: [10.1109/LRA.2018.2854910](https://doi.org/10.1109/LRA.2018.2854910).
- [15] S. Kolathaya and A. D. Ames. “Input-to-State Safety With Control Barrier Functions”. In: *2018 IEEE 57th Conference on Decision and Control (CDC)*. 2018. DOI: [10.1109/LCSYS.2018.2853698](https://doi.org/10.1109/LCSYS.2018.2853698).

Peer Reviewed Book Chapters

- [1] S. N. Y. Kolathaya, M. Pasupuleti, and A. D. Ames. “From Formal Methods to Algorithmic Implementation of Human Inspired Control on Bipedal Robots”. In: *Algorithmic Foundations of Robotics X: Proceedings of the Tenth Workshop on the Algorithmic Foundations of Robotics*. Ed. by E. Frazzoli et al. Berlin, Heidelberg: Springer Berlin Heidelberg, 2013, pp. 511–526. ISBN: 978-3-642-36279-8. DOI: [10.1007/978-3-642-36279-8_31](https://doi.org/10.1007/978-3-642-36279-8_31).
- [2] S. Kolathaya, W. L. Ma, and A. D. Ames. “Composing Dynamical Systems to Realize Dynamic Robotic Dancing”. In: *Algorithmic Foundations of Robotics XI: Selected Contributions of the Eleventh International Workshop on the Algorithmic Foundations of Robotics*. Ed. by H. L. Akin et al. Cham: Springer International Publishing, 2015, pp. 425–442. ISBN: 978-3-319-16595-0. DOI: [10.1007/978-3-319-16595-0_25](https://doi.org/10.1007/978-3-319-16595-0_25).
- [3] J. P. Reher et al. “Algorithmic Foundations of Realizing Multi-Contact Locomotion on the Humanoid Robot DURUS”. In: *The International Workshop on the Algorithmic Foundations of Robotics (WAFR) XII*. San Francisco, 2016. URL: <http://wafr2016.berkeley.edu/>.

Miscellaneous

- [1] S. Kolathaya et al. *Human-Inspired Walking in AMBER 1.0 and AMBER 2.0, Dynamic Walking*. 2013.

- [2] S. N. Y. Kolathaya. *Phase Uncertainty to State Stability of Continuous Periodic Orbits*, *arXiv preprint arXiv:1707.02258*. 2017.
- [3] S. Kolathaya et al. *System Identification and Control of Valkyrie through SVA-Based Regressor Computation*, *arXiv preprint arXiv:1608.02683*. 2016.
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Teaching Experience

Georgia Institute of Technology

Nonlinear Systems–Graduate Level–ECE6552

Taught four lectures, set homeworks, mentored projects, held weekly office hours and also graded exams.

ATLANTA, GEORGIA, USA

Spring 2016

California Institute of Technology

Dynamics and Control of Walking Robots–Graduate Level–CDS270-2

Taught two lectures, set homeworks, mentored projects, held office hours and also graded exams.

PASADENA, CALIFORNIA, USA

Spring 2017

Achievements

- INSPIRE Faculty Fellowship - 2018, awarded by the Department of Science and Technology INDIA.
- Best paper award (second author) for a seminal work on *Dynamic multi-domain bipedal walking with ATRIAS through slip based human-inspired control*, In the *Proceedings of the 17th international conference on Hybrid systems: Computation and Control*, 2014.
- Student travel award for the Workshop on Algorithmic Foundations in Robotics XI, 2014, Istanbul, Turkey.

List of Seminars and Presentations

- *From Formal Methods to Algorithmic Implementation of Human Inspired Control on Bipedal Robots*, Workshop on Algorithmic Foundations of Robotics X, Cambridge, Massachusetts, USA.
 - *Zeno behavior in electromechanical hybrid systems: From theory to experimental validation*, American Control Conference 2012, Montreal, Quebec, Canada.
 - *Human-inspired underactuated bipedal robotic walking with AMBER on flat-ground, up-slope and uneven terrain*, International Conference on Intelligent Robots and Systems 2012, Vilamoura, Algarve, Portugal.
 - *Bipedal robotic running with partial hybrid zero dynamics and human-inspired optimization*, International Conference on Intelligent Robots and Systems 2012, Vilamoura, Algarve, Portugal.
 - *Achieving Bipedal Locomotion on Rough Terrain through Human-Inspired Control*, International Symposium on Safety Security and Rescue Robotics 2012, College Station, Texas, USA.
 - *Dynamic Multi-domain Bipedal Walking with ATRIAS Through SLIP Based Human-inspired Control*, Cyber Physical Systems Week 2014, Berlin, Germany.
 - *Exponential convergence of a unified CLF controller for robotic systems under parameter uncertainty*, American Control Conference 2014, Portland, Oregon, USA.
 - *Composing Dynamical Systems to Realize Dynamic Robotic Dancing*, Workshop on Algorithmic Foundations of Robotics XI, Istanbul, Turkey.
 - *Parameter Sensitivity and Boundedness of Robotic Hybrid Periodic Orbits*, Analysis and Design of Hybrid Systems 2015, Atlanta, Georgia, USA.
 - *Time dependent control Lyapunov functions and hybrid zero dynamics for stable robotic locomotion*, American Control Conference 2016, Boston, Massachusetts, USA.
 - *Introduction to Human-Inspired Bipedal Walking*, Invited seminar 2012, National Institute of Technology Karnataka, Surathkal, Karnataka, India.
 - *Achieving Human-Inspired Bipedal Robotic Walking*, Invited seminar 2013, National Institute of Technology Karnataka, Surathkal, Karnataka, India.
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Reviewership

- Program committee member of Robots Science and Systems (RSS 2017, 2018).
- Program committee member of Safety Security and Rescue Robotics (SSRR 2012-2013).
- IEEE-TRO, IEEE-TAC, IEEE-LCSS, IEEE-RA-L, NAHS, IJRR.
- IROS, ICRA, CDC, ACC, ICC.