

Kaushik Jayaram, Ph.D.

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Employment History

- 2020 – ···· ■ **Assistant Professor.** Mechanical Engineering, University of Colorado Boulder.
- 2019 – 2019 ■ **Visiting Assistant Professor.** Mechanical Engineering, University of Colorado Boulder.
- 2018 – 2019 ■ **Research Associate.** John A. Paulson School of Engineering and Applied Sciences, Harvard University.
(Prof. Rob Wood's Microrobotics Lab)
- 2015 – 2018 ■ **Postdoctoral Scholar.** Wyss Institute for Biologically Inspired Engineering, Harvard University.
(Prof. Rob Wood's Microrobotics Lab)
- 2009 – 2015 ■ **Graduate Research Assistant.** University of California Berkeley.
(Prof. Robert Full's PolyPEDAL Lab)
- 2007 – 2007 ■ **Undergraduate Research Fellow.** Ecole Polytechnique Federale du Laussane.
(Prof. Dario Floreano's Laboratory for Intelligent Systems)
- 2006 – 2006 ■ **Undergraduate Research Fellow.** University of Bielefeld.
(Prof. Holk Cruse's Bio Cybernetics Group)

Education

- 2009 – 2015 ■ **Ph.D., University of California Berkeley** in Integrative Biology.
Thesis title: *Robustness of biological and bioinspired exoskeletons.*
Advisor: Prof. Robert J. Full
- 2004 – 2009 ■ **M.Tech., Indian Institute of Technology Bombay** in Computer Integrated Manufacturing.
Thesis title: *Development of low-cost, vision-based microassembly system.*
Advisor: Prof. Suhas S. Joshi
- **B.Tech., Indian Institute of Technology Bombay** in Mechanical Engineering.

Honors and Awards

- 2019 ■ Burroughs Wellcome Fund's Career Award at Scientific Interface, (*finalist*)
- 2018 ■ IOP Outstanding Reviewer Award
- 2017 ■ IROS Best Paper Award, Finalist 2017
- 2016 ■ Mimi Koehl and Stephen Wainwright Best Paper Award (SICB)
- 2014 ■ Outstanding Graduate Student Instructor
- 2012 – 2015 ■ David and Caroline Miller Fellowship
- 2009 – 2014 ■ Travel Awards : Wiley Foundation (13-14), Charlotte Magnum (10-12), Hansen Fund (09-14)
- 2009 – 2011 ■ UC Berkeley Graduate Fellowship
- 2005 ■ IIT Bombay Heritage Scholarship - *One of 20 selected from over 500 students*

Honors and Awards (continued)

- 2004 ■ International Chemistry Olympiad Camp 2004 - *Amongst the top 25 in the country selected*
- 2002 – 2004 ■ State Mathematics Olympiad - *Ranked in the top 10 for 3 successive years*
- 2002 – 2009 ■ National Talent Search Scholarship 2002-09 - *One of 750 awardees countrywide (State Rank 3)*

Research Publications

Google Scholar

Journal Articles

- 1 Abondance, T., **Jayaram, K.**, Jafferis, N., Shum, J., & Wood, R. J. (2020). Piezoelectric grippers from mobile manipulation. *IEEE Robotics and Automation Letters (RA-L)*, 5(3), 4407–4414.
- 2 ***Jayaram, K.**, *Doshi, N., Castellanos, S., Kuindersma, S., & Wood, R. J. (2019). Effective locomotion at multiple stride frequencies using proprioceptive feedback on a legged microrobot. *Bioinspiration & Biomimetics*, 14(5), 056001.
- 3 de Rivaz, S. D., Goldberg, B., Doshi, N., **Jayaram, K.**, Zhou, J., & Wood, R. J. (2018). Inverted and vertical climbing of a quadrupedal microrobot using electroadhesion. *Science Robotics*, 3(25), eaau3038. (**Altmetric Score 172**)
- 4 **Jayaram, K.**, Jafferis, N. T., Doshi, N., Goldberg, B., & Wood, R. J. (2018). Concomitant sensing and actuation for piezoelectric microrobots. *Smart Materials and Structures*, 27(6), 065028.
- 5 **Jayaram, K.**, Mongeau, J.-M., Mohapatra, A., Birkmeyer, P., Fearing, R. S., & Full, R. J. (2018). Transition by head-on collision: mechanically mediated manoeuvres in cockroaches and small robots. *Journal of The Royal Society Interface*, 15(139), 20170664. (**Altmetric Score 337**)
- 6 Christodouleas, D. C., Simeone, F. C., Tayi, A., Targ, S., Weaver, J. C., **Jayaram, K.**, ... Whitesides, G. M. (2017). Fabrication of paper-templated structures of noble metals. *Advanced Materials Technologies*, 2(2), 1600229.
- 7 Goldberg, B., Doshi, N., **Jayaram, K.**, & Wood, R. J. (2017). Gait studies for a quadrupedal microrobot reveal contrasting running templates in two frequency regimes. *Bioinspiration & Biomimetics*, 12(4), 046005.
- 8 **Jayaram, K.** & Full, R. J. (2016). Cockroaches traverse crevices, crawl rapidly in confined spaces, and inspire a soft, legged robot. *Proceedings of the National Academy of Sciences*, 113(8), E950–E957. (**Altmetric Score 1118, Annual Ranking # 103**)
- 9 **Jayaram, K.** & Joshi, S. S. (2016). Design and development of a vision-based micro-assembly system. *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture*, 230(6), 1164–1168.
- 10 Mongeau, J.-M., Demir, A., Dallmann, C. J., **Jayaram, K.**, Cowan, N. J., & Full, R. J. (2014). Mechanical processing via passive dynamic properties of the cockroach antenna can facilitate control during rapid running. *Journal of Experimental Biology*, 217(18), 3333–3345.
- 11 **Jayaram, K.** & Joshi, S. S. (2010). Development of a flexure-based, force-sensing microgripper for micro-object manipulation. *Journal of Micromechanics and Microengineering*, 20(1), 015001.

Conference Proceedings

- 1 **Jayaram, K.**, Shum, J., Castellanos, S., Helbling, E., & Wood, R. J. (2020). Scaling down an insect-size microrobot, hamr-vi into hamr-jr. In *2020 IEEE International Conference on Robotics and Automation (ICRA)*. IEEE.

- 2 Doshi, N., **Jayaram, K.**, Goldberg, B., Manchester, Z., Wood, R., & Kuindersma, S. (2018). Contact-implicit optimization of locomotion trajectories for a quadrupedal microrobot. In *Robotics: science and systems*.
- 3 Doshi, N., **Jayaram, K.**, Goldberg, B., & Wood, R. J. (2017). Phase control for a legged microrobot operating at resonance. In *2017 IEEE International Conference on Robotics and Automation (ICRA)* (pp. 5969–5975). IEEE.
- 4 Goldberg, B., Doshi, N., **Jayaram, K.**, Koh, J.-S., & Wood, R. J. (2017). A high speed motion capture method and performance metrics for studying gaits on an insect-scale legged robot. In *Ieee/rsj international conference on intelligent robots and systems (iros) 2017*. (**Finalist, Best Conference Paper**)
- 5 **Jayaram, K.** & Joshi, S. S. (2012). Development of a low-cost vision-based micro-assembly system. International Conference on Mechatronics and Manufacturing.

Abstracts

- 1 Eligar, S. S., Hari Prasad, H. K., & **Jayaram, K.** (2021). Origami-inspired, high energy-density, low-voltage voice coil actuators for autonomous micro-robotic applications. APS.
- 2 Evans, S., Wanzer, L., McDonnell, P., Doshi, N., Wood, R., & **Jayaram, K.** (2021). Micro electroadhesive treaded robot. APS.
- 3 Kabutz, H. & **Jayaram, K.** (2021a). Morphological compliance enables robot locomotion through cluttered terrain. APS.
- 4 Kabutz, H. & **Jayaram, K.** (2021b). Morphological compliance enables robot locomotion through cluttered terrain. Society of Integrative and Comparative Biology Annual Meeting.
- 5 **Jayaram, K.** & Wood, R. (2020). Testing the effect of scaling on microrobot locomotion performance. APS March Meeting.
- 6 **Jayaram, K.**, Doshi, N., & Wood, R. (2019). Gait recovery using proprioceptive feedback in hamr, a biologically-inspired robotic platform. Society of Integrative and Comparative Biology Annual Meeting.
- 7 **Jayaram, K.**, Salcedo, M., Weaver, J., Bartlett, N., Mahadevan, L., & Wood, R. (2018). Fabrication of insect wings ranging from millimeters to meters. Society of Integrative and Comparative Biology Annual Meeting.
- 8 Doshi, N., Goldberg, B., **Jayaram, K.**, & Wood, R. (2017). Task driven optimal leg trajectories in insect-scale legged microrobots. American Physical Society March Meeting.
- 9 **Jayaram, K.**, Goldberg, B., Doshi, N., & Wood, R. (2017). Towards rapid running at resonance using hamr, a biologically-inspired robotic platform. Society of Integrative and Comparative Biology Annual Meeting.
- 10 **Jayaram, K.** & Full, R. (2016). Cockroaches squeezing through crevices. Society of Integrative and Comparative Biology Annual Meeting. (**Winner, Best Conference Presentation**)
- 11 Li, C., Tian, R., Porter, W., Hammond, Z., Strachan-Olson, D., Kooker, A., ... Fearing, R. (2016). Cockroach-inspired self-righting robots. Society of Integrative and Comparative Biology Annual Meeting.
- 12 **Jayaram, K.** & Full, R. (2015). Body size limit predictions for mechanically mediated maneuvers. Society of Integrative and Comparative Biology Annual Meeting. (**Finalist, Best Conference Presentation**)

- 13 **Jayaram, K.**, Goldman, D., & Full, R. (2014). Effect of friction on cockroaches running in confined spaces. Society of Integrative and Comparative Biology Annual Meeting.
- 14 Dallmann, C., Mongeau, J.-M., **Jayaram, K.**, Mahavadi, A., & Full, R. (2013). Dynamic response of antenna flagellum in the american cockroach. Society of Integrative and Comparative Biology Annual Meeting.
- 15 **Jayaram, K.**, Springthorpe, D., Haldane, D., McKinley, S., DiRocco, A., & Full, R. (2013). Running in confined spaces by the american cockroach. Society of Integrative and Comparative Biology Annual Meeting.
- 16 **Jayaram, K.**, Merritt, C., & Full, R. (2012). Robust climbing in cockroaches results from fault tolerant design using leg spines. Society of Integrative and Comparative Biology Annual Meeting.
- 17 Demir, A., Samson, E., Mongeau, J.-M., **Jayaram, K.**, Full, R., & Cowan, N. (2011). A tunable, multisegmented robotic antenna for identifying and testing biomechanical design principles. Society of Integrative and Comparative Biology Annual Meeting.
- 18 Full, R., **Jayaram, K.**, Mongeau, J.-M., Birkmeyer, P., Hoover, A., & Fearing, R. (2011). Role of robustness in running: bio-and bio-inspired exoskeletons. Society of Integrative and Comparative Biology Annual Meeting.
- 19 **Jayaram, K.**, Merritt, C., Cherian, A., & Full, R. (2011). Running without feet: the role of tarsi during high-speed horizontal locomotion in cockroaches. Society of Integrative and Comparative Biology Annual Meeting.
- 20 Mongeau, J.-M., **Jayaram, K.**, Demir, A., Sampson, E., Cowan, N., & Full, R. (2011). Biomechanics of tactile sensor for wall following and spatial mapping. Society of Integrative and Comparative Biology Annual Meeting.
- 21 **Jayaram, K.**, Mongeau, J.-M., McRae, B., & Full, R. (2010). High-speed horizontal to vertical transitions in running cockroaches reveals a principle of robustness. Society of Integrative and Comparative Biology Annual Meeting. (**Finalist, Best Conference Presentation**)
- 22 Mongeau, J.-M., **Jayaram, K.**, Lee, J., Full, R., & Cowan, N. (2010). Mechanical feedback of antenna-substrate interaction simplifies cockroach antennal navigation. Society of Integrative and Comparative Biology Annual Meeting.

Popular Press

Select Compilation

News

- Jun 2020 ■ **HAMR-Jr**, Scaling to an insect sized robot
Science News, WIRED, TechXplore, Cosmos (+10 more)
- Dec 2018 ■ **HAMR-E**, Harvard Ambulatory Microrobot with Electroadhesion
Science News, WIRED, TechXplore, Cosmos (+10 more)
- Jul 2018 ■ Rolls-Royce tests cockroach-like robots that help repair plane engines
TechCruch, Telegraph, CNBC, Engadget (+50 more)
- Mar 2018 ■ Transition by head-on Collisions in Cockroaches and Robots
Science News, NYTimes, Science Friday, LiveScience (+50 more)
- Feb 2018 ■ **HAMR**, a cockroach inspired robot
IEEE Spectrum, Wyss News, TechXplore, Digital Trends
- Feb 2016 ■ Cockroaches Squeeze through Crevices and Crawl in Confined Spaces
Science News, Nature News, NYTimes, NatGeo (+400 more)

- Feb 2010 ■ Racing Crash-Happy Cockroaches - Elizabeth Pennisi
Science Meeting Briefs, 12 February 2010, Vol 327 Science. p 776

Books

- Nov 2018 ■ How to Walk on Water and Climb up Walls: Animal Movement and the Robots of the Future – David Hu
Princeton University Press

Videos

- Mar 2014 ■ The secrets of nature's grossest creatures, channeled into robots – Robert J Full
TED2014

Misc

- Jun 2019 ■ Jeff Bezos on Twitter
■ Shaquille O'Neal on Instagram

Invited Talks

Research

- Mar , 2020 ■ Robotics, Control & Dynamics Seminar Series, University of Colorado Boulder, US
Feb , 2020 ■ ATLAS Institute, University of Colorado Boulder, US
Jun 6, 2019 ■ Amazon re:MARS, Las Vegas, US
Apr 8, 2019 ■ Graduate School of Design, Harvard University, UK
Mar 20, 2019 ■ Biomechanics and Mechanobiology, Cambridge University, UK
Mar 6, 2019 ■ Mechanical Engineering, Tufts University, US
Feb 25, 2019 ■ Mechanical Engineering, University of Texas Austin, US
Feb 11, 2019 ■ Mechanical Engineering, University of California Riverside, US
Feb 8, 2019 ■ Mechanical, Industrial & Manufacturing Engineering, Oregon State University, US
Feb 4, 2019 ■ Mechanical & Industrial Engineering, University of Massachusetts Amherst, US
Jan 18, 2019 ■ Mechanical Engineering, University of Colorado Boulder, US
Dec 10, 2018 ■ Mechanical & Nuclear Engineering, Penn State University, US
Nov 13, 2018 ■ World Conference for Inspection and Maintenance Robotics, Galveston, US
Aug 1, 2018 ■ Biosciences Science and Engineering, Indian Institute of Science, Bangalore, IN
Jun 30, 2018 ■ Carnegie Mellon University, Pittsburg, US (*Robotics: Science and Systems: Workshop on Dynamics and Control of Small Legged Robots*)
May 14, 2018 ■ US Army Natick Soldier Research, Development, and Engineering Center, Natick, US (*Sigma Xi Lecture Series*)
Mar 4, 2018 ■ Mechanical Engineering, University of California Santa Barbara, Santa Barbara, US
Nov 17, 2017 ■ Concord Field Station, Harvard University, Bedford, US
Oct 11, 2017 ■ School of Engineering and Applied Sciences, Harvard University, Cambridge, US
Oct 10, 2015 ■ Young Investigators Meeting, MIT, Cambridge, US
Nov 20, 2013 ■ Avanti Learning Centre, Mumbai, IN
Jul 09, 2013 ■ BioRobotics Institute - Scuola Superiore Sant'Anna, Piza, Italy

Invited Talks (continued)

Dec 27, 2012 ■ Young Researchers' Conclave - IIT Gandhinagar, Gandhinagar, IN

Dec 24, 2012 ■ Indian Institute of Technology Bombay, Mumbai, IN

Outreach

May 1, 2020 ■ Innovation Center Level Up, St.Vrain Valley School District, US

May 10, 2016 ■ Museum of Natural History, Harvard University, Cambridge, US

Mar 8, 2016 ■ Park School, Brookline, US

Professional Experience

Research Associate of

Denver Museum of Natural History

Member of

Society of Integrative and Comparative Biology (SICB)

Society of Experimental Biology (SEB)

The Institute of Electrical and Electronics Engineers (IEEE)

Representative of

Broadening Participation Committee, SICB 2018-21

Organizer of

Multimodal Locomotion - a robotics inspired biology workshop, IROS 2020

Robotics Inspired Biology Workshop, IROS 2017

Session Chair of

Robophysics, APS 2020

Division of Comparative Biomechanics, SICB 2015-17

Judge for

Best Student Paper Award, Division of Comparative Biomechanics, SICB 2017-18

Reviewer for

Proceedings of the National Academy of Sciences (PNAS)

Science Robotics

Nature Communications

Nature Scientific Reports

Proceedings of The Royal Society

Bioinspiration and Biomimetics (B&B)

Journal of Micromechanics and Micro-engineering (JMM)

Soft Robotics

IEEE Transactions on Robotics (T-RO)

International Conference on Intelligent Robots and Systems (IROS)

International Conference on Robotics and Automation (ICRA)

Robotics Automation and Letters (RA-L)

International Conference on Automation Science and Engineering (CASE)

Frontiers in Zoology

Journal of Mechanical Engineering Science

Panelist for

National Robotics Initiative (NRI-2.0) 2020

National Defense Science and Engineering Graduate Fellowship Program (NDSEG) 2020

NSF Graduate Research Fellowship Program (GRFP) 2020

Associate Editor for

International Conference on Biomedical Robotics & Biomechatronics (BioRob 2020)

Guest Editor for

PLoS Computational Biology, special issue on Neuroscience

Teaching Experience

CU-Boulder

- Spring 2021 ■ Bioinspired Robotics
- Fall 2020 ■ Undergraduate Senior Design
- Spring 2020 ■ Bioinspired Robotics

Harvard

- Fall 2016 ■ Physics for Engineers (TA)

UC Berkeley

- Fall 2013 ■ Motor Control (TA, **Outstanding Graduate Student Instructor**)
- Spring 2012 ■ Mechanisms of Organisms (TA)

IIT Bombay

- Spring 2009 ■ Experimental Engineering Lab (TA)
- Fall 2008 ■ Advanced Manufacturing Processes (TA)

Outreach Activities

- 2017- ■ Broadening Participation Student Mentor, SICB
- 2015-2017 ■ Cambridge Science Festival
- 2015 ■ Dinner with Scientist, Oakland Zoo
- 2013-2015 ■ Bay Area Students in Science (BASIS)
- 2014 ■ OpenMAKE, Lawrence Hall of Science
- 2012-2014 ■ Science and Engineering Community Outreach (SECO)
- 2013 ■ Pre-IMSD Student Mentor
- 2005-2009 ■ Technical Activities Club, IIT Bombay (*won Special Mention Award 2011*)

References

Available on Request