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Curriculum vitae last updated: January 30, 2021

Education

Ph.D. - Mechanical Engineering [University of Pennsylvania] May 2019
Dissertation: Modeling and Control for Robotic Assistants: Single and Multi-robot Manipulation

M.S.E. - Robotics [University of Pennsylvania] May 2016
B.S. - Mechanical Engineering [University of Maryland Baltimore County] May 2012

Positions Held

- **Stanford University** — Stanford, CA (Assistant Professor) September 2019-Present
  Teaching courses in undergraduate and graduate dynamics, controls and robotics. Leading the Assistive Robotics and Manipulation (ARM) Laboratory.
- **MIT Lincoln Laboratory** — Boston, MA (Technical Staff) March - August 2019
  Worked in the Engineering Division in group 76 'Control & Autonomous Systems Engineering Group' as Technical Staff.
- **MITRE Corp** — Alexandria, VA (Internship) Summer 2012
  Worked on software for the android phone for obstacle detection during autonomous, fixed-wing flight.
- **University of Pennsylvania** — Philadelphia, PA (Internship) Summer 2011
  Worked on mapping the magnetic field topography for micro-robotic control.
- **Rutgers University** — New Brunswick, NJ (Internship) Summer 2010
  Studied the effects of compaction and additives on the tensile strength of acetaminophen tablets.
- **University of Illinois Urbana Champaign** — Urbana Champaign IL (Internship) Summer 2009
  Developed circuitry designs for regenerative braking in a robotic arm.

Research Interests

My research focuses on developing principles and tools needed to realize assistive robotics, human-robot collaboration and robotic manipulation. Topics that are of particular interest to me include: (1) Robotic Assistants: collaborative robots that work for or alongside human teammates and require modeling of complex tasks and (human) teammate behavior. (2) Connected Devices: passive robotic platforms that enhance an ability of the human user and leverage situational awareness to assist and predict the human users needs. (3) Intelligent Wearables: devices that either augment or enhance a humans ability and is worn on the individual, such devices require situational awareness, and prediction of users intent and actions in order to serve the human users needs. Solutions rely on combination of tools in dynamical systems analysis, control theory (classical, non-linear and robust control), state estimation and prediction, motion planning, vision for robotic autonomy and machine learning. Application areas include autonomous assistive technology, robotic assistants with the goal of deployment for service tasks that may be highly dynamic and require dexterity, situational awareness, as well as human-robot collaboration.

Awards and Certificates

- National Science Foundation Graduate Fellow [University of Pennsylvania]
- GEM Fellow [University of Pennsylvania]
- Outstanding Teaching Assistant Award in Mechanical Engineering [University of Pennsylvania]
- Center for Teaching and Learning (CTL) Teaching Certificate [University of Pennsylvania]
- Meyerhoff Scholar [University of Maryland, Baltimore County]
- Tau Beta Pi Honors Society [University of Maryland, Baltimore County]

Journal Articles

[1] **Monroe Kennedy**, Karl Schmeckpeper, Dinesh Thakur, Jiang Chenfanfu, Vijay Kumar, and Kostas Daniilidis. Autonomous precision pouring from unknown containers. *IEEE Robotics and Automation Letters*, pages 1–1, 2019.

[2] **Monroe Kennedy**, Dinesh Thakur, M Ani Hsieh, Subhrajit Bhattacharya, and Vijay Kumar. Optimal paths for polygonal robots in se (2). *Journal of Mechanisms and Robotics*, 10(2):021005, 2018.

[3] Caio Mucchiani, **Monroe Kennedy**, Mark Yim, and Jun Seo. Object picking through in-hand manipulation using passive end-effectors with zero mobility. *IEEE Robotics and Automation Letters*, 3(2):1096–1103, April 2018.

[4] Edward Steager, Mahmut Selman Sakar, Magee Ceridwen, **Monroe Kennedy**, Anthony Cowley, and Vijay Kumar. Automated biomanipulation of single cells using magnetic microrobots. *The International Journal of Robotics Research*, 32(3):346–359, 2013.

Refereed Conference Articles

[1] **Monroe Kennedy**, Luis Guerrero, and Vijay Kumar. Decentralized algorithm for force distribution with applications to cooperative transport. In *ASME 2015 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, pages V05CT08A013–V05CT08A013. American Society of Mechanical Engineers, 2015.

[2] **Monroe Kennedy**, Kendall Queen, Dinesh Thakur, Kostas Daniilidis, and Vijay Kumar. Precise dispensing of liquids using visual feedback. In *2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 1260–1266, Sept 2017.

[3] Mabel Zhang, **Monroe Kennedy**, M. Ani Hsieh, and Kostas Daniilidis. A triangle histogram for object classification by tactile sensing. In *2016 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 4931–4938, Oct 2016.

Editorials/Invited/Non-refereed/Short Conference Articles and Abstracts

[1] Ayanna Howard and **Monroe Kennedy III**. Robots are not immune to bias and injustice., nov 2020.

[2] Junwu Zhang and **Monroe Kennedy**. Recent development in human motion and gait prediction. *Workshop on Robot Retrospectives, Robot Science and Systems*, 2020.

Professional Service

International Program, Editorial, and Review Committees

- Guest Editor for Field Robotics: *Robotics Collaborative Technology Alliance (RCTA)– Developing Autonomous Robotic Team Members for Unstructured Environments* 2020-2021
- Associate Editor for IEEE International Conference on Robotics and Automation 2020
- Reviewer for International Journal of Robotics Research 2019
- Reviewer for IEEE International Conference on Automation Science and Engineering 2018
- Reviewer for ASME International Design Engineering Technical Conferences 2017-2018
- Reviewer for IEEE Robotics and Automation Letters 2017- 2019
- Reviewer for IEEE International Conference on Intelligent Robots and Systems 2014-2016

Administrative and Organizational Committees

Black in Robotics (non-profit) co-founder and board member 2020-present

University Service

Graduate Admissions Committee, Department of Mechanical Engineering (2019-present)
Diversity, Equity and Inclusion Committee, Department of Mechanical Engineering (2020-present)
Co-lead of Robotics and Autonomous Systems Area, SystemX Stanford University, (2020-present)

Professional Affiliations

- Member, American Society of Mechanical Engineers
- Member, Institution of Electrical and Electronic Engineers

Press Coverage and Media Appearances

- KUKA Innovation award Finalist 2018
- Exploration Earth 2050 "Bio-Mechanimals" (S1E1)
- Bloomberg Technology: "The End of Traffic: How the Smartest People in the World Are Fixing Your Commute"
- Xploration Nature Knows Best (S1E12)

Advising

Doctoral and Pre-doctoral Students

Eley Ng, Ph.D. student, Stanford Mechanical Engineering expected 2023. NSF Graduate Fellow.
Shivani Guptasarma, Ph.D. student, Stanford Mechanical Engineering expected 2023. Knight-Hennessy Scholar
Won Kyung Do, Ph.D. student, Stanford Mechanical Engineering expected 2023.

Masters Thesis/Research Students

Albert Li, M.S. in Mechanical Engineering, Stanford University, expected 2021.
Aliyah Smith, M.S. in Aeronautics & Astronautics, Stanford University, expected 2021.
Gabriela Bravo Illanes, M.S. in Mechanical Engineering, Stanford University, expected 2021.
Luciana Frazao, M.S. in Mechanical Engineering, Stanford University, expected 2021.
Ewurama Nyarkoah Karikari, M.S. in Mechanical Engineering, Stanford University, expected 2021.
Junwu Zhang, M.S. in Mechanical Engineering, Stanford University, expected 2021.
Alexander Maynard, M.S. in Aeronautics & Astronautics, Stanford University, expected 2021.
Moromoke Adekanye, M.S. in Mechanical Engineering, Stanford University, expected 2021.
Holly Dinkel, M.S. in Aeronautics & Astronautics, Stanford University, 2020. Now Aerospace Engineering Ph.D. Student at UIUC.
Manuel Retana, M.S. in Aeronautics & Astronautics, Stanford University, 2020. Now Project Engineer - Environmental Control Systems at NASA.
Richie Ling, M.S. in Mechanical Engineering, Stanford University, 2020. Now a Robotic Systems Engineer at Singapore Technologies Engineering Ltd.

Undergraduate Students

Undergraduate Research is performed for course credit, pay (either through an REU supplement to an NSF grant or from the ME Department SURI program), or volunteer participation. This is a list of undergraduates who have performed reserach in the ARMLab: James Kelly (from January 2020), Bryn Hughes (from June 2020), Rekha Ramanathan (06/2020-1/2021), Ashley Marie Lowber (from October 2020).

Research Experience for Teachers (RET)

At Stanford University: (through the program Igniteducation) Suporn Chenhansa from Ohlone College (Summer 2020, 2021)
At the University of Pennsylvania: (through NSF funded RET) David Devard (science teacher at the School District of Philadelphia) (Summer 2017). Elissa Goldberg School Librarian at School District of Philadelphia (Summer 2016, 2017).

Thesis Defense and Reading Committees

Thesis Defenses:
2019: Margaret Koehler (Stanford PhD)
2020: Jooyeun Ham (Stanford PhD)
2021: Alex Grubele (Stanford PhD, and Reading Committee)
Reading Committees: Gwen Bryan (Stanford, ME), Nathan Spielberg (Stanford, ME), Eric Jordan Gonzalez (Stanford, ME), Benoit Landry (Stanford, Aero-Astro), John Talbot (Stanford, ME), Shenli Yuan (Stanford, ME)

Instruction and Course Development

ME 334: Advanced Dynamics, Controls and System Identification (new course) Modeling and analysis of dynamical systems. This class will cover reference frames and coordinate systems, kinematics and constraints, mass distribution, virtual work, D'Alembert's principle, Lagrange and Hamiltonian equations of motion. We will then consider select topics in controls including: dynamical system stability, feedback linearization, system observability and controllability, and system identification methods. Students will learn and apply these concepts through homework and projects that involve the simulation of dynamical systems. *Stanford University: Spring 2020. 23 students*

ENGR 15: Dynamics The application of Newton's Laws to solve 2-D and 3-D static and dynamic problems, particle and rigid body dynamics, free-body diagrams, and equations of motion, with application to mechanical, biomechanical, and aerospace systems. Computer numerical solution and dynamic response. *Stanford University: Autumn 2020. 31 students*

Invited Presentations

1. Human-Centered Interaction (HCI) Seminar, Stanford, CA, January 29, 2021
2. Bay Area Robotics Symposium, Stanford, CA, November 20, 2020
3. CARS 2020 Annual Meeting, Stanford, CA, November 11, 2020
4. SystemX November Conference, Stanford, CA, November 10, 2020
5. eWEAR Symposium, Stanford, CA, September 10, 2020
6. Bay Area Robotics Symposium, Berkeley, CA, November 15, 2019

Skills

- Dynamics and Controls Analysis, Numerical Optimization, Kalman Filters, Motion Planning, Computer Vision, Machine Learning
- *Programming Languages:* Python, C++ , Matlab
- *Applications:* TensorFlow, Pytorch, ROS, OpenCV, Solid Works, Eigen, Gurobi, LaTeX
- *Operating Systems:* Linux/Unix system
- *Robots:* Panda Franka Emika Manipulator, Allegro Hand, Fetch Mobile Manipulator, Rethink Robotics Baxter and Sawyer, KUKA iiwa and YouBot, Scarab Differential Drive.