Stanford



Monroe Kennedy III

Assistant Professor of Mechanical Engineering and, by courtesy, of Computer Science

NIH Biosketch available Online Curriculum Vitae available Online

Bio

BIO

Monroe Kennedy III is an Assistant Professor of Mechanical Engineering, with a courtesy appointment in Computer Science. He is the recipient of the NSF Career Award. He received his Ph.D. in Mechanical Engineering and Applied Mechanics, and a Masters in Robotics from the University of Pennsylvania where he was a recipient of both the NSF and GEM graduate research fellowships. His area of expertise is in collaborative robotics, specifically the development of theoretical and experimental approaches to enhance robotic autonomy and robotic effectiveness in decentralized tasks toward human-robot collaboration. He applies expertise in machine learning, computer vision, collaborative robot teammate intent estimation, dynamical systems analysis, control theory (classical, non-linear, and robust control), state estimation and prediction, and motion planning.

He is the director of the Assistive Robotics and Manipulation Lab (ARMLab) whose broad research objective is to develop technology that improves everyday life by anticipating and acting on the needs of human counterparts. ARMLab specializes in developing intelligent robotic systems that can perceive and model environments, humans, and tasks and leverage these models to predict system processes and understand their assistive role. The research can be divided into the following sub-categories: robotic assistants, connected devices, and intelligent wearables. ARMLab research requires the use of a 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, teammate intent estimation, and machine learning. ARMLab focuses heavily on both the analytical and experimental components of collaborative robotics. Research applications include autonomous assistive technology, robotic assistants (mobile manipulators and humanoids) with the goal of deployment for service tasks that may be highly dynamic and require dexterity, situational awareness, and human-robot collaboration.

ACADEMIC APPOINTMENTS

- Assistant Professor, Mechanical Engineering
- Assistant Professor (By courtesy), Computer Science
- Member, Bio-X
- Faculty Affiliate, Institute for Human-Centered Artificial Intelligence (HAI)
- Member, Wu Tsai Human Performance Alliance

HONORS AND AWARDS

- Faculty Early Career Award, National Science Foundation (February 24, 2022)
- Graduate Research Fellowship, National Science Foundation (2013-2018)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, American Society of Mechanical Engineers (2015 - present)
- Member, Institute of Electrical and Electronics Engineers (2016 - present)

PROGRAM AFFILIATIONS

- Center for Automotive Research at Stanford (CARS)
- Stanford SystemX Alliance

PROFESSIONAL EDUCATION

- PhD, University of Pennsylvania , Mechanical Engineering and Applied Mechanics (2019)
- MS, University of Pennsylvania , Robotics (2016)
- BS, University of Maryland, Baltimore County , Mechanical Engineering (2012)

COMMUNITY AND INTERNATIONAL WORK

- National Director for Black in Robotics

LINKS

- Assistive Robotics and Manipulation Lab: https://arm.stanford.edu
- Google Scholar: https://scholar.google.com/citations?user=x2ZPRfoAAAAJ&hl=en&oi=ao

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

My research is to develop technology that improves everyday life by anticipating and acting on the needs of human counterparts. The research can be divided into the following sub-categories: robotic assistants, connected devices and intelligent wearables. I use a 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. My Assistive Robotics and Manipulation lab (arm.stanford.edu) focuses heavily on both the analytical and experimental components of assistive technology design. While our application area domain is autonomous assistive technology, our primary focus is robotic assistants (mobile manipulators and humanoids) with the goal of deployment for service tasks that may be highly dynamic and require dexterity, situational awareness, and human-robot collaboration.

Teaching

COURSES

2026-27

- Collaborative Robotics: CS 339R, ME 326 (Win)
- Dynamics: ENGR 15 (Aut)
- Robotic Dexterity: Principles and Practice: ME 314 (Spr)

2025-26

- Collaborative Robotics: CS 339R, ME 326 (Win)
- Dynamics: ENGR 15 (Spr)

2024-25

- Collaborative Robotics: CS 339R, ME 326 (Win)

- Dynamics: ENGR 15 (Aut)
- Robotic Dexterity: Principles and Practice: ME 314 (Spr)

2023-24

- Advanced Dynamics, Modeling and Analysis: ME 334 (Spr)
- Collaborative Robotics: CS 339R, ME 326 (Win)
- Dynamics: ENGR 15 (Aut)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Wesley Guo, Boyeon Kim, Daniel Morton, Gadi Sznaier Camps

Orals Chair

Timothy Chen, Moo Kim

Postdoctoral Faculty Sponsor

Yanda Yang

Doctoral Dissertation Advisor (AC)

Max Burns, Ankush Dhawan, Cindy Huang, Maisha Khanum, Shalika Neelaveni, Jinho So

Master's Program Advisor

Marc Bernardino, Jeffery Cai, Matthew Hart, Akshat Jain, Anna Jensen, Ethan Le, Mark Leone, Aaron Li, Alexandre Menon, Ahmed Muhammad, Quynh Nguyen, Kai Rayle, Ashlynn Sweet, Gabrielle Walrath, Luke Yuen, Stanley Zhou

Doctoral Dissertation Co-Advisor (AC)

William Chong, Yunxin Fan

Doctoral (Program)

Judith Brown, William Heap, Matt Strong, Aiden Swann

Publications

PUBLICATIONS

- **Learning Humanoid Navigation From Human Data** *IEEE ROBOTICS AND AUTOMATION LETTERS*
  Wang, W., Ze, Y., Liu, C., Kennedy, M.
  2026; 11 (9): 10449-10456
- **DexFruit: Dexterous Manipulation and Gaussian Splatting Inspection of Fruit** *IEEE ROBOTICS AND AUTOMATION LETTERS*
  Swann, A., Qiu, A., Strong, M., Zhang, A., Morstein, S., Rayle, K., Kennedy, M.
  2026; 11 (2): 2034-2041
- **TensorTouch: Calibration of Tactile Sensors for High Resolution Stress Tensor and Deformation for Dexterous Manipulation** *IEEE TRANSACTIONS ON ROBOTICS*
  Do, W., Strong, M., Swann, A., Lei, B., Kennedy, M.
  2026; 42: 2107-2126
- **ProACT: An Augmented Reality Testbed for Intelligent Prosthetic Arms** *IEEE TRANSACTIONS ON NEURAL SYSTEMS AND REHABILITATION ENGINEERING*
  Guptasarma, S., Kennedy, M. D.
  2025; 33: 354-365

- **Dynamic Layer Detection of Thin Materials using DenseTact Optical Tactile Sensors** *2025 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*
  Dhawan, A., Chungyoun, C., Ting, K., Kennedy, M.
  2025
- **Understanding and Imitating Human-Robot Motion with Restricted Visual Fields**
  Bhatt, M., Zhen, H., Kennedy, M., Mehr, N.
  2025: 9932-9939
- **A Control Barrier Function for Safe Navigation with Online Gaussian Splatting Maps**
  Chen, T., Swann, A., Yu, J., Shorinwa, O., Murai, R., Kennedy, M., Schwager, M.
  edited by Ott, C.
  IEEE.2025: 11758-11765
- **Next Best Sense: Guiding Vision and Touch with FisherRF for 3D Gaussian Splatting**
  Strong, M., Lei, B., Swann, A., Jiang, W., Daniilidis, K., Kennedy, M.
  edited by Ott, C.
  IEEE.2025: 3204-3210
- **Black in Robotics: Improving community and equity in the field of robotics.** *Science robotics*
  Kennedy, M., Howard, A.
  2024; 9 (97): eadu2915
- **Inter-finger Small Object Manipulation With DenseTact Optical Tactile Sensor** *IEEE ROBOTICS AND AUTOMATION LETTERS*
  Do, W., Aumann, B., Chungyoun, C., Kennedy, M.
  2024; 9 (1): 515-522
- **Splat-MOVER: Multi-Stage, Open-Vocabulary Robotic Manipulation via Editable Gaussian Splatting**
  Shorinwa, O., Tucker, J., Smith, A., Swann, A., Chen, T., Firoozi, R., Kennedy, M., Schwager, M.
  edited by Kroemer, O., Agrawal, P., Burgard, W.
  JMLR-JOURNAL MACHINE LEARNING RESEARCH.2024
- **Facial Haptic Feedback for Robotic Prostheses**
  Guptasarma, S., Vuong, B. B., Okamura, A. M., Kennedy, M.
  edited by Pons, J. L., Tornero, J., Akay, M.
  SPRINGER INTERNATIONAL PUBLISHING AG.2024: 311-315
- **DenseTact-Mini: An Optical Tactile Sensor for Grasping Multi-Scale Objects From Flat Surfaces**
  Do, W., Dhawan, A., Kitzmann, M., Kennedy, M., IEEE
  IEEE.2024: 6928-6934
- **Facial Haptic Feedback for Robotic Prostheses**
  Guptasarma, S., Vuong, B., Okamura, A., Kennedy, M.
  2024
- **Splat-mover: Multi-stage, open-vocabulary robotic manipulation via editable gaussian splatting**
  Shorinwa, O., Tucker, J., Smith, A., Swann, A., Chen, T., Firoozi, R., Kennedy, M., Schwager, M.
  2024
- **Touch-GS: Visual-Tactile Supervised 3D Gaussian Splatting**
  Swann, A., Strong, M., Do , W., Sznaier, G., Schwager, M., Kennedy, M.
  2024: 10511-10518
- **Embedded Object Detection and Mapping in Soft Materials Using Optical Tactile Sensing** *SN Computer Science*
  Solano-Castellanos, J. A., Do, W., Kennedy, M.
  2024; 5
- **The role of collaborative robotics in assistive and rehabilitation applications.** *Science robotics*
  Kennedy, M.

2023; 8 (83): eadk6743

- **Trajectory and Sway Prediction Towards Fall Prevention.** *IEEE International Conference on Robotics and Automation : ICRA : [proceedings]. IEEE International Conference on Robotics and Automation*
  Wang, W., Raitor, M., Collins, S., Liu, C. K., Kennedy, M.
  2023; 2023: 10483-10489
- **DenseTact 2.0: Optical Tactile Sensor for Shape and Force Reconstruction**
  Do, W., Jurewicz, B., Kennedy, M.
  2023: 12549-12555
- **Diffusion Co-Policy for Synergistic Human-Robot Collaborative Tasks** *IEEE Robotics and Automation Letters*
  Ng, E., Liu, Z., Kennedy, M.
  2023: 1-8
- **Trajectory and Sway Prediction Towards Fall Prevention**
  Wang, W., Raitor, M., Collins, S., Liu, C., Kennedy, M.
  2023: 10483-10489
- **It Takes Two: Learning to Plan for Human-Robot Cooperative Carrying**
  Ng, E., Liu, Z., Kennedy, M.
  2023: 7526-7532
- **DenseTact: Optical Tactile Sensor for Dense Shape Reconstruction**
  Do, W., Kennedy, M.
  2022: 6188-6194
- **Replay Overshooting: Learning Stochastic Latent Dynamics with the Extended Kalman Filter** *IEEE International Conference on Robotics and Automation*
  Li, A. H., Wu, P., Kennedy, M.
  2021: 852-858
- **Considerations for the Control Design of Augmentative Robots**
  Guptasarma, S., Kennedy, M.
  IEEE IROS Workshop on Building and Evaluating Ethical Robotic Systems.
  2021
- **Robots are not immune to bias and injustice.** *Science robotics*
  Howard, A., Kennedy, M. 3.
  2020; 5 (48)
- **Recent Development in Human Motion and Gait Prediction**
  Zhang, J., Kennedy, M.
  RSS 2020 Workshop RobRetro.
  2020
- **Autonomous Precision Pouring From Unknown Containers** *IEEE ROBOTICS AND AUTOMATION LETTERS*
  Kennedy, M., Schmeckpeper, K., Thakur, D., Jiang, C., Kumar, V., Daniilidis, K.
  2019; 4 (3): 2317–24
- **Modeling And Control For Robotic Assistants: Single And Multi-Robot Manipulation**
  Kennedy, M. D.
  Publicly Accessible Penn Dissertations.
  2019 (3299):
- **Optimal Paths for Polygonal Robots in SE(2)**
  Kennedy, M., Thakur, D., Hsieh, M., Bhattacharya, S., Kumar, V.
  ASME.2018
- **Object Picking Through In-Hand Manipulation Using Passive End-Effectors With Zero Mobility** *IEEE ROBOTICS AND AUTOMATION LETTERS*

Mucchiani, C., Kennedy, M., Yim, M., Seo, J.
2018; 3 (2): 1096–1103

- **Precise dispensing of liquids using visual feedback** *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*
  Kennedy, M. D., Queen, K., Thakur, D., Daniilidis, K., Kumar, V.
  2017
- **Precise Dispensing of Liquids Using Visual Feedback**
  Kennedy, M., Queen, K., Thakur, D., Daniilidis, K., Kumar, V.
  edited by Bicchi, A., Okamura, A.
  IEEE.2017: 1260–66
- **A Triangle Histogram for Object Classification by Tactile Sensing**
  Zhang, M. M., Kennedy, M. D., Hsieh, M., Daniilidis, K., IEEE
  IEEE.2016: 4931–38
- **DECENTRALIZED ALGORITHM FOR FORCE DISTRIBUTION WITH APPLICATIONS TO COOPERATIVE TRANSPORT**
  Kennedy, M. D., Guerrero, L., Kumar, V., ASME
  AMER SOC MECHANICAL ENGINEERS.2016
- **Decentralized Algorithm for Force Distribution With Applications to Cooperative Transport** *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*
  Kennedy III , M., Guerrero, L., Kumar, V.
  2015
- **Automated biomanipulation of single cells using magnetic microrobots** *INTERNATIONAL JOURNAL OF ROBOTICS RESEARCH*
  Steager, E. B., Sakar, M., Magee, C., Kennedy, M., Cowley, A., Kumar, V.
  2013; 32 (3): 346–59