Pragna Mannam, Ph.D.

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Robotic manipulation specialist skilled in designing robotic hands to achieve human-like dexterity and deploying them on real systems.

Education

August 2019 - January 2024 **Carnegie Mellon University, Pittsburgh, PA**
Ph.D. in Robotics, Robotics Institute, School of Computer Science Advisors : Prof. Nancy Pollard, Prof. Jean Oh
Thesis Title: **Design Iteration of Dexterous Compliant Robotic Manipulators**

August 2017 - May 2019 **Carnegie Mellon University, Pittsburgh, PA**
MS in Robotics, Robotics Institute, School of Computer Science Advisor : Prof. Matthew T. Mason
Thesis Title: **Model-free Sensorless Manipulation**

August 2013 - May 2017 **Carnegie Mellon University, Pittsburgh, PA**
BS in Electrical and Computer Engineering, College of Engineering Advisor : Prof. Matthew T. Mason

Projects

Design Iteration for Dexterous Anthropomorphic Soft Robotic Hands *2022-2024*
Guide: Prof. Nancy Pollard, Prof. Jean Oh, Carnegie Mellon University, Pittsburgh, PA, USA (*PhD thesis*)
- Designed customizable tendon-driven anthropomorphic hands with soft materials
- Tackled sim-to-real gap for design optimization of dexterous hand

Sensorization of Compliant Delta Robot Manipulators *2021-22*
Guide: Prof. Abhinav Gupta and Dr. Tess Hellebrekers, *Meta AI*, Pittsburgh, PA, USA
- Mapped state estimation of soft Delta robot end-effector using magnetometer sensing for dynamic object handover

Compliant Delta Manipulator Fingers for Autonomous Manipulation *2019-2022*
Guide: Prof. Zeynep Temel, Prof. Oliver Kroemer, Carnegie Mellon University, Pittsburgh, PA, USA
- Designed Delta parallel manipulator with flexural hinges
- Executed dexterous manipulation skills with Delta robots as modular fingers

Deformable and Rigid Object Manipulation using Force Feedback *2018*
Guide: Dr. Katharina Muelling, Carnegie Mellon University, Pittsburgh, PA, USA
- Learned suction gripper grasp strategies with force-torque feedback

Sensorless Pose Determination using Randomized Action Sequences *2015-18*
Guide: Prof. Matthew T. Mason, Carnegie Mellon University, Pittsburgh, PA, USA (*Masters thesis*)
- Designed randomized deterministic action sequences to reorient objects from unknown initial states

Media Coverage

- Soft Robotic Hand Design featured in New York Times Article *This Robot Can Paint. But Is It Art?*, *May 2023*
- Filmed Sensorless Pose Determination project for WQED Series on Workforce development as a result of technological changes and automation, *Aired on March 21, 2019 at 8pm EST*

Awards and Scholastic Achievements

- **Best Demo Finalist** at 2024 IEEE-RAS International Conference on Soft Robotics
- **Best Oral Paper Finalist** at 2023 IEEE-RAS International Conference on Humanoid Robots
- Kanaka Muira Award at 2023 IEEE-RAS International Conference on Humanoid Robots
- 2022 Intelligent Symbiotic Systems Moonshot Funding from CMU College of Engineering
- 2017 CMU Small Undergraduate Research Grant (SURG) for Sensorless Pose Determination project
- Fall 2016 CMU College of Engineering Dean's list

Publications

Conference and Journal Publications:

- *P. Mannam*, X. Liu, D. Zhao, J. Oh, & N. Pollard. Design and Control Co-Optimization for Automated Design Iteration of Dexterous Anthropomorphic Soft Robotic Hands. In 7th IEEE-RAS International Conference on Soft Robotics (RoboSoft), 2024. **Best Demo Finalist**
- A. Kannan, K. Shaw, S. Bahl, *P. Mannam*, & D. Pathak. DEFT: Dexterous Fine-Tuning for Hand Policies. In 7th Annual Conference on Robot Learning (CORL), 2023.
- *P. Mannam*, K. Shaw, D. Bauer, J. Oh, D. Pathak, and N. Pollard. Designing Dexterous Anthropomorphic Soft Hands through Interaction. In IEEE-RAS International Conference on Humanoid Robots, 2023.
  Best Oral Paper Finalist
- S. Patil, S.C. Alvares, *P. Mannam*, O. Kroemer, and F.Z. Temel.
  DeltaZ: An Accessible Compliant Delta Robot Manipulator for Research and Education. In IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022.
- *P. Mannam*, A. Rudich, K. Zhang, M. Veloso, O. Kroemer, and F.Z. Temel.
  A Low-Cost Compliant Gripper Using Cooperative Mini-Delta Robots for Dexterous Manipulation.
  In Robotics: Science and Systems (RSS), 2021.
- S. Thompson, *P. Mannam*, Z. Temel and O. Kroemer,
  Towards Robust Planar Translations using Delta-Manipulator Arrays, In 2021 IEEE International Conference on Robotics and Automation (ICRA), 2021.
- *P. Mannam*, O. Kroemer, F.Z. Temel,
  Characterization of Compliant Parallelogram Links for 3D-Printed Delta Manipulators. In International Symposium on Experimental Robotics (ISER), 2020.
- *P. Mannam*, A. Volkov Jr., R. Paolini, G. Chirikjian, M. T. Mason.
  Sensorless Pose Determination using Randomized Action Sequences. *Entropy*, 21(2), 154. 2019.

Workshop Publications:

- A. Kannan, K. Shaw, S. Bahl, *P. Mannam*, & D. Pathak. DEFT: Dexterous Fine-Tuning for Hand Policies. Towards Generalist Robots Workshop at Conference on Robot Learning (CORL), 2023. Poster presentation.
- *P. Mannam*, A. Volkov Jr., R. Paolini, G. Chirikjian, M. T. Mason
  Sensorless Pose Determination using Randomized Action Sequences. Manipulation Intelligence Workshop at International Conference on Intelligent Robots and Systems (IROS), 2018. Oral and poster presentation.

Internships

Manipulation of Deformable and Rigid Objects *(Summer 2018)*
Guide: Dr. Katharina Muelling, *National Robotics Engineering Center* (NREC), Pittsburgh, PA, USA

- Used suction grippers to pick and place deformable and rigid objects
- Accommodated dense to sparse packing of objects for pick-and-place tasks

Hydraulic Off-Road Vehicle Conversion to Electric Steer-by-Wire *(Summer 2016)*
Guide: David A. Johnson, *John Deere*, Cary, NC, USA

- Developed and tested steer-by-wire system for controlling off-road equipment
- Designed electrical wiring foundation for addition of "smart" capabilities to aid user

Leadership Experience and Outreach

- **SCS Dean's PhD Student Advisory Committee, CMU** *(Dec '19 - Dec '23)*
- **Robotics Institute Climate Committee, CMU** *(Feb '20 - Feb '21)*
- **Vice-President of Graduate Student Life**, Graduate Student Assembly, CMU *(Aug '18 - May '19)*
- **Provost Search Committee and University Student Affairs Council** *(Aug '18 - May '19)*
- **Department Representative and Advocate**, Graduate Student Assembly, CMU *(Aug '17 - Jul '18)*
- **Executive Member**, Society of Women Engineers *(Jun '15 - May '17)*