Elizabeth "Bibit" Bianchini

I am a PhD student interested in data-efficient, dynamic robotic manipulation in contact-rich settings. Specifically, I work on model predictive control and building dynamics models of novel objects as quickly as possible, with the aim of enabling robotic manipulation in the wild.

Roboticist, Mechanical Engineer
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EDUCATION

University of Pennsylvania - Ph.D. Mechanical Engineering   *Entered Fall 2020*
- Advised by Michael Posa and Dan Koditschek

Stanford University - M.S. Mechanical Engineering   *Class of 2020*
- Specialization in Mechatronics

Massachusetts Institute of Technology - B.S. Mechanical Engineering   *Class of 2018*
- Concentration in Philosophy

PUBLICATIONS

[1] B. Bianchini, M. Halm, and M. Posa, "Simultaneous learning of contact and continuous dynamics," in *Conference on Robot Learning.* PMLR, 2023, pp. 3966–3978.

[2] E. Bianchini, P. Verma, J. K. S. Jr., and E. Chassaing, "Systems and methods for tactile gesture interpretation," U.S. Patent Application US18/061,341, December, 2022. [Online]. Available: https://patents.google.com/patent/US20230173669A1

[3] B. Bianchini, M. Halm, N. Matni, and M. Posa, "Generalization bounded implicit learning of nearly discontinuous functions," in *Learning for Dynamics and Control Conference.* PMLR, 2022, pp. 1112–1124.

[4] B. Bianchini, P. Verma, and J. K. Salisbury, "Towards human haptic gesture interpretation for robotic systems," in *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).* IEEE, 2021, pp. 7334–7341.

[5] E. Bianchini, "Fabricating sand cast parts for a herreshoff steam engine," Undergraduate Thesis, Massachusetts Institute of Technology, 2018.

[6] S. Resnick, E. Bianchini, K. Kocher, and A. McInroy, "Tool attachment for raking mortar joints," U.S. Patent 10,544,597, December, 2017. [Online]. Available: https://patents.google.com/patent/US10544597

PRESENTATIONS AND WORKSHOP PARTICIPATION

IROS Workshop on Leveraging Models for Contact-Rich Manipulation - Invited speaker   *October 2023*
"Sampling-Based Model Predictive Control for Contact-Rich Manipulation"

Unstable Zeros Lab Group Meeting - Invited speaker   *March 2023*
"Robots Leaning into and Learning through Frictional Contact"

RSS Differentiable Simulation Workshop - Invited speaker   *July 2022*
"Avoiding Poor Generalizability of Differentiable Simulation"

ICRA Workshop on Neural Implicit Geometry - Accepted paper   *May 2022*
"Simultaneously Learning Contact and Continuous Dynamics"

ICRA Workshop on Ethical Challenges of Lethal Autonomous Weapons Systems - Participant   *May 2022*

AWARDS

National Defense Science and Engineering Graduate (NDSEG) Fellow   *2020 to 2023*
National Science Foundation (NSF) Graduate Research (GRFP) Fellow (declined)   *2020*
Ford Foundation Predoctoral Scholar (declined)   *2020*
Threshold Ventures Fellow (formerly known as DFJ Fellowship)   *2019*
1st Place in Undergraduate Division, Collegiate Inventors Competition [6]   *2018*

Research Experience

Penn DAIR Lab - PhD Student   *June 2020 to present*
  Combines model-based and data-driven approaches to contact-rich robotic manipulation [1, 3].

Stanford Salisbury Robotics Lab - Graduate researcher and consultant   *Dec. 2019 to Sept. 2020*
  Classified force data readings from UR5e robotic arm to interpret human touch gestures [2, 4].

Stanford CHARM Lab - Graduate researcher   *March 2019 to June 2019*
  Implemented the hardware and software for a haptic bracelet made with voice coils for use in virtual reality.

MIT Stress Line Additive Manufacturing Project - Undergraduate researcher   *Sept. 2014 to Dec. 2014*
  Implemented non-planar additive manufacturing method using Kuka robotic arm to deposit material in response to
    3D flow of forces in structures under load.

Industry Experience

Boston Dynamics AI Institute - Research Intern   *May to Dec. 2023*
  Joined a team aiming to equip robots to watch, understand, and perform new tasks on the fly.
  Built an interactive, manipulation-based model-building process for learning dynamics models of novel objects.

Intuitive Surgical - Mechanical Engineering Intern   *June to Sept. 2019*
  Designed an injection-molded subassembly for Ion, a lung biopsy robot.
  Designed, fabricated, and validated an electromechanical test fixture for a system part.

Uber Advanced Technologies Group - Hardware Engineering Intern   *June to Sept. 2017*
  Compared 4 simulation methods against real-world data to guide simulation tool development.
  Planned and executed testing to stress specific autonomous features on a test track.

Fitbit - Mechanical Engineering Intern   *June to Aug. 2016*
  Ran a cross-disciplinary project to balance electromechanical components with user considerations.
  Oversaw the build of an injection-molded part at a factory in Shenzhen, China.

Carnegie Robotics - Mechanical Engineering Intern   *June to Aug. 2015, 2014*
  Generated 3D point cloud maps of city infrastructure for a confidential project.
  Wrote data collection and analysis programs to quantify LIDAR scanner performance.

New Valence Robotics - Design Intern   *Jan. 2015*
  Worked for a startup providing schools with 3D printers and Common Core lesson plans utilizing the printers.
  Headed a team of interns to generate lesson plans, CAD models, and documentation to teach students concepts.

Teaching Experience

Penn ENGR 1050 Introduction to Scientific Computing - Teaching Assistant   *Aug. to Dec. 2023*
  Developed assignments, held office hours, gave fill-in lectures for introductory Python course.

Penn MEAM 2110 Engineering Mechanics: Dynamics - Teaching Assistant   *Jan. to June 2023*
  Held recitations, gave fill-in lectures for undergraduate dynamics course.

Penn MEAM 520 Introduction to Robotics - Teaching Assistant   *Jan. to June 2022*
  Developed and ran written assignments and practical labs with Franka Panda robotic arms.

Stanford ME 218 Mechatronics Series - Teaching Assistant   *Sept. 2019 to June 2020*
  Collaboratively designed new game challenges for teams to design and construct competitive mechatronic systems.
  Assisted with circuit design and implementation, and corresponding C and assembly programming.

MIT 2.007 Robotics Pappalardo Apprenticeship - Teaching Assistant   *Jan. to June 2018, 2017*
  Assisted students in designing and fabricating their custom robots to compete in a new annual robotics challenge.
  Sandcast and machined parts from original drawings of an 1897 Herreshoff steam engine, now on display at the MIT
    Museum, as part of a collaborative Pappalardo Apprentice project documented in my undergraduate thesis [5].

Global Teaching Labs - Teacher   *Jan. 2017, 2018*
  Led students aged 8-15 at the American School of Tangier in Morocco and Tecnológico de Monterrey Guadalajara in
    Mexico through makerspace projects, including a PID-controlled balancing robot and electronic pinhole cameras.

SERVICE AND MENTORSHIP

Penn Diversity, Equity, and Inclusion (DEI) MEAM Task Force - DEI Scholar *Jan. 2022 to present*
  Develop and lead a DEI project to increase representation of under-represented groups in future PhD cohorts.

Polygence - Research Mentor *Jan. 2022 to present*
  Mentor high school students through self-directed research projects, including writing robotics review papers.

More Active Girls in Computic (MAGIC) - Project Mentor *Dec. 2020 to April 2022*
  Mentor high school girls in independent mechatronics projects, including a hanging drawbot and autonomous car.

The Tech Challenge, San Jose Tech Museum - Team Mentor *Oct. 2018 to April 2020*
  Mentor a middle school student team through building a hovercraft and catapult for the annual Tech Challenge.

MIT MakerWorkshop - Mentor, Milling Machine Specialist *Jan. to June 2018*
  Trained and supervised MIT graduate and undergraduate students on safe milling machine use.

MIT Maker Lodge - Freshmen Mentor, CAD/CAM Training Chair *Sept. 2016 to June 2018*
  Developed training curriculum and qualified MIT freshmen for campus machine shop use through equipment training.

LEADERSHIP

MIT Design for America (DFA) - President, Project Director *Sept. 2015 to June 2018*
  Recruited and provided resources for 8 project teams to tackle real-world design problems in the local community.

MIT Camp Kesem - Camp Counselor *Sept. 2016 to Aug. 2018*
  Coordinated a unit of kids aged 13-16 years whose parents are/were affected by cancer for a week-long camp.

MIT TechX, MakeMIT - 2016 Event Director *Sept. 2014 to June 2016*
  Directed a committee to organize and raised $48K in corporate sponsorships for a 300 person hardware hackathon.

MIT Robotics Team - Executive Mechanical Engineer *Sept. 2014 to June 2016*
  Designed and presented rovers at GITEX conference in Dubai, UAE for NASA Sample Return Centennial Challenge.