

NEEL DOSHI

Intelligence Community Postdoctoral Fellow

nddoshi@mit.edu · <https://neeld.github.io> · 516-662-6438

MIT Building 3, Room 070 · Cambridge, MA 02139

EDUCATION

Harvard University Doctor of Philosophy, Engineering Sciences Thesis: <i>Model-based design, control, and planning for legged microrobots</i> Advisors: Robert J. Wood & Scott Kuindersma	Cambridge, MA <i>May 2019</i>
Harvard University Master of Science, Engineering Sciences	Cambridge, MA <i>Nov 2015</i>
University of Pennsylvania Master of Science, Robotics	Philadelphia, PA <i>May 2013</i>
University of Pennsylvania Bachelor of Science, <i>summa cum laude</i> , Mechanical Engineering Minors: Electrical Engineering, Mathematics	Philadelphia, PA <i>May 2012</i>

PROFESSIONAL EXPERIENCE

Massachusetts Institute of Technology <i>IC Postdoctoral Fellow, The MCube Lab</i>	Cambridge, MA <i>April 2019-Present</i>
<ul style="list-style-type: none">Combining mechanics and trajectory optimization to develop tools for planning, estimation, and control through contact for robotic manipulation.Designing robotic fingers that leverage switchable adhesion to simplify dexterous manipulation.	
Harvard University <i>Doctoral Student, Harvard Microrobotics Laboratory</i>	Cambridge, MA <i>Sept 2013-March 2019</i>
<ul style="list-style-type: none">Used trajectory optimization and machine learning to plan and control the locomotion of millimeter-scale (mm-scale) legged robots, e.g., the Harvard Ambulatory Microrobot (HAMR).Developed techniques to optimized the design of mm-scale structures with applications to the design of robot-feet that enable novel locomotion modalities, including climbing and swimming.	
University of Pennsylvania <i>Research Assistant, ModLab</i>	Philadelphia, PA <i>Mar 2012-July 2013</i>
<ul style="list-style-type: none">Developed an analytic simulator to resolve the hydrodynamics of a large (100+ node) elastically linked modular sea-bases for DARPA (Defense Advanced Research Projects Agency) research.	
NASA Goddard Space Flight Center <i>Robotics Intern, NASA-GSFC</i>	Greenbelt, MD <i>Summer 2011</i>
<ul style="list-style-type: none">Designed, analyzed, and manufactured a protective thermal enclosure for the electronics of Grover 2, an autonomous rover designed to explore Greenland's ice sheets.	

SELECTED PUBLICATIONS

Planning and control through contact

10. **N. Doshi***, O.T. Taylor* et al., *Manipulation of unknown objects via contact configuration regulation*. Submitted to the International Conference on Robotics and Automation (ICRA) 2022.

*contributed equally

9. J. Gruenstein, T. Chen, **N. Doshi**, and P. Agrawal, *Residual Model Learning for Microrobot Control*. ICRA 2021.
8. **N. Doshi**, F.R. Hogan, and A. Rodriguez, *Hybrid differential dynamic programming for planar manipulation primitives*. ICRA 2020.

SELECTED PUBLICATIONS (CONT.)

7. Z. Manchester, **N. Doshi**, R. J. Wood, and S. Kuindersma, *Contact-Implicit trajectory optimization using variational integrators*. The International Journal of Robotics Research (IJRR) 2019.
6. **N. Doshi**, et al., *Contact-implicit optimization of locomotion trajectories for a quadrupedal microrobot*. Robotics: Science and Systems (RSS) 2018.

Design for manipulation and locomotion

5. R. Jiang et al. including **N. Doshi**, *Shape and Motion Optimization of Rigid Planar Manipulators for Contact Trajectory Satisfaction*. Submitted to ICRA 2022.
4. I. H. Taylor et al. including **N. Doshi**, *PnuGrip: An active two-phase gripper for dexterous manipulation*. International Conference on Intelligent Robots and Systems (IROS) 2020.
3. S. D. Rivaz et al. including **N. Doshi**, *Inverted and vertical climbing of a quadrupedal microrobot using electroadhesion*. Science Robotics 2018.
2. Y. Chen, **N. Doshi**, et al. *Controllable water surface to underwater transition through electrowetting in a hybrid terrestrial-aquatic microrobot*. Nature Communications 2018.
1. **N. Doshi** et al., *Model driven design for flexure-based microrobots*. IROS 2015.

AWARDS AND RECOGNITION

Fellowships

Intelligence Community Postdoctoral Research Fellowship [†]	2019-2021
National Defense Science and Engineering Graduate (NDSEG) Fellowship [†]	2014-2017
Honorable Mention, National Science Foundation (NSF) Graduate Fellowship	2014

Best Paper/Project Awards

RA-L Best Paper Award	2020
Finalist, Best Conference Paper Award (ICRA)	2018
Finalist, Best Conference Paper Award (IROS)	2017
Best Automation Paper (ICRA)	2014
William K. Gemmill Memorial Award for Senior Design Project	2012

Popular Press

Popular Mechanics, Science Daily, My Science (+75 more) for publication 3	2018
Wired, TechTimes, Tech Xplore, (+15 more): for publication 2	2018

INTELLECTUAL PROPERTY

N.C. Daffe, A. Rodriguez, **N. Doshi**, and I. Taylor, *PnuGrip: an active two-phase gripper for dexterous manipulations*. Provisional Application, 2020.

TECHNICAL SKILLS

- **Software Skills:** MATLAB, Python, C++, and Robot Operating System (ROS).
- **CAD and Fabrication Skills:** SolidWorks, OnShape, DraftSight, 3D printing, laser cutting, and laminate manufacturing.

References can be provided upon request.

For a full academic CV, see <https://neeld.github.io/assets/pdfs/CV.pdf>.

[†]full funding