NEEL DOSHI

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SUMMARY

Applied scientist specializing in autonomous robotic manipulation and locomotion. Expertise in control, optimization, mechanics, and machine learning across systems from cm-scale legged robots to industrial arms. Proven cross-functional technical leadership in research and production environments. U.S. citizen.

EDUCATION

Harvard University — Cambridge, MA
Doctor of Philosophy, Engineering Sciences — *May 2019*
Thesis: *Model-based design, control, and planning for legged microrobots*
Advisors: Robert J. Wood, Scott Kuindersma

University of Pennsylvania — Philadelphia, PA
Master of Science, Robotics (GPA: 3.9/4.0) — *May 2013*

University of Pennsylvania — Philadelphia, PA
Bachelor of Science, *summa cum laude*, Mechanical Engineering (GPA: 3.83/4.0) — *May 2012*

PROFESSIONAL EXPERIENCE

Amazon Robotics — Seattle, WA
Senior Applied Scientist, Vulcan Stow — *Oct 2025-Present*

- Developing next-generation affordances to improve bin manipulation success rate and reduce defects.
- Lead weekly operations reviews, synthesizing metrics to identify and prioritize critical execution gaps.

Applied Scientist, Vulcan Stow — *Jun 2022 - Sep 2025*

- Led cross-functional defect reduction initiative across Hardware, Motion Planning, and Perception, reducing defect rates 61% through data-driven roadmaps and technical decision-making.
- Developed affordance generation algorithms for stowing, reducing cycle time and increasing success rate 1%. Co-designed and implemented a shared C++ library that is now a critical production dependency.
- Architected and scaled a program-wide A/B testing infrastructure with factorial experimentation, accelerating data collection 20% and enabling rigorous cross-team evaluation.
- Mentored scientists and supported hiring (52+ interviews), organized 2024–2025 intern recruiting, and strengthened cross-team execution through on-call leadership and technical guidance.

Massachusetts Institute of Technology — Cambridge, MA
Postdoctoral Researcher, The MCube Lab — *Apr 2019-Apr 2022*

- Developed a mechanics-, trajectory optimization-, and ML-based framework for contact-rich manipulation of real-world objects (in collaboration with Amazon Robotics & AI).
- Introduced contact-configuration regulation for manipulation of unknown polygonal objects, modeling contact location, geometry, and mode across robot, object, and environment.
- Mentored 5 researchers (PhD, MS, RA, high school), co-authoring publications with each.
- Built cross-disciplinary collaborations resulting in two publications.

SKILLS

- **Analytical:** Nonlinear, quadratic, and linear programming; trajectory optimization; optimal control and estimation; mechanics and dynamics; machine learning.
- **Software:** C++; Python; MATLAB and Simulink; Robot Operating System (ROS).
- **Fabrication**: SolidWorks; OnShape; DraftSight; 3D printing; laser cutting; laminate manufacturing.
- **Languages:** English (native); Gujarati (fluent); Hindi (basic).

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RESEARCH EXPERIENCE

Harvard University — Cambridge, MA

Doctoral Student, Harvard Microrobotics Laboratory — *Sep 2013-Mar 2019*

- Developed a trajectory-optimization framework for closed-loop locomotion of computationally constrained cm-scale legged robots. Deployed on the Harvard Ambulatory MicroRobot (HAMR), improving speed, stability, and efficiency, and enabling dynamic behaviors including jumping.
- Designed and fabricated cm-scale mechanisms, including electro-adhesive feet for vertical/inverted climbing (with Rolls-Royce) and a hybrid terrestrialaquatic robot.
- Advised 10 students (MS, RA, undergraduate) and supervised two undergraduate capstone projects (one Dean's Design Award winner); co-authored 7 publications, including a Best Paper finalist and two in *Science Robotics*.

SELECTED PUBLICATIONS

Planning and control through contact

9. N. Hudson, et al., *Stow: Robotic Packing of Items into Fabric Pods.* In Review.
8. **N. Doshi***, O.T. Taylor* et al., *Manipulation of unknown objects via contact configuration regulation.* ICRA 2022.
7. **N. Doshi**, et al, *Hybrid differential dynamic programming for planar manipulation primitives.* ICRA 2020.
6. **N. Doshi***, K. Jayaram*, et al., *Effective locomotion at multiple stride frequencies using proprioceptive feedback on a legged microrobot.* Bioinspiration & Biomimetics, 2019.
5. 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.
4. **N. Doshi**, et al., *Contact-implicit optimization of locomotion trajectories for a quadrupedal microrobot.* Robotics: Science and Systems (RSS) 2018.
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, full funding); NDSEG Fellowship (2014 - 2017, full funding); Honorable Mention, NSF Graduate Fellowship (2014).

Best Paper / Project Awards: ICRA Best Manipulation Paper, 2022; RA-L Best Paper, 2020; Finalist, Best Conference Paper, ICRA 2018 & IROS 2017; ICRA Best Automation Paper, 2014; William K. Gemmill Memorial Award, Senior Design Project, 2012.

Popular Press Coverage: Publication #9: CNBC, The Verge, IEEE Spectrum, TechCrunch, +100 others; Publication #3: Wired, TechTimes, Tech Xplore, +15 others (2018); Publication #2: Popular Mechanics, Science Daily, My Science, +75 others (2018).

INTELLECTUAL PROPERTY

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

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*contributed equally