Morgan Thomas Pope

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Education

2016 (exp.)   **PhD, Mechanical Engineering**   Stanford University
Thesis: "Creatures of Two-Worlds: Scaling and Design Considerations for Robotics on the Boundary of Aerial and Terrestrial Locomotion" (defense scheduled 4/26/16)
2013   **MS, Mechanical Engineering**   Stanford University   (3.94 GPA)
2011   **BS, Engineering Sciences (EE focus)**   Harvard University   (*cum laude*)

Experience

2011-present   **Research Assistant - Biomimetics and Dextrous Manipulation Lab**
Perching and Climbing on Concrete/Stucco: Invented SCAMP, the first robot that can fly, perch passively, climb, and take off again. Combined novel climbing mechanism and a new perching strategy to create a robust solution that works outdoors on concrete and stucco and dramatically extends quadrotor mission life. Wrote article for IEEE Spectrum introducing the work to a public audience. Featured on Engadget, Cnet, etc.
Perching on Windows with Gecko-Inspired Adhesives: Led successful three-University effort to make quadrotors perch and take off from vertical glass surfaces using gecko-inspired adhesives. Wrote successful funding application. Derived/verified scaling laws. Work featured on NYT, Popular Science, etc.
Jumping and Gliding: Helped create a "Jumpgliding" robot which travels farther than a conventional jumping robot through the clever use of aerodynamics. Patent pending on this robot's magnetic latch design. Work featured on Gizmag, Discovery, etc.

Spring 2016   **Teaching Assistant - ME 210: Introduction to Mechatronics**
Mentored 30 teams in troubleshooting design/fabrication of autonomous robots. Designed project, helped build infrastructure, taught one class.

July 2014   **Operations Consultant - TieYourSocks.com**
Handled logistics and translation during visit to Shanghai, China to secure manufacturing contracts for business apparel design firm.

2010-2011   **Research Assistant - Harvard Microrobotics Lab**
Wing Fiducial Tracking: Developed automated marker tracking software to capture Robobee wing kinematics at high spatial and temporal resolution

Fall 2010   **Teaching Assistant - ES 181: Thermodynamics**
Led problem sessions and office hours, wrote and graded homework and exams.

2009-2010   **Property Evaluator - Taylored Properties**
Evaluated property values for highly time-constrained courthouse auction business.
On-site inspection, online research, and secretarial duties.

2006-2008   **Volunteer, The Church of Jesus Christ of Latter-day Saints**
Conducted thousands of daily discussions on religious topics, exclusively in Mandarin
Chinese. Mentored other volunteers one-on-one and in groups of 10-20. Worked 10-12
hour days, six days a week. Taught free English classes.

Awards and Honors

-NSF Graduate Research Fellowships Program - Honorable Mention
-Stanford Graduate Fellowship - three years of full tuition and stipend, awarded to ~5% of
Stanford graduate students schoolwide.

Journal Articles (in Preparation)

1. **Pope, M.T.**, Thomas, J.T.., Jiang, H., Estrada, M.A., Kerst, C.F., Roderick, W.R.T., and
Cutkosky, M.R. "Scaling Considerations for Dynamic Perching on Smooth Vertical Surfaces
using Onboard Sensing." In preparation.

Journal Articles (in Review or Published)

2. **Pope, M.T.**, Kimes, C.W., Jiang, H., Hawkes, E.W., Estrada, M.A., Kerst, C.F., Roderick,
W.R.T., Han, A.K., Christensen, D.L., and Cutkosky, M.R. "Robust Perching and Climbing
Using Microspines on Vertical Outdoor Surfaces." In review.
3. Hawkes, E.W., Christensen, D.L., **Pope, M.T.**, and Cutkosky, M.R. "One Motor, Two Degrees
of Freedom through Dynamic Response Switching." IEEE Robotics and Automation
Letters. Accepted.
4. Thomas, J., Loianno, G., **Pope, M.T.**, Hawkes, E.W., Estrada, M.A., Jiang, H., Cutkosky, M.R.,
and Kumar, V. (2015). "Aggressive Flight with Quadrotors for Perching on Inclined
Surfaces," ASME Journal of Mechanisms and Robotics, 2015
5. **Pope, M. T.**, Desbiens, A. L., Christensen, D. L., Hawkes, E. W., & Cutkosky, M. R. (2014).
"Design principles for efficient, repeated jumpgliding," Bioinspiration & Biomimetics,
9(2), 25009. doi:10.1088/1748-3182/9/2/025009

Refereed Conference Articles (in Preparation)

6. **Pope, M.T.** and Cutkosky, M.R. "Thrust-Assisted Perching and Climbing for a Multi-modal UAV." In preparation.

Refereed Conference Articles (in Review or Published)

7. Jiang, H., **Pope, M.T.**, Estrada, M.A., Edwards, B., Cuson, M., Hawkes, E.W., Cutkosky, M.R., (2015) "Perching Failure Detection and Recovery with Onboard Sensing," IEEE/RSJ IROS 2015
8. Thomas, J., Loianno, G., **Pope, M.T.**, Hawkes, E.W., Estrada, M.A., Jiang, H., Cutkosky, M.R., and Kumar, V. (2015). "Planning and Control of Aggresive Maneuvers for Perching on Inclined and Vertical Surfaces," ASME International Design Engineering Technical Conferences, 2015
9. Jiang, H., **Pope, M.T.**, Hawkes, E.W., Christensen, D.L., Estrada, M.A., Parlier, A., Tran, R., and Cutkosky, M.R., (2014) "Modeling the Dynamics of Perching with Opposed-Grip Mechanisms," IEEE/ICRA 2014
10. Hawkes, E.W., Christensen, D.L., Eason, E.V., Estrada, M.A., Heverly, M., Hilgemann, E., Jiang, H., **Pope, M.T.**, Parness, A., and Cutkosky, M.R., (2013) "Dynamic Surface Grasping with Directional Adhesion," IEEE/RSJ IROS 2013, Nov. 2013.
11. Lussier-Desbiens, A., Pope, M., Berg, F., Ern Toh, Z., Lee, J. and Cutkosky, M.R., (2013) "Efficient Jumpgliding: Theory and Design Considerations," IEEE ICRA 2013

Articles for Popular Press

12. **Pope, M.T.** "Stanford's Flying, Perching SCAMP Robot Can Climb Straight Up Walls." IEEE Spectrum Robotics (online), Mar. 16, 2016.

Theses

Stanford University, Department of Mechanical Engineering, PhD Thesis: "Creatures of Two-Worlds: Scaling and Design Considerations for Robotics on the Boundary of Aerial and Terrestrial Locomotion", 2016 (expected).

Harvard University, School of Engineering and Applied Sciences, Undergraduate Capstone Project: "Personal Shopping Cart: Linkage Design and Iterative Prototyping to create Assistive Device for Pedestrian Grocery Access in Challenging Urban Environments", 2011.

Patents

1. Hawkes, E.W., **Pope, M.T.**, Christensen, D.L., and Cutkosky, M.R. "Velocity-dependent magnetic averaging for one-way clutch," 2014. (U.S. Patent Application No. 61/924,140).

Grants (helped write or provided content)

-MAST "Integrated Air-Surface Operation for Micro Aerial Vehicles", $675,000, under Prof. Cutkosky; helped write 2-year extension proposal, wrote quarterly project reports
-NSF "Hybrid Aerial-Scansorial Locomotion", Prof. Cutkosky; wrote annual summary reports

Teaching

Spring 2016   Teaching Assistant - ME 210: Introduction to Mechatronics (Stanford)
2012-2014   Paid personal tutor for local primary school student
Fall 2010   Teaching Assistant - ES 181: Thermodynamics (Harvard)
Fall 2009   Volunteer ESL Instructor for Chinese Speakers (Harvard)
2006-2008   Taught weekly English classes (Taiwan)

Press for Research

Perching and Climbing (SCAMP)
-IEEE Spectrum: Stanford's Flying, Perching SCAMP Robot Can Climb Straight Up Walls
-Engadget: Stanford's SCAMP robot can fly, climb and perch on walls
-NewsbeatSocial: WATCH: Drone Called 'SCAMP' Can Climb Walls
-Cnet: This robot flies, lands and crawls up walls like a bug
-DailyMail: Meet Scamp, the creepy robot that flies, scurries and climbs wall just like an insect
-Nerdist: SCAMP Robot Can Fly, Climb, Find You No Matter Where You Hide
-Mental_floss: Stanford Researchers Have Developed a Drone That Also Climbs Walls
-Slashgear: SCAMP robot is a quadrotor drone that can fly, climb, and perch
-TechXplore: For real, outdoors: SCAMP robot can fly, perch, climb
-Elektor Magazine: Seeing is believing: SCAMP robot can perch and climb walls (and fly too)

Perching with Gecko-Inspired Adhesives
-New York Times: What You Get When You Blend a Drone and a Gecko
-Popular Science: Gecko-Like Drone Can Land on Walls and Ceilings
-Gizmodo: This Sticky Quadrotor Can Literally Be a Fly on the Wall

Jumpgliding
-Gizmag: Stanford's Flying Fish Glider Bests Ordinary Jumping Robots
-Inhabitat: Stanford Engineers Create a Jumping and Gliding Robot Inspired by a Flying Fish
-The Tech Journal: Researchers Created a Jumping and Gliding Robot Inspired by a Flying Fish
-Discovery: Future Drones Could Mimic Birds and Bats