Mike Roberts

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Research Interests

Using **photorealistic synthetic data** for **computer vision**; motion planning, trajectory optimization, and control methods for robotics; reconstructing 3D scenes from images; continuous and discrete optimization; submodular optimization; software tools and algorithms for creativity support.

Education

Stanford University — Stanford, California
Ph.D. Computer Science — 2012–2019
Advisor: Pat Hanrahan
Dissertation: Trajectory Optimization Methods for Drone Cameras

Harvard University — Cambridge, Massachusetts
Visiting Research Fellow — Summer 2013
John A. Paulson School of Engineering and Applied Sciences
Advisor: Hanspeter Pfister

University of Calgary — Calgary, Canada
M.S. Computer Science — 2010

University of Calgary — Calgary, Canada
B.S. Computer Science — 2007

Employment

Apple — Seattle, Washington
Research Scientist — 2018–

Microsoft Research — Redmond, Washington
Research Intern — Summer 2016, 2017
Advisors: Neel Joshi, Sudipta Sinha

Skydio — Redwood City, California
Research Intern — Spring 2016
*Mentors: Adam Bry, Frank Dellaert*x

Udacity — Mountain View, California
Course Developer, Introduction to Parallel Computing — 2012–2013
Instructors: John Owens, David Luebke

Harvard University — Cambridge, Massachusetts
Research Fellow, John A. Paulson School of Engineering and Applied Sciences — 2010–2012
Advisor: Hanspeter Pfister

NVIDIA — Austin, Texas
Developer Tools Programmer Intern — Summer 2009

Radical Entertainment — Vancouver, Canada
Graphics Programmer Intern — 2005–2006

Honors And Awards

Featured in the Highlights of SIGGRAPH session at the FMX Festival 2017 — 2017
1% selection rate (3 / 467)

Invited speaker, TEDxBerkeley 2017 — 2017

Excellent reviewer, ACM Human Factors in Computing Systems (CHI) 2017 — 2017

Featured in the SIGGRAPH 2016 Technical Papers Trailer — 2016
4% selection rate (19 / 467)

Featured in the SIGGRAPH Asia 2015 Technical Papers Trailer — 2015
4% selection rate (11 / 302)

Front cover article, Cell 162(3) — 2015

NSERC Alexander Graham Bell Canada Graduate Scholarship — 2012
3 year fellowship for Canadian PhD students, 14% selection rate (233 / 1628)

Selected Publications

My publications are also listed on Google Scholar.

Hypersim: A Photorealistic Synthetic Dataset for Holistic Indoor Scene Understanding
Mike Roberts, Nathan Paczan
arXiv (preprint)

Submodular Trajectory Optimization for Aerial 3D Scanning
Mike Roberts, Debadeepta Dey, Anh Truong, Sudipta Sinha, Shital Shah, Ashish Kapoor, Pat Hanrahan, Neel Joshi
International Conference on Computer Vision (ICCV) 2017

Generating Dynamically Feasible Trajectories for Quadrotor Cameras
Mike Roberts, Pat Hanrahan
ACM Transactions on Graphics 35(4) (SIGGRAPH 2016)

Featured in the Highlights of SIGGRAPH session at the FMX Festival 2017
Featured in the SIGGRAPH 2016 Technical Papers Trailer

An Interactive Tool for Designing Quadrotor Camera Shots
Niels Joubert*, **Mike Roberts***, Anh Truong, Floraine Berthouzoz, Pat Hanrahan
*ACM Transactions on Graphics 34(6) (SIGGRAPH Asia 2015), * Authors contributed equally*

Featured in the SIGGRAPH Asia 2015 Technical Papers Trailer

Saturated Reconstruction of a Volume of Neocortex
Narayanan Kasthuri, Kenneth Jeffrey Hayworth, Daniel Raimund Berger, Richard Lee Schalek, Jose Angel Conchello, Seymour Knowles-Barley, Dongil Lee, Amelio Vazquez-Reina, Verena Kaynig, Thouis Raymond Jones, **Mike Roberts**, Josh Lyskowski Morgan, Juan Carlos Tapia, H. Sebastian Seung, William Gray Roncal, Joshua Tzvi Vogelstein, Randal Burns, Daniel Lewis Sussman, Carey Eldin Priebe, Hanspeter Pfister, Jeff William Lichtman
Cell 162(3), 2015

Front cover article

Large-Scale Automatic Reconstruction of Neuronal Processes from Electron Microscopy Images
Verena Kaynig, Amelio Vazquez-Reina, Seymour Knowles-Barley, **Mike Roberts**, Thouis R. Jones, Narayanan Kasthuri, Eric Miller, Jeff Lichtman, Hanspeter Pfister
Medical Image Analysis 22(1), 2015

Design and Evaluation of Interactive Proofreading Tools for Connectomics
Daniel Haehn, Seymour Knowles-Barley, **Mike Roberts**, Johanna Beyer, Narayanan Kasthuri, Jeff W. Lichtman, Hanspeter Pfister
IEEE Transactions on Visualization and Computer Graphics 20(12) (SciVis 2014)

Neural Process Reconstruction from Sparse User Scribbles
Mike Roberts, Won-Ki Jeong, Amelio Vazquez-Reina, Markus Unger, Horst Bischof, Jeff Lichtman, Hanspeter Pfister
Medical Image Computing and Computer Assisted Intervention (MICCAI) 2011

A Work-Efficient GPU Algorithm for Level Set Segmentation
Mike Roberts, Jeff Packer, Mario Costa Sousa, Joseph Ross Mitchell
High Performance Graphics 2010

Datasets

Hypersim: A Photorealistic Synthetic Dataset for Holistic Indoor Scene Understanding
github.com/apple/ml-hypersim

Software

Flashlight: A Python Library for Analyzing and Solving Quadrotor Control Problems
mikeroberts3000.github.io/flashlight

Invited Talks

Sample-Efficient Learning with Synthetic Data
Stanford University — October 2020
Intel Labs
University of Washington

Trajectory Optimization Methods for Drone Cameras
Oculus Research — June 2018
Snapchat Research — May 2018
Carnegie Mellon University
Boston University — March 2018
Google Research
Adobe Research
Toyota Technological Institute at Chicago
NVIDIA Research — February 2018
Simon Fraser University

Harnessing the Creative Power of Drones
Charles University in Prague — November 2017
Hacker Connect Conference 2017, opening keynote — August 2017
Google — June 2017
University College London — May 2017
Disney Research
ETH Zurich
University of Oxford
Max Planck Institute for Informatics
University of California, Berkeley — April 2017
Samsung
TEDxBerkeley 2017
Autel Robotics — March 2017
3D Robotics
University of California, Berkeley — February 2017
Columbia University — November 2016
Yale University
Princeton University
Brown University
Intel — October 2016

Generating Dynamically Feasible Trajectories for Quadrotor Cameras
FMX Festival 2017, Highlights of SIGGRAPH session — May 2017
Adobe Research — September 2016
Apple — August 2016
Massachusetts Institute of Technology
Skydio — February 2016
Cape Productions
3D Robotics — January 2016

Teaching Experience

Udacity — 2013–2018
Course Developer, Introduction to Parallel Programming
Instructors: John Owens, David Luebke
Developed course materials in 2012–2013, over 80,000 students enrolled in 2013–2018.

Stanford University — Spring 2018
Course Assistant, Convolutional Neural Networks for Visual Recognition
Instructors: Fei-Fei Li, Justin Johnson, Serena Yeung

Stanford University — Winter 2018
Course Assistant, Mathematical Methods for Robotics, Vision, and Graphics
Instructor: Doug James

Massachusetts Institute of Technology Summer 2016
Guest Lecturer, Advances in Imaging
Instructor: Ramesh Raskar

Harvard University Fall 2013
Course Contributor, Data Science
Instructors: Hanspeter Pfister, Joe Blitzstein
Contributed lecture notes to the initial offering of Harvard's Data Science course in Fall 2013.

Harvard University Winter 2012
Teaching Fellow, Visualization
Instructor: Hanspeter Pfister

Harvard University Fall 2011
Teaching Fellow, Computing Foundations for Computational Science
Instructor: Hanspeter Pfister

Harvard University Winter 2011
Teaching Fellow, Massively Parallel Computing
Instructors: Hanspeter Pfister, Nicolas Pinto

University of Calgary Winter 2006, 2007, 2008
Guest Lecturer, Video Game Programming

Reviewing Experience

Conference
SIGGRAPH; SIGGRAPH Asia; Computer Vision and Pattern Recognition (CVPR); International Conference on 3D Vision (3DV); International Conference on Robotics and Automation (ICRA); Human Robot Interaction (HRI); Human Factors in Computing Systems (CHI); Virtual Reality (VR); Eurographics; High Performance Graphics (HPG)

Journal
Transactions on Graphics (TOG); Transactions on Visualization and Computer Graphics (TVCG); Robotics and Automation Letters (R-AL)

Game Credits

Prototype (PC, Playstation 3, and Xbox 360) 2009
Radical Entertainment, Activision

Scarface: The World Is Yours (PC, Wii, Xbox, and Playstation 2) 2006
Radical Entertainment, Sierra

Press Coverage

Skydio R1 Review: The Ultimate Follow-Me Drone Comes at a Price
Engadget (April 2nd, 2018)

Skydio R1 Review: A Mesmerizing, Super-Expensive Self-Flying Drone
TechCrunch (April 2nd, 2018)

This Drone Can Follow and Record You From the Sky, No Controller Required
CNBC (February 14th, 2018)

The Skydio R1 Might Be the Smartest Consumer Drone in the Sky
Engadget (February 13th, 2018)

Skydio Demonstrates Incredible Obstacle-Dodging Full Autonomy With New R1 Consumer Drone
IEEE Spectrum (February 13th, 2018)

Drones That Dodge Obstacles Without Guidance Can Pursue You Like Paparazzi
MIT Technology Review (February 13th, 2018)

The Autonomous Selfie Drone Is Here. Are We Ready For It?
The New York Times (February 13th, 2018)

New App Lets Drone Pilots Customize Flight Path and Camera Movement Before Takeoff
Digital Trends (October 19th, 2015)

Researchers Create Software for Designing Pro Drone Shots in a Virtual World
Petapixel (October 16th, 2015)

Interactive Drone App Lets You Capture Aerial Shots Like a Pro
Engadget (October 15th, 2015)

These Stunning Images Will Take You on a Journey Through the Brain
Huffington Post (August 4th, 2015)

3D Color Images of the Brain Reveal its Glorious Unseen Detail
Popular Science (July 31st, 2015)

3D Brain Map Reveals Connections Between Cells in Nano-Scale
The Guardian (July 30, 2015)

Crumb of Mouse Brain Reconstructed in Full Detail
Nature News (July 30, 2015)

A Voyage into the Brain
National Geographic (February 2014)

What Makes Us Human?
BBC Horizon (July 3rd, 2013)

In Pursuit of a Mind Map, Slice by Slice
The New York Times (December 27th, 2010)

References

Pat Hanrahan
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Doug James
Professor of Computer Science, Stanford University
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Hanspeter Pfister
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Adam Finkelstein
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John Owens
Child Family Professor of Engineering and Entrepreneurship, University of California, Davis
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