

Samarth Brahmbhatt

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EDUCATION

Doctor of Philosophy, Robotics (advisor: [James Hays](#))

School of Interactive Computing, Georgia Institute of Technology, GA

May 2020

Master of Science in Engineering, Robotics (advisor: [Kostas Daniilidis](#))

University of Pennsylvania, PA.

May 2014

Bachelor of Technology, Electronics & Communication Engineering

Nirma University, Ahmedabad, India.

May 2012

PAPERS UNDER REVIEW

1. “[Zero-Shot Transfer of Haptics-based Object Insertion Policies](#)” - **Samarth Brahmbhatt**, Ankur Deka, Andrew Spielberg, and Matthias Müller

REFEREED PUBLICATIONS

2. “[PressureVision: Estimating Hand Pressure from a Single RGB Image](#)” - Patrick Grady, Chengcheng Tang, **Samarth Brahmbhatt**, Christopher D. Twigg, Chengde Wan, James Hays, and Charles C. Kemp, *The European Conference on Computer Vision (ECCV) 2022 (oral)*
3. “[Visual Pressure Estimation and Control for Soft Robotic Grippers](#)” - Patrick Grady, Jeremy A. Collins, **Samarth Brahmbhatt**, Christopher D. Twigg, Chengcheng Tang, James Hays, and Charles C. Kemp, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2022*
4. “[ContactOpt: Optimizing Contact to Improve Grasps](#)” - Patrick Grady, Chengcheng Tang, Minh Vo, Christopher D. Twigg, **Samarth Brahmbhatt**, and Charles C. Kemp, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2021 (oral)*
5. “[ContactPose: A Dataset of Grasps with Object Contact and Hand Pose](#)” - **Samarth Brahmbhatt**, Chengcheng Tang, Christopher D. Twigg, Charles C. Kemp, James Hays, *The European Conference on Computer Vision (ECCV) 2020*
6. “[Towards Markerless Grasp Capture](#)” - **Samarth Brahmbhatt**, Charles C. Kemp, and James Hays, *Third Workshop on Computer Vision for AR/VR, CVPR 2019*
7. “[ContactGrasp: Functional Multi-finger Grasp Synthesis from Contact](#)” - **Samarth Brahmbhatt**, Ankur Handa, James Hays, and Dieter Fox, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2019*
8. “[ContactDB: Analyzing and Predicting Grasp Contact via Thermal Imaging](#)” - **Samarth Brahmbhatt**, Cusuh Ham, Charles C. Kemp, James Hays, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2019 (oral, best paper finalist)*
9. “[MapNet: Geometry-Aware Learning of Maps for Camera Localization](#)” - **Samarth Brahmbhatt**, Jinwei Gu, Kihwan Kim, James Hays, Jan Kautz, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2018 (spotlight)*
10. “[DeepNav: Learning to Navigate Large Cities](#)” - **Samarth Brahmbhatt**, James Hays, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2017*
11. “[StuffNet: Using ‘Stuff’ to Improve Object Detection](#)” - **Samarth Brahmbhatt**, Henrik Christensen and James Hays, *IEEE Winter Conference on Applications of Computer Vision (WACV) 2017*
12. “[Occlusion-Aware Object Localization, Segmentation and Pose Estimation](#)” - **Samarth Brahmbhatt**, Heni Ben Amor and Henrik Christensen, *British Machine Vision Conference (BMVC) 2015*

13. “Single Image 3D Object Detection and Pose Estimation for Grasping” - Menglong Zhu, Kosta Derpanis, Yinfei Yang, **Samarth Brahmabhatt**, Mabel Zhang, Cody Phillips and Kostas Daniilidis, *IEEE International Conference on Robotics and Automation (ICRA) 2014*
14. “RoboCup 2013 Humanoid Kidsize League Winner” - Daniel D. Lee, Seung-Joon Yi, Stephen McGill, Yida Zhang, Larry Vadakedathu, **Samarth Brahmabhatt**, Richa Agrawal and Vibhavari Dasagi, *RoboCup 2013: Robot World Cup XVII, Springer Berlin Heidelberg 2014*
15. “Practical OpenCV” - **Samarth Brahmabhatt**, book published by Apress Media LLC

INVITED TALKS

1. “Contact-Rich Manipulation by Humans and Robots” - Department of Computational and Data Sciences, IISc Bangalore, 28 July 2022
2. “Learning Compliant Object Insertion” - CyPhySS 2022, IISc Bangalore Robert Bosch Centre for Cyber Physical Systems, 29 July 2022
3. “Learning Compliant Object Insertion” - Nirma University, 5 August 2022
4. “6-part lecture series on Computer Vision, Machine Learning, and Robotics” - Nirma University, June-July 2021
5. “Sim-to-Real Robot Learning” - Symbiosis Institute of Technology, 16 May 2021
6. “Contact-Centric Grasping Behavior” - Guest lecture at the Robotic Caregivers: From Dreams to Reality Spring 2020 course at Georgia Tech.
7. “Hand-Object Contact” - University of Toronto People, AI, & Robots Research Group, March 2021
8. “Hand-Object Contact During Grasping: Capture, Analysis, and Applications” - CVPR 2020 Doctoral Consortium, June 2020
9. “A Contact-Centric Understanding of our Functional Grasping Behavior” - Guest Lecture in Georgia Tech BMED 8813 course on robotic caregivers, Spring 2020
10. “A Contact-Centric Understanding of our Functional Grasping Behavior” - Stanford Vision and Learning Lab, Stanford CA USA 23 March 2020
11. “A Contact-Centric Understanding of our Functional Grasping Behavior” - Facebook AI Research, Pittsburgh PA USA 28 February 2020
12. “A Contact-Centric Understanding of our Functional Grasping Behavior” - Facebook Reality Labs, Redmond WA USA 26 February 2020
13. “A Contact-Centric Understanding of our Functional Grasping Behavior” - Amazon Robotics & AI, Seattle WA USA 24 February 2020

WORK EXPERIENCE

Intel Labs May 2022 - present
Research Scientist
Reinforcement learning for contact-rich robot manipulation, navigation, and locomotion.

Intel Labs August 2020 - April 2022
Postdoctoral Researcher with *Vladlen Koltun*

- Reinforcement learning for contact-rich robot manipulation (paper 1), navigation, and locomotion.
- RGB image-based prediction of hand-object pose (Pub. 4) and contact pressure (Pub. 2), as well as soft robot gripper contact pressure (Pub. 3).

Institute for Robotics and Intelligent Machines, Georgia Tech Fall 2014 - Spring 2020
Graduate Research Assistant

- Understanding functional grasps of household objects, focusing on hand-object contact and hand pose (Pubs. 5 to 8)
- Learning to navigate large cities using Convolutional Neural Networks (CNNs) (Pub. 10)
- Panoptic segmentation as a local context signal to improve object detection (Pub. 11)
- Detection and 3D pose estimation of partially occluded objects (Pub. 12)

Facebook Reality Labs, Sausalito, CA

Summer 2019

Research Intern, advisors: [Chengcheng Tang](#) and [Chris Twigg](#)

Creating a large and diverse dataset of paired 3D hand pose, object pose, hand-object contact and multi-view RGB-D images. Deep learning experiments for the novel task of hand-object contact prediction (Pub 5).

NVIDIA Research, Seattle

Summer 2018

Robotics Research Intern, advisors: [Ankur Handa](#) and [Dieter Fox](#)

Synthesizing functional human-like grasps for diverse robotic end-effectors, from human demonstrations of hand-object contact (Pub 7).

NVIDIA Research, Santa Clara

Summer 2017

Research Intern, advisors: [Jinwei Gu](#) and [Kihwan Kim](#)

Deep learning for image-based camera localization: proposed novel algorithms to use geometric constraints between images and to make use of large amounts of unlabelled data through semi-supervised learning (Pub. 9).

Dextro, Inc. New York City

Summer 2015

Intern, advisor: [Sanchit Arora](#)

Panoptic segmentation as a local context signal to improve object detection (Pub. 11)

GRASP Laboratory, University of Pennsylvania

Spring 2013 - Spring 2014

Research Assistant with [Kostas Daniilidis](#) and [Daniel Lee](#)

- Detection, 6-DOF pose estimation, and PR2 robot grasping of objects in clutter from a single RGB image (Pub. 13, [wiki](#))
- Particle filter localization and player-goalkeeper communication for direction disambiguation for the [Robocup 2013](#) humanoid robot football competition winning team (Pub. 14, [wiki](#))
- High-performance inference [code](#) for “Active Deformable Part Models” - Zhu et. al., ECCV 2014
- Detecting partially occluded objects in RGB images ([Masters’ thesis](#))

School of Engineering and Applied Sciences, University of Pennsylvania

Fall 2013

Teaching Assistant

- MEAM 510: Design of Mechatronic Systems
- MEAM 520: Introduction to Robotics

SERVICE

- [Nirma University Alumni Sponsored Lab](#): Started a robotics and computer vision lab at my undergraduate university by collaborating with other alumni and department faculty. Involved fundraising, student mentoring, and organization building.
- Delivered a 6-part [lecture series](#) on computer vision, machine learning, and robotics at my undergraduate university consisting of lectures and homework notebooks.
- Regularly review for CVPR (outstanding reviewer 2019), RSS, ECCV, ICRA, IROS, BMVC, WACV, T-PAMI, and RA-L.
- [RoboGrads](#): VP Academics (2017), VP PhD Robotics Program (2018)
- [Asha for Education](#): Ran the Atlanta half-marathon thrice to raise funds, coached the running group twice

SELECTED COURSEWORK

Learning in Robotics (UPenn ESE 650)

Spring 2013

- RGB-D point-cloud registration for 3D mapping ([wiki](#))
- Planar Simultaneous Localization and Mapping using a particle filter ([wiki](#))
- Image panoramas using 3-DOF orientation tracking by an Unscented Kalman Filter ([wiki](#))
- Path planning in aerial photographs using imitation learning ([wiki](#))
- Probabilistic color image segmentation using Gaussian Mixture Models ([wiki](#))

Computer Vision and Computational Photography (UPenn CIS 581)

Fall 2013

- Logo replacement using Shape Context feature matching ([wiki](#))
- Panoramas by Corner appearance feature matching ([wiki](#))
- Image Morphing by Thin Plate Splines ([wiki](#))

Machine Perception (UPenn CIS 580)

Spring 2013

- Image stitching using vanishing points and matching points ([wiki](#))
- Logo warping using perspective transforms ([wiki](#))

Intro to Parallel Programming (Udacity Online Course)

Summer 2014

- Tone mapping using histogram equalization
- Poisson blending of masked images

COMPUTER SKILLS

- Programming Languages: C++, Python
- Libraries and Tools: [MuJoCo](#), [PyTorch](#), [TF-Agents](#), [Unity ML Agents](#), [ROS](#), [GTSAM](#), OpenCV