

Samarth Brahmbhatt

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perception, policy learning, sim-to-real for contact-rich manipulation
simulation for embodied agents

EDUCATION

Doctor of Philosophy, Robotics (advisor: [James Hays](#), co-advisor: [Charles C. Kemp](#))
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

REFEREED PUBLICATIONS

1. “[OpenBot-Fleet: A System for Collective Learning with Real Robots](#)” - Matthias Müller, **Samarth Brahmbhatt**, Ankur Deka, Quentin Leboutet, David Hafner, Vladlen Koltun, *International Conference on Robotics and Automation (ICRA) 2024*
2. “[The Un-Kidnappable Robot: Acoustic Localization of Sneaking People](#)” - Mengyu Yang, Patrick Grady, **Samarth Brahmbhatt**, Arun Balajee Vasudevan, Charles C. Kemp, and James Hays, *International Conference on Robotics and Automation (ICRA) 2024*
3. “[Zero-Shot Transfer of Haptics-based Object Insertion Policies](#)” - **Samarth Brahmbhatt**, Ankur Deka, Andrew Spielberg, and Matthias Müller, *International Conference on Robotics and Automation (ICRA) 2023*
4. “[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)*
5. “[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*
6. “[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)*
7. “[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*
8. “[Towards Markerless Grasp Capture](#)” - **Samarth Brahmbhatt**, Charles C. Kemp, and James Hays, *Third Workshop on Computer Vision for AR/VR, CVPR 2019*
9. “[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*
10. “[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)*
11. “[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)*

12. “DeepNav: Learning to Navigate Large Cities” - **Samarth Brahmbhatt**, James Hays, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2017*
13. “StuffNet: Using ‘Stuff’ to Improve Object Detection” - **Samarth Brahmbhatt**, Henrik Christensen and James Hays, *IEEE Winter Conference on Applications of Computer Vision (WACV) 2017*
14. “Occlusion-Aware Object Localization, Segmentation and Pose Estimation” - **Samarth Brahmbhatt**, Heni Ben Amor and Henrik Christensen, *British Machine Vision Conference (BMVC) 2015*
15. “Single Image 3D Object Detection and Pose Estimation for Grasping” - Menglong Zhu, Kosta Derpanis, Yinfei Yang, **Samarth Brahmbhatt**, Mabel Zhang, Cody Phillips and Kostas Daniilidis, *IEEE International Conference on Robotics and Automation (ICRA) 2014*
16. “RoboCup 2013 Humanoid Kidsize League Winner” - Daniel D. Lee, Seung-Joon Yi, Stephen McGill, Yida Zhang, Larry Vadakedathu, **Samarth Brahmbhatt**, Richa Agrawal and Vibhavari Dasagi, *RoboCup 2013: Robot World Cup XVII, Springer Berlin Heidelberg 2014*
17. “Practical OpenCV” - **Samarth Brahmbhatt**, book published by Apress Media LLC

WORK EXPERIENCE

Overland AI

February 2024 - present

Technology Lead - Perception

- Improve the Overland AI OverDrive perception system.

Intel Labs

May 2022 - January 2024

Research Scientist

- Contributing robot control and accurate physics features to the [SPEAR](#) simulation platform.
- Sim-to-real reinforcement learning (RL) for contact-rich robot manipulation (Pub. 3).
- Distributed on-robot RL for navigation (Pub. 1).

Intel Labs

July 2020 - April 2022

Postdoctoral Researcher with [Matthias Müller](#) and [Vladlen Koltun](#)

- Sim-to-real RL for contact-rich robot manipulation (Pub. 3), distributed on-robot RL for navigation (Pub. 1).
- RGB image-based prediction of hand-object pose (Pub. 6) and contact pressure (Pub. 4), as well as soft robot gripper contact pressure (Pub. 5).

Institute for Robotics and Intelligent Machines, Georgia Tech

Fall 2014 - Spring 2020

Graduate Research Assistant, advisor: [James Hays](#), co-advisor: [Charles C. Kemp](#)

- Understanding functional grasps of household objects, focusing on hand-object contact and hand pose (Pubs. 7 to 10)
- Learning to navigate large cities using Convolutional Neural Networks (CNNs) (Pub. 12)
- Panoptic segmentation as a local context signal to improve object detection (Pub. 13)
- Detection and 3D pose estimation of partially occluded objects (Pub. 14)

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 7).

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 9).

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. 11).

Dextro, Inc. New York City

Summer 2015

Intern, advisor: [Sanchit Arora](#)

Panoptic segmentation as a local context signal to improve object detection (Pub. 13)

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. 15, [wiki](#))
- Particle filter localization and player-goalkeeper communication for direction disambiguation for the [Robocup 2013](#) humanoid robot football competition winning team (Pub. 16, [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

INVITED TALKS

1. “[Robot Learning and Perception for Contact-Rich Manipulation](#)” - Allen Institute for AI, 2 March 2023
2. “Learning Compliant Object Insertion” - Nirma University, 5 August 2022
3. “Learning Compliant Object Insertion” - [CyPhySS 2022](#), IISc Bangalore [Robert Bosch Centre for Cyber Physical Systems](#), 29 July 2022
4. “Contact-Rich Manipulation by Humans and Robots” - [Department of Computational and Data Sciences, IISc Bangalore](#), 28 July 2022
5. “Contact-Rich Manipulation by Humans and Robots” - [Department of Computer Science and Engineering, IIT Gandhinagar](#), 27 July 2022
6. “6-part lecture series on Computer Vision, Machine Learning, and Robotics” - Nirma University, June-July 2021
7. “Sim-to-Real Robot Learning” - Symbiosis Institute of Technology, 16 May 2021
8. “Contact-Centric Grasping Behavior” - Guest lecture at the [Robotic Caregivers: From Dreams to Reality](#) Spring 2020 course at Georgia Tech.
9. “Hand-Object Contact” - University of Toronto [People, AI, & Robots Research Group](#), March 2021
10. “Hand-Object Contact During Grasping: Capture, Analysis, and Applications” - CVPR 2020 Doctoral Consortium, June 2020
11. “A Contact-Centric Understanding of our Functional Grasping Behavior” - Guest Lecture in Georgia Tech BMED 8813 course on robotic caregivers, Spring 2020
12. “A Contact-Centric Understanding of our Functional Grasping Behavior” - Stanford Vision and Learning Lab, Stanford CA USA 23 March 2020
13. “A Contact-Centric Understanding of our Functional Grasping Behavior” - Facebook AI Research, Pittsburgh PA USA 28 February 2020
14. “A Contact-Centric Understanding of our Functional Grasping Behavior” - Facebook Reality Labs, Redmond WA USA 26 February 2020
15. “A Contact-Centric Understanding of our Functional Grasping Behavior” - Amazon Robotics & AI, Seattle WA USA 24 February 2020

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.
- Area Chair for the [Indian Conference on Computer Vision, Graphics and Image Processing](#) 2022 and 2023.
- Regularly review for CoRL, 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

COMPUTER SKILLS

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