Samarth Manoj Brahmbhatt

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EDUCATION

Doctor of Philosophy, Robotics (advisor: James Hays)
School of Interactive Computing, Georgia Institute of Technology, GA — expected 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

PUBLICATIONS

1. "Towards Markerless Grasp Capture" - **Samarth Brahmbhatt**, Charles C. Kemp, and James Hays, *Third Workshop on Computer Vision for AR/VR, CVPR 2019*
2. "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*
3. "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**)*
4. "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)*
5. "DeepNav: Learning to Navigate Large Cities" - **Samarth Brahmbhatt**, James Hays, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2017*
6. "StuffNet: Using 'Stuff' to Improve Object Detection" - **Samarth Brahmbhatt**, Henrik Christensen and James Hays, *IEEE Winter Conference on Applications of Computer Vision (WACV) 2017*
7. "Occlusion-Aware Object Localization, Segmentation and Pose Estimation" - **Samarth Brahmbhatt**, Heni Ben Amor and Henrik Christensen, *British Machine Vision Conference (BMVC) 2015*
8. "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*
9. "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*
10. "Practical OpenCV" - **Samarth Brahmbhatt**, *book published by Apress Media LLC*

RESEARCH EXPERIENCE

Institute for Robotics and Intelligent Machines, Georgia Tech — Fall 2014 - present
Graduate Research Assistant

- Capturing, analyzing and predicting hand-object contact maps for human grasps with functional intent (Pubs. 1 to 3)
- Learning to navigate large cities using Convolutional Neural Networks (CNNs) (Pub. 5)
- Object detection and semantic segmentation using CNNs (Pub. 6)
- Detection and 3D pose estimation of partially occluded objects (Pub. 7)

Facebook Reality Labs, Sausalito, CA Summer 2019
Hand-object interaction
Advisors: Chengcheng Tang, Chris Twigg

NVIDIA Research, Seattle Summer 2018
Hand pose optimization for human-guided multi-fingered grasping
Advisors: Ankur Handa, Dieter Fox
Synthesizing functional human-like grasps for diverse robotic end-effectors, from human demonstrations of hand-object contact (Pub 2).

NVIDIA Research, Santa Clara Summer 2017
Deep Learning for Camera Localization
Advisors: Jinwei Gu, Kihwan Kim
- Deep learning for image-based relocalization: proposed novel algorithms to use geometric constraints between images and to make use of large amounts of unlabelled data through semi-supervised learning (Pub. 4)

Dextro, Inc. New York City Summer 2015
Improving CNN-based object localization using local context
- Implemented a Convolutional Neural Network system for object localization and semantic segmentation (Pub. 6)
- Used semantic segmentation as a local context signal to improve object detection
- Implemented CPU and GPU versions of various required layers in Caffe

GRASP Laboratory, University of Pennsylvania Spring 2014
Detecting Partially Occluded Objects in Images (Masters' Thesis)
- Augmented the DPM object detection algorithm to detect up to 60% occluded objects
- Used HOG features and graph-cuts to segment all pixels inside the bounding box to object/non-object
- Used Structural SVM to train HOG feature and graph edge weights (Pub. 7)

GRASP Laboratory, University of Pennsylvania Summer 2013
Detection and 6-DOF pose estimation of objects from a single 2D image
Helped develop an algorithm to detect objects using their shape and estimate their 6-DOF pose from a single RGB image by matching the outline with a CAD model (Pub. 8). Works in heavily cluttered scenes.

GRASP Laboratory, University of Pennsylvania Spring 2013
Robocup 2013 Humanoid Kid-size soccer international competition
Our team won the Kid-size competition after competing against international teams. I contributed to the particle-filter based localization system and player location disambiguation based on the goalkeeper ball estimate.

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*: ROS, OpenCV, CUDA, Caffe, PyTorch, Vim, Git, LaTeX

SERVICE

- Reviewer for: T-PAMI, RA-L, BMVC 2019, CVPR 2019 (outstanding reviewer), RSS 2019, CVPR 2018, IROS 2016, ICRA 2015, IROS 2015
- RoboGrads: VP Academics (2017), VP PhD Robotics Program (2018)