

# Samarth Manoj Brahmhatt

## School Address

Institute for Robotics and Intelligent Machines  
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## EDUCATION

*Doctor of Philosophy, Robotics*

School of Interactive Computing, Georgia Institute of Technology, GA

expected May 2019

*Master of Science in Engineering, Robotics*

University of Pennsylvania, PA.

May 2014

*Bachelor of Technology, Electronics & Communication Engineering*

Nirma University, Ahmedabad, India.

May 2012

## PUBLICATIONS

- “Occlusion-Aware Object Localization, Segmentation and Pose Estimation” - **Samarth Brahmhatt**, Heni Ben Amor and Henrik Christensen (British Machine Vision Conference 2015)
- “Single Image 3D Object Detection and Pose Estimation for Grasping” - Menglong Zhu, Kosta Derpanis, Yinfei Yang, **Samarth Brahmhatt**, Mabel Zhang, Cody Phillips and Kostas Daniilidis (IEEE International Conference on Robotics and Automation 2014)
- “RoboCup 2013 Humanoid Kidsize League Winner” - Daniel D. Lee, Seung-Joon Yi, Stephen McGill, Yida Zhang, Larry Vadakedathu, **Samarth Brahmhatt**, Richa Agrawal and Vibhavari Dasagi (RoboCup 2013: Robot World Cup XVII, Springer Berlin Heidelberg 2014)
- “[Practical OpenCV](#)” - **Samarth Brahmhatt** (book published by Apress Media LLC)

## RESEARCH EXPERIENCE

[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
- 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

*GRASP Laboratory, University of Pennsylvania*

Fall 2013

[Active Deformable Part models inference implementation](#)

Wrote MEX implementation of the A-DPM object-detection algorithm inference part. This algorithm treats part inference order in DPM as a scheduling problem and achieves up to 3x speedup over Cascade-DPM.

*GRASP Laboratory, University of Pennsylvania*

Summer 2013

[Detection and 6-DOF pose estimation of objects from a single 2D image](#)

System to detect objects using their shape and estimate their 6-DOF pose by matching the outline with a pre-computed 3D model. Works in heavily cluttered scenes. Contributed to:

- Dynamic programming based object outline matching for pose estimation
- Motion-field based algorithm for iteratively deciding the pose of the 3D model in space to match its silhouette with outline of detected object
- Putting the silhouette extraction, detection and pose-estimation modules together into an efficient pipeline executable on a Willow Garage PR2 robot

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. Contributed to:

- Particle filter based localization system that used goal posts and field lines as landmarks and odometry information from the walk engine
- Player self-localization orientation disambiguation based on goalkeeper ball estimate

*Schneider India Innovation Challenge 2011*

August 2011

### **Fuel saving at traffic signals**

- Designed and prototyped a system that used accelerometers, magnetometers and wireless communication to automatically switch off engines of cars opposite red signals at traffic intersections

## **TEACHING EXPERIENCE**

Teaching Assistant for

- Introduction to Robotics (MEAM 520): Responsible for weekly office hours and conducting a class project on mobile robots.
- Design of Mechatronic systems (MEAM 510): Responsible for weekly lab hours and conducting a newly added project in which students make an autonomous golfer robot.

## **ACADEMIC PROJECTS**

### **Learning in Robotics (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 (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 (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, C++, Matlab, Python
- *Libraries and Tools:* OpenCV, CUDA, Caffe, Vim, Git, L<sup>A</sup>T<sub>E</sub>X
- *Operating Systems:* Microsoft Windows, Linux flavors, ROS

### **HONORS**

- Best overall student in the Electronics and Communication department, Nirma University
- Second prize for final year project, Electronics and Communication department, Nirma University
- Dhirubhai Ambani Scholarship for all four years of undergraduate study

References available upon request.