

# Samarth Manoj Brahmhatt

## School Address

General Robotics, Automation, Sensing and Perception Laboratory  
University of Pennsylvania  
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## Permanent Address

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## EDUCATION

*Master of Science in Engineering, Robotics*

University of Pennsylvania, PA GPA 3.78/4.00

Expected May 2014

*Bachelor of Technology, Electronics & Communication Engineering*

Nirma University, Ahmedabad, India GPA 9.04/10.00

May 2012

## RESEARCH EXPERIENCE

*GRASP Laboratory, University of Pennsylvania*

Summer 2013

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

Collaborated with three other Ph.D. students under the guidance of Prof. Kostas Daniilidis to develop a system to detect objects in images using their shape and estimate their 6-DOF pose by matching the shape with the outline of a pre-computed 3D model in heavily cluttered scenes. Contributed to:

- SIFT feature based object outline matching for pose estimation
- Motion-field based algorithm for iteratively rendering 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 teams from Iran, Indonesia, Japan, Germany and England. Contributed to:

- Color-based object recognition
- Particle filter based localization system that used goal posts and field lines as landmarks and odometry information from the walk engine

*Nirma University, India*

January - May 2012

### Object seeker robot

- Developed a real time object detection (using Speeded Up Robust Features) and stereo imaging system
- Used it to control a simple wheeled robot that could recognize objects, estimate its distance to them, drive up to them and grip them

*University of Southern California*

Summer 2011

### Robot arm control using 3D information

- Researched the Microsoft Kinect sensor and Point Cloud Library
- Designed a vision system to determine position of known objects and guide a robotic arm to that position

*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

## PUBLICATIONS

- “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 (Submitted to 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 Brahmbhatt**, Richa Agrawal and Vibhavari Dasagi (Robocup Symposium 2014)
- “Practical Computer Vision using OpenCV” - **Samarth Brahmbhatt** (book to be published by Apress Media LLC)

## 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](#))

### Machine Perception (CIS 580)

Spring 2013

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

### Machine Learning (CIS 520)

Fall 2012

- Song genre classification using lyrics and audio features
- Optical character recognition using boosted decision trees

## COMPUTER SKILLS

- *Programming Languages*: C, C++, Python, Matlab, Unix shell scripting
- *Libraries and Tools*: OpenCV, Point Cloud Library, iPython, Vim, Git, Microsoft Office, 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

## INTERESTS

- Reading History, World War 2, Cold War and science fiction
- Long distance running, swimming, skateboarding