Samarth Manoj Brahmbhatt

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EDUCATION

Master of Science in Engineering, Robotics
University of Pennsylvania, PA GPA 3.71/4.00 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 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 teams from Iran, Indonesia, Japan, Germany and England. 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

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 (Accepted at Robocup Symposium 2014)
- "Practical OpenCV" - **Samarth Brahmbhatt** (book 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)

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)

Machine Learning (CIS 520) Fall 2012

- Song genre classification using lyrics and audio features
- Optical character recogniton 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, LaTeX
- *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

EXTRACURRICULAR INTERESTS

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