Ana C. Huamán Quispe

TRACLABS
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Research Interests

My main work motivation is to enable robots to do useful tasks, ideally as independently as possible. My thesis work comprehends the implementation of a robot manipulation pipeline that allows a bimanual manipulator to perform elementary manipulation tasks with household objects for which partial information might or might not be known. As most roboticists, I have experience working on the areas of perception, artificial intelligence, planning and control. Besides manipulation, I have a special interest in motion planning, having worked on this area during the first years of my PhD – I actually decided to go to grad school after reading a RRT paper.

Education

PhD, Robotics   2010 – *2016*
Georgia Institute of Technology, USA

MS, Computational Perception and Robotics   2010 - 2013
Georgia Institute of Technology, USA

B.Sc, Mechatronics   2003 – 2008
Universidad Nacional de Ingeniería, Perú

Work Experience

Post-Doctoral Research Assistant   February 2017 - present
TRACLabs
Work on developing a software framework for easy programming of robot manipulation and navigation tasks.

Robotics Intern   June 2016 - October 2016
Toyota InfoTechnology Center (Toyota ITC)
Develop a learning system on our mobile robot, HSR-20 (Human Support Robot) that allowed the robot to interact with users and learn their personal robot-human preferences.

Student Developer   May 2014 - August 2014
PointCloud Library (PCL) - Google Summer of Code
Implemented a hierarchical fitting algorithm to represent simple household objects with geometrical primitives (superquadrics) using as inputs one-view pointclouds from a RGBD sensor.

Student Developer   May 2011 - August 2011
Open Source Computer Vision (OpenCV) - Google Summer of Code
Wrote diverse tutorials as user documentation for the OpenCV project. Topics covered include edge detection, feature matching, image processing and cascade classifiers.

Graduate Research Assistant   August 2010 – May 2016
Georgia Institute of Technology
- Developed a baseline object recognition system currently supporting a database of 42 household objects. The recognition is based on RCNN features feeding a standard SVM.
- Developed a full pipeline for picking up unknown objects using superquadrics as a base representation, which allowed fast online planning of simple manipulation tasks.
- Developed a deterministic algorithm for path planning for redundant robotic arms. Designed simulation cases for arms with different kinematics.
- Developed a deterministic algorithm to generate diverse end-effector trajectories for a given manipulation task.

Robot Experience

Schunk Light Weight Arms (LWA3 and LWA4)
Most of my current manipulation experiments have been carried out in bimanual manipulators manufactured by Schunk. These arms possess 7 degrees of freedom each and are endowed with a gripper (LWA3) and a 3 Schunk Dexterous Hand (LWA4). For videos of the robots in action, please refer to my website or upon request. The communication between my planning software and the low-level robot control software is done purely in C and C++ (purposely we did not use ROS in these platforms as at the time its latency was not acceptable for our real-time control needs).

Baxter
Experience transferring our planning platform from the LWA3 / LWA4 robot to a Baxter platform (in collaboration with colleagues at Arizona State University). For this, ROS was used as the framework for robot communication. Used Python for low-level commanding and designed libraries to communicate our original ROS-free C++ planning code to the robot.

Publications

Towards Understanding User Preferences in Robot-Human Handovers: How Do We Decide?
E. Martinson, A. Huamán Quispe, K. Oguchi
26th IEEE Intl. Symposium on Robot and Human Interactive Communication (ROMAN 2017)

Combining Arm and Hand Metrics for Sensible Grasp Selection
A. Huamán Quispe, H. Ben Amor and H.I. Christensen
12th Conference on Automation, Science and Engineering (CASE 2016)

A Taxonomy of Benchmark Tasks for Robot Manipulation
A. Huamán Quispe, H. Ben Amor and H.I. Christensen
International Symposium on Robotics Research (ISRR 2015)

Efficient Manipulation Planning with basic primitives
A. Huamán Quispe, B. Melville, C. Erdogan, H. Ben Amor, H.I. Christensen and M. Stilman
Proceedings of 2015 IEEE International Conference on Robotics and Automation (ICRA)

Handover Planning for Every Occasion

A. Huamán Quispe, Heni Ben Amor and M. Stilman

Proceedings of 2014 IEEE-RSJ International Conference on Humanoid Robots (Humanoids)

Generation of Diverse Paths in 3D Environments

A. Huamán Quispe, T. Kunz and M. Stilman

Proceedings of 2013 IEEE-RSJ International Conference on Intelligent Robots and Systems (IROS)

Deterministic Motion Planning for Redundant Robots along End-Effector Paths

A. Huamán Quispe and M. Stilman

Proceedings of 2012 IEEE-RAS International Conference on Humanoid Robots (Humanoids)

Software Skills

Languages: C, C++, Python
Computational: Matlab, Mathematica, Maxima
Robotics: OpenCV, PCL, ROS
OS: Linux **SCM:** Git, svn.
Familiar with: Caffe, Blender, Meshlab, SolidWorks, SketchUp.

Languages

English: Fluent. **Spanish:** Native. **Italian:** Basic