

MATTHEW KLINGENSMITH

PhD Candidate, Robotics Institute at Carnegie Mellon

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Work Experience

Dyson Robotics Lab

Imperial College London, London UK

Visiting researcher. Spring 2016.

Developed algorithms for automatically calibrating and tracking robot arms using visual SLAM. .

Personal Robotics Lab

Carnegie Mellon Robotics Institute, Pittsburgh PA

Student researcher. 2013-2016.

Software support, research and development for the Home Exploring Robotic Butler (HERB) and Assistive Dextrous Arms (ADA). Research focusing on the intersection of 3D computer vision and robot manipulation.

Google/Motorola Advanced Technologies and Projects

Mountain View, CA

Temporary project staff. Summer 2014

Worked on Google's secretive project Tango, a mobile device with onboard *Imus*, depth cameras, and visual sensors. My role here was to develop real-time 3D mapping capabilities for the sensor, which culminated in the CHISEL application.

National Robotics Engineering Center

Carnegie Mellon Robotics Institute, Pittsburgh, PA

Student intern. 2012-2013.

Software engineer. Summer 2013

Employed as a student intern (then as a full-time employee) to work on the DARPA ARM-S project. Programmed key parts of the software infrastructure, planning algorithms and high-level behaviors. Assisted with on-site testing.

Willow Garage

Menlo Park, CA

Software engineering intern Summer 2011

Worked on the ROS Electric Arm Navigation stack. Made improvements to the CHOMP algorithm allowing planning safely out of collision. Wrote key software (Arm Navigation Wizard and the Arm Navigation Warehouse) which would become components of the MoveIt software framework.

re² inc.

Pittsburgh, PA

Software engineering intern Summer 2010

Developed sensor visualization, testing, and user-interface software during development of the DARPA ARM robot.

Education

CMU Robotics Institute PhD Program 2013 - June 2016

Degree: Doctor of Philosophy in Robotics

QPA: 4.0, Advisors: Sidd Srinivasa and Michael Kaess

Thesis: *Automatic tracking and calibration of robot arms using SLAM techniques.*

CMU Robotics Institute MS Program 2011 - 2012

Degree: Master of Science in Robotics

QPA: 3.9, Advisor: Nancy Pollard

Carnegie Mellon School of Computer Science 2008 - 2011

Degree: Bachelor of Science in Computer Science, Minor in robotics

QPA: 3.21

Publications

Touch-based Localization on High Dimensional Manifolds using the Implicit Manifold Particle Filter

RSS 2016 submission. First Author.

Articulated Robot Motion For SLAM

ICRA RA-L 2016. First Author.

Chisel: Real-time 3D Reconstruction Onboard a Mobile Device

RSS 2015. First Author. Best systems paper finalist

Object Modelling and recognition from Noisy and Sparse Data via Voxel Depth Carving

ISER 2014. First Author

Closed-loop Servoing using real-time Markerless Arm Tracking

ICRA 2013. First Author.

Efficient Touch-based Localization through Submodularity

ICRA 2013. Second Author.

CHOMP: Covariant Hamiltonian Optimization for Motion Planning

IJRR 2012.

CHOMP-R: Covariant Optimization for Motion Replanning

Tech Report 2012. Second Author.

An Integrated System for Autonomous Robotics Manipulation

IROS 2012.

Skills and Research Interests

Languages: C++ (10 years), Java (9 years), Python (8 years), C# (8 years), MATLAB (8 years)

Key Concepts: Robot manipulation, kinematics and dynamics, computer vision, computer graphics, 3D perception, SLAM, machine learning, interactive systems, planning and optimization.

Contributed to Projects: Dyson manipulation project, Home Exploring Robotic Butler (HERB), Assistive Dextrous Arm (ADA), Project Tango, DARPA ARM-S project, ROS manipulation stack (MoveIt), OpenRAVE, Dynamics and Animation for Robotics Toolkit (DART)

Manage Projects: OpenChisel, ARM-SLAM, DwarfCorp