Xianyi Cheng

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Education

Ph.D. in Mechanical Engineering   Aug 2019 - Present
Courtesy Student in the School of Computer Science
Carnegie Mellon University
Advisor: Matthew T. Mason

M.S. in Robotics   Aug 2017 - Aug 2019
Carnegie Mellon University
Advisor: Matthew T. Mason

B.S. in Aerospace Engineering   Aug 2013 - Jun 2017
Harbin Institute of Technology

Publication

- **Cheng, Xianyi**; Huang, Eric; Hou, Yifan; and Mason, Matthew T. "Contact Mode Guided Sampling-Based Planning for Quasistatic Dexterous Manipulation in 2D." *International Conference on Robotics and Automation (ICRA),* 2021. pdf

- Huang, Eric; **Cheng, Xianyi**; and Mason, Matthew T. "Efficient Contact Mode Enumeration in 3D." *Workshop on the Algorithmic Foundations of Robotics (WAFR),* 2020. pdf

- **Cheng, Xianyi**; Hou, Yifan; and Mason, Matthew T. "Manipulation with Suction Cups using External Contacts." *International Symposium on Robotics Research (ISRR),* 2019. pdf

- **Cheng, Xianyi**; Jia, Zhenzhong; and Mason, Matthew T. "Data-Efficient Process Monitoring and Failure Detection for Robust Robotic Screwdriving." *International Conference on Automation Science and Engineering (CASE),* 2019. pdf

- **Cheng, Xianyi**; Jia, Zhenzhong; Bhatia, Ankit; Aronson, Reuben M.; and Mason, Matthew T. "Sensor Selection and Stage and Result Classifications for Automated Miniature Screwdriving." *International Conference on Intelligent Robots (IROS),* 2018. pdf.

Research Experience

The Manipulation Lab   Carnegie Mellon University
Research Assistant   Oct 2017 - Present

Action Generation and Planning For Dexterous Manipulation

- Developing algorithms that generate manipulation actions in contact-rich manner without motion primitives

Dexterous Manipulation with Vacuum Grippers

- Built statistical contact models and physical models for vacuum suction cups
- Modeled suction cups as passive elastic joints to perform dexterous manipulation tasks
- Executed robot actions to tilt a block with a suction cup under external contacts

Data-efficient Fault Detection and Process Monitoring for Automatic Screwdriving

- Developed realtime stage classification and result prediction system for screwdriving assembly
- Developed sensor reduction algorithms to select for minimal sensor set for high prediction accuracy
- Incorporated process models into hidden markov model to achieve data-efficiency

Spacecraft System Research Center Harbin Institute of Technology
Research Assistant Jan 2017 - Jun 2017

Indoor SLAM and 3D Object Segmentation

- Implemented RGB-D SLAM and 3D point cloud reconstruction using Kinect V2 camera
- Designed Object Segmentation algorithms on 3D point cloud using region growing method

Pattern Recognition Lab Harbin Institute of Technology
Research Assistant May 2016 - Sept 2016

Interactive Segmentation of Objects in Cluttered Environment

- Selected and tracked features using KLT feature tracking method.
- Segregated features into different clusters by their trajectories.
- Segmented object contours and identify objects given multiple fixations.

Industrial Experiences

ABB Robotics May 2020 - Aug 2020
Research Intern

Honors and Awards

Aug 2018	Foxconn Student Fellowship
Nov 2016	The First Place in the 4th Start-up Competition in Harbin Institute of Technology
Oct 2016	Excellent Student Award in School of Astronautics
Aug 2016	First Prize of the 9th National University Student Social Practice and Science Contest on Energy Saving and Emission Reduction
Jan 2016	Selected in Outstanding Engineering Leader Program in Harbin Institute of Technology
Apr 2015	People's Scholarship (awarded to top 5% students)

Technical Skills

Programming: Python, C/C++, MATLAB
OS: Linux, ROS
Robots: ABB 120, Foxbot
Tools: PyBullet, Vrep, Mujoco, Pytorch, OpenCV, Point Cloud Library, SolidWorks, AutoCAD