

Zheming Zhou

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EDUCATION

University of Michigan, Ann Arbor

Michigan, USA

Ph.D. Candidate in Robotics

Sept. 2017-Apr. 2021 (expected)

- *Research Topics:* Robot Perception for Manipulation, Light-field Perception
- *Advisor:* Prof. Chad Jenkins

University of Michigan, Ann Arbor

Michigan, USA

M.S. in Robotics

Sept. 2015-Dec. 2016

- *Courses:* Robot Modeling and Control, Machine Learning, Computer Vision

University of Electronic Science and Technology of China (UESTC)

Chengdu, China

B.E. in Mechatronics Engineering

Sept. 2011-Jun. 2015

- *Thesis:* Multi-frequency weak signal detection based on multi-segment cascaded stochastic resonance for rolling bearings
- *GPA:* 3.88/4

PUBLICATIONS AND PATENTS

- **Zheming Zhou**, Xiaotong Chen and, Odest Chadwicke Jenkins. "LIT: Light-field Inference of Transparency for Refractive Object Localization", In *IEEE Robotics and Automation Letters (RA-L)*
- **Zheming Zhou**, Tianyang Pan, Shiyu Wu, Haonan Chang, and Odest Chadwicke Jenkins. "Glass-Loc: Plenoptic Grasp Pose Detection in Transparent Clutter", In *IEEE Intelligent Robots and Systems (IROS)*, Macau, China, 2019.
- Kevin French, Shiyu Wu, Tianyang Pan, **Zheming Zhou**, and Odest Chadwicke Jenkins. "Learning Behavior Trees From Demonstration", In *IEEE Robotics and Automation (ICRA)*, Montreal, Canada, 2019.
- **Zheming Zhou**, Zhiqiang Sui and, Odest Chadwicke Jenkins. "Plenoptic Monte Carlo Object Localization for Robot Grasping under Layered Translucency", In *IEEE Intelligent Robots and Systems (IROS)*, Madrain, Spain, 2018.
- Zhen Zeng, **Zheming Zhou**, Zhiqiang Sui, and Odest Chadwicke Jenkins. "Semantic robot programming for goal-directed manipulation in cluttered scenes", In *IEEE Robotics and Automation (ICRA)*, Brisbane, Australia, 2018.
- Zhiqiang Sui, **Zheming Zhou**, and Odest Chadwicke Jenkins. "SUM: Sequential Scene Understanding and Manipulation", In *IEEE Intelligent Robots and Systems (IROS)*, Canada, 2017.
- Wei Guo, **Zheming Zhou**, Cheng Chen, and Xiang Li. "Multi-frequency weak signal detection based on multi-segment cascaded stochastic resonance for rolling bearings", *Journal of Microelectronics Reliability*, 2017.
- **Zheming Zhou**, Shaoyuan Chen, Zhuangfa He, Jinmao Jiang, National Innovation Patent (China), "A Mechanical Lock Encrypting Different Devices with Different Codes", 201410188588.8.
- Shaoyuan Chen, **Zheming Zhou**, Zhuangfa He, Jinmao Jiang, National Innovation Patent (China), "An Automatic Homework Collecting and Structuring Device", 201410188579.9.
- **Zheming Zhou**, Wei Guo, National Software Copyright (China), "A LabVIEW-based Data Acquisition and Processing System V1.0", 2014SR044241.

PROFESSIONAL APPOINTMENTS

University of Michigan, CSE

Graduate Student Research Assistant advised by Prof. Chad Jenkins

Ann Arbor, Michigan

Jan. 2016- Present

Wondermatrix Research

Robotics Perception Intern

Beijing, China

Apr. 2017- Aug. 2017

PROFESSIONAL ACTIVITIES

- *Research Topic Coordinator*, Journal of Frontiers in Robotics
- *Program Reviewer*, IEEE Access, Humanoids 2016, IROS 2018, IROS 2019, ICRA 2019, ICRA 2020
- *Attendee*, ICRA 2016, IROS 2018, IROS 2019

HONORS AND AWARDS

- Rackham Graduate Student Travel Grants *Oct. 2019*
- Outstanding Graduates (state-level) (top 1/258) *Apr. 2015*
- Best undergraduate Thesis (top 1/258) *Jan. 2015*
- National Scholarship (top 1/258) *Oct. 2014*
- Tang Lixing Fellowship (Highest fellowship for academic excellence in UESTC, only 50 out of over 30,000 students granted the fellowship each year) *Dec. 2013*
- The First Prize Scholarship (UESTC) *Dec. 2013*
- The Second Prize Scholarship (UESTC) *Dec. 2012*

INDUSTRIAL RESEARCH GRANTS AND PROJECTS

Parts Pose Estimation in Cluttered Bin, \$309K

Technical member

Magna International Inc.

Feb. 2019–Feb. 2020

Evaluation of ICP-based Pose Estimation within Tolerances for Robotic Grasping, \$173K

Technical member

Magna International Inc.

Jun. 2018–Feb. 2019

RESEARCH EXPERIENCE

Plenoptic Object Pose Estimation and Grasp Pose Detection

Supervisor: Prof. Chad Jenkins

University of Michigan

Sept. 2017- Present

- Proposed Depth Likelihood Volume (DLV) as new light-field depth descriptor.
- Achieved 90% of pose estimation accuracy with 5cm and 20 degree rotation threshold for transparent object and object behind translucent surfaces by proposing Plenoptic Monte Carlo Localization (PMCL) algorithm.
- Achieved 81% manipulation successful rate over transparent clutter by proposing Plenoptic Grasp Poss Detection Pipeline (GlassLoc).
- Proposed LIT dataset with 70000 synthetic light-field images rendered in Unreal engine and 400 real images labelled with ground truth poses – the first light-field dataset for transparent objects localization.
- Proposed two-stage transparency estimator LIT with deep neural network first stage and generative

sampling as second stage.

Robot Manipulation over Cluttered Environment

University of Michigan

Supervisor: Prof. Chad Jenkins

Jan. 2016- Apr. 2018

- Achieved 87.3% object detection and pose estimation accuracy (63.4% accuracy when using traditional R-CNN with ICP) for the 4PROGRESS cluttered environment dataset by leveraging R-CNN with generative pose estimation method.
- Created and optimized the manipulation system's (built on ROS) running time to half of its initial version by creating point cloud pre-processing server and trajectory evaluation functions.
- Realized robot manipulation in cluttered environment by implementing grasp pose detection algorithm and exhibited real time grasping in the International Conference on Robotics and Automation (ICRA 2016).

MAEBot and ArmLab Project

University of Michigan

Supervisor: Prof. Edwin Olson

Sept. 2015- Nov. 2015

- Averaged probabilistic roadmap (PRM) with local search based A* algorithm to realize real-time planning along with action, winning 2nd (out of 16) in the MAEBot competition.
- Implemented inverse kinematics, trajectory smoothing algorithm and potential field object avoiding method to realize 6-DOF arm picking task with half of average task completion time (16 teams).

Solar Pink Pong (SPP) Project

University of Michigan

Supervisor: Prof. Edwin Olson

Sept. 2015- Jan. 2016

Solar Pink Pong is a hybrid of a street and video game. Players of this game can interact with an animated pink sunlight reflection on the street using their bodies and shadows.

Website: <http://www.solarpinkpong.com/>

- Designed the mirror angle control system for the SPP2 (Second version of SPP) with <1cm (5 cm for the first version) error for line and circle drawing.
- Doubled auto calibration system's accuracy by automatically creating kinematics correlation tables between camera world and real world with laser pointers.

Rolling Bearing Fault Signal Identification and Processing

UESTC

Supervisor: Prof. Wei Guo

Sept. 2013- Jan. 2015

- Designed the "LabVIEW-based Vibration Data Acquisition and Analysis System" for data collection and analysis, and acquired a software copy right.
- Diagnosed rolling bearings' fault by means of stochastic resonance and empirical mode decomposition, introducing the fault frequency extraction method to distinguish the fault frequency from the spectrum envelope.
- Analyzed the process of particle transition as the non-linear system shifted from the unstable stage to the quasi-stable stage in stochastic resonance.

LEADERSHIPS

- *Student representative for Michigan Robotics Day, 2015-2016*
- *Leader of Fortune Global Forum volunteer group, 2013*
- *Vice President, Calligraphy Association of UESTC, 2012-2013*

PROFICIENCY AND SKILLS

- *Technical Skills:* ROS, C++, Python, Pytorch, Linux, Latex, MATLAB etc.
- *Languages:* English (proficient) and Mandarin (native)