Zheming Zhou

zhezhou@umich.edu | (734)-780-9775 | www.zhemingzhou.net

EDUCATION

University of Michigan, Ann Arbor **Michigan, USA**
Ph.D. in Robotics *Sept. 2017-Apr. 2021*

- *Research Topics*: Robot Perception for Manipulation, Light-field Perception
- *Dissertation Title*: Robotic Manipulation under Transparency and Translucency from Light-field Sensing
- *Dissertation Committee*: Chad Jenkins (Chair), Peter Allen, Dmitry Berenson, Robert Platt Jr., and David Fouhey

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

PROFESSIONAL APPOINTMENTS

Applied Scientist II **Sunnyvale, California**
Amazon Lab126 *Jun 2021- Present*

Applied Scientist Intern **Sunnyvale, California**
Amazon Lab126 *May 2020- Aug 2020*

Graduate Student Research Assistant **Ann Arbor, Michigan**
University of Michigan *Jan 2016- Apr 2021*

Robotics Perception Intern **Beijing, China**
Wondermatrix Research *Apr. 2017- Aug. 2017*

SELECTED PUBLICATIONS AND PATENTS

- **Zheming Zhou**, Xiaotong Chen and, and Odest Chadwicke Jenkins. "LIT: Light-field Inference of Transparency for Refractive Object Localization", *Journal of IEEE Robotics and Automation Letters (RA-L), 2020.* ***(2020 RA-L Best Paper Award Winner)***
- **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 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

- 2020 RA-L Best Paper Award *Apr. 2021*
- Rackham Graduate Student Travel Grants *Oct. 2019*
- Outstanding Graduates (state-level) (top 1/258) *Apr. 2015*
- Best Undergraduate Thesis Award (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 **Magna International Inc.**
Main Contributor *Feb. 2019–Feb. 2020*

Evaluation of ICP-based Pose Estimation within Tolerances for Robotic Grasping, $173K **Magna International Inc.**
Main Contributor *Jun. 2018–Feb. 2019*

RESEARCH EXPERIENCE

Deep Learning for Refractive Object Pose Estimation **University of Michigan**
Supervisor: Prof. Chad Jenkins *Mar. 2019- Present*

- Proposed LIT two-stage pipeline which leverage the deep neural network with generative sampling for refractive object segmentation and 6-DoF pose estimation.
- Introduced 3D convolutional EPIs and EPIt filters for light-field-based refractive object segmentation which proves to performs 10% better at segmentation result using normal RGB image.
- Created the LIT dataset with 75,000 rendered light-field images and 300 real test images as the first light-field dataset for the purpose of refractive object segmentation and pose estimation tasks.

Robot Perception over Transparency Using Light-field **University of Michigan**
Supervisor: Prof. Chad Jenkins *Oct. 2017–Present*

- Proposed Depth Likelihood Volume (DLV) as a novel light-field descriptor to describe environment with transparent and translucent objects.
- Introduced Plenoptic Monte Carlo Localization (PMCL) algorithm for generatively localizing 6-DoF pose of transparent objects and object behind translucent surfaces.
- Introduced Glassloc grasp pose detection algorithm for manipulating transparent objects in cluttered environment which achieves 81% pick successful rate over 220 robot manipulation trials.

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*

- Aeveraged probabilistic roadmap (PRM) with local search based A* algorithm to realize real-time planning along with action, wining 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, Latex, MATLAB etc.
- ***Languages***: English (proficient) and Mandarin (native)