# ZICHEN (VINCENT) ZHANG

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## SELECTED RESEARCH

**Time Discretization in Continuous-Time Reinforcement Learning** NeurIPS 2023 & Ongoing
- Analyzed the impact of time discretization in policy evaluation for continuous-time stochastic LQR
- Uncovered a fundamental trade-off between approximation and statistical error in value estimation
- Ongoing: analyze the trade-off in Temporal Differencing methods

**Decentralized Cross-Entropy Method for Continuous-Action Planning** NeurIPS 2022
- Generalized the Cross-Entropy Method to increase sample efficiency in planning

**Reducing Selection Bias in Counterfactual Reasoning** NeurIPS 2019 CausalML Workshop (Spotlight)
- Developed a method to reduce selection bias in counterfactual reasoning
- Achieved state-of-the-art results on a benchmark dataset for estimating individual treatment effects

**Fast and Accurate Salient Object Detection (SOD)** CVPR 2019 & Best Paper at Pattern Recognition 2020
- Designed experiments to understand the utility of a new loss function for boundary refinement
- ReSidual U-blocks enables training a deep neural net from scratch for SOD

**Interactive Object and Task Learning for Contact Motions on Unstructured Surfaces** ICRA 2019
- One of five finalists of the KUKA innovation challenge 2018
- Led the development of incremental object detection, GUI and system integration

## INDUSTRY EXPERIENCE

**Research Intern** 08/2020 - 04/2022
Huawei Noah's Ark Lab Edmonton, AB
- Conducted and published research in reinforcement learning
- Mentored undergraduate interns in implementing reinforcement learning algorithms

**Machine Learning Scientist Intern** 05/2018 - 03/2019
Medo.ai, later acquired by Exo Edmonton, AB
- Lead developer of the deep learning infrastructure
- Developed and deployed a medical image segmentation method on AWS Stack

**Software Developer** 06/2013 - 05/2015
NTT Data Inc. Halifax, NS
- Worked on a multi-tier web-based information management system, on a two-week release cycle
- Led a team of three to win the internal annual Hackathon
  - Utilized Puppet to reduce the Dev Environment setup time from 1-2 days to 1 second
  - Pitched the idea to VP of R&D, resulting in its promotion to a production project

**Research Engineer** 11/2012 - 04/2013
Mechanical Engineering Department, Dalhousie University Halifax,NS
- Developed the ROS driver for Robucar (a ground vehicle) https://sourceforge.net/projects/acm-robucar
- Designed and developed C++ teleoperation programs with ROS for iRobot Create robot and Robucar

## EDUCATION

**Ph.D. in Computing Science** 2018 - present
University of Alberta. Supervisors: Dale Schuurmans, Martin Jagersand Edmonton, AB, Canada

**M.Sc. in Computing Science** 2015 - 2017
University of Alberta. Supervisors: Dana Cobzas, Martin Jagersand Edmonton, AB, Canada

**M.A.Sc. in Electrical Engineering** 2009 - 2012
Dalhousie University. Supervisor: Jason Gu Halifax, NS, Canada

**B.E. in Electrical Engineering** 2005 - 2009
Huazhong University of Science and Technology (HUST) Wuhan, China

## Honors & awards

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| NeurIPS 2023 Top Reviewer | 2023 |
| Alberta Graduate Excellence Scholarship | 2023 |
| NeurIPS 2023 Scholar Award | 2023 |
| NeurIPS 2022 Scholar Award | 2022 |
| NSERC Canada Graduate Scholarship-Doctoral (CGS-D), University of Alberta | 2018-2022 |
| Alberta Innovates - Graduate Student Scholarship (AIGSS - PhD), University of Alberta | 2018-2022 |
| NeurIPS 2019 Travel Award | 2019 |
| President's Doctoral Prize of Distinction, University of Alberta | 2018,2019 |
| Science Graduate Scholarship, University of Alberta | 2016,2018 |
| NSERC Canada Graduate Scholarships–Master's Program (CGS-M), University of Alberta | 2016-2017 |
| Alberta Innovates Technology Futures Scholarship (AITF - Master), University of Alberta | 2016-2017 |
| Walter H Johns Graduate Fellowship, University of Alberta | 2016 |

## Selected publications

Google Scholar: https://scholar.google.com/citations?user=nSh2eD4AAAAJ&hl=en

*: equal contribution, †: equal advising

1. Managing Temporal Resolution in Continuous Value Estimation: A Fundamental Trade-off
   ***Zichen Zhang****, Francesco Zanini*, Junxi Zhang*, Alex Ayoub*, Johannes Kirschner*, Masood Dehghan*, Dale Schuurmans*
   **NeurIPS 2023**. A preliminary version appeared at the ICML 2022 ReALML Workshop.
2. A Simple Decentralized Cross-Entropy Method
   ***Zichen Zhang***, Jun Jin, Martin Jagersand, Jun Luo†, Dale Schuurmans†
   Conference on Neural Information Processing Systems (**NeurIPS**), 2022.
3. Learning State Conditioned Linear Mappings for Low-Dimensional Control of Robotic Manipulators
   Michael P., Kerrick J., ***Zichen Zhang***, Laura P., Masood D., Faezeh H., Martin J.
   International Conference on Robotics and Automation (**ICRA**), 2023
4. U2-Net: Going deeper with nested U-structure for salient object detection
   Xuebin Qin, ***Zichen Zhang***, Chenyang Huang, Masood Dehghan, Osmar R Zaiane, Martin Jagersand
   **Best Paper Award**, In Pattern Recognition, 2020
5. Reducing Selection Bias in Counterfactual Reasoning for Individual Treatment Effects Estimation
   ***Zichen Zhang***, Qingfeng Lan, Lei Ding, Yue Wang, Negar Hassanpour, Russ Greiner
   **Spotlight Paper, NeurIPS CausalML Workshop 2019**
6. BASNet: Boundary Aware Salient Object Detection
   Xuebin Qin, ***Zichen Zhang***, Chenyang Huang, Chao Gao, Masood Dehghan and Martin Jagersand
   IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), 2019
7. Online Tool and Task Learning via Human Robot Interaction
   Masood Dehghan*, ***Zichen Zhang****, Mennatullah Siam*, Jun Jin, Laura Petrich, Martin Jagersand
   International Conference on Robotics and Automation (**ICRA**), 2019
8. End-to-end detection-segmentation network with ROI convolution
   ***Zichen Zhang***, Min Tang, Dana Cobzas, Dornoosh Zonoobi, Martin Jagersand, Jacob L. Jaremko
   International Symposium on Biomedical Imaging (**ISBI**), 2018
9. Segmentation-by-Detection: A Cascade Network for Volumetric Medical Image Segmentation
   Min Tang, ***Zichen Zhang***, Dana Cobzas, Martin Jagersand, Jacob L. Jaremko
   International Symposium on Biomedical Imaging (**ISBI**), 2018