Ze Yang – Curriculum Vitæ

CONTACT INFORMATION

Department of Computer Science
University of Toronto
Toronto, ON, Canada

+1(647)786-0934
zeyang@cs.toronto.edu
https://www.cs.toronto.edu/~zeyang/

RESEARCH INTERESTS

My research interests focus on the intersection of 3D computer vision, robotics, and machine learning. In particular, I am dedicated to build *scalable* and *realistic* digital twins for *real-world modeling*, with the purpose of creating *immersive* and *controllable* simulations that facilitate the development and evaluation of autonomous systems, such as self-driving vehicles, in a *safe*, *controlled*, *reactive*, and *cost-effective* manner. Towards this goal, I have delved into various areas over the past few years, such as *reconstruction* spanning from individual objects to large-scale scene, *world modeling* encompassing both rigid and dynamic contents, and *closed-loop simulation* for camera and LiDAR data. Crucially, I investigate these tasks not only in *controlled* environments but also in more challenging *in-the-wild* settings where the resulting models will be deployed. During the earlier stages of my research, I'm interested in learning *flexible* and *structural* representation for visual perception.

EDUCATION

University of Toronto
Department of Computer Science — 2020/09 – Present
Ph.D., Supervisor: Raquel Urtasun

Peking University
School of Electronics Engineering and Computer Science (EECS) — 2017/09 – 2020/06
M.Sc., Supervisor: Liwei Wang
Thesis: "Learning Representative Points for Visual Perception"

Xi'an Jiaotong University
Special Class for the Gifted Young
B.Eng., *Electrical Engineering and Automation* — 2013/09 – 2017/06

PROFESSIONAL EXPERIENCE

Waabi Innovation, Toronto, ON, Canada
Senior Researcher — 2023/09 – Present
Researcher II — 2022/06 – 2023/09
Researcher — 2021/03 – 2022/06
Working on next-generation sensor simulation for self-driving

Uber ATG, Toronto, ON, Canada
Research Scientist — 2020/06 – 2021/02
Research Internship — 2019/10 – 2020/06
Working on 3D reconstruction, modeling and simulation for self-driving

Microsoft Research Asia, Beijing, China
Research Internship — 2018/12 – 2019/09
Working with Dr. Han Hu, Jifeng Dai, and Steve Lin on visual perception

Sinovation Ventures, Beijing, China
Research Internship — 2017/06 – 2017/08
Working on unmanned convenience store project

National University of Singapore, Singapore
Research Internship — 2016/09 – 2016/12
Working with Prof. Jiashi Feng on generative model

Peer-Reviewed Conference Publications

(*=equal contribution, †=interns)

2025

C1 GenAssets: Generating in-the-wild 3D Assets in Latent Space
Ze Yang, Jingkang Wang, Haowei Zhang, Siva Manivasagam, Yun Chen, Raquel Urtasun
In *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2025

2024

C2 UniCal: Unified Neural Sensor Calibration
Ze Yang*, George Chen*†, Haowei Zhang, Kevin Ta, Ioan Andrei Bârsan, Daniel Murphy, Siva Manivasagam, Raquel Urtasun
In *European Conference on Computer Vision (ECCV)*, 2024

C3 G3R: Gradient Guided Generalizable Reconstruction
Yun Chen*, Jingkang Wang*, **Ze Yang**, Siva Manivasagam, Raquel Urtasun
In *European Conference on Computer Vision (ECCV)*, 2024

C4 Copilot4D: Learning Unsupervised World Models for Autonomous Driving via Discrete Diffusion
Lunjun Zhang, Yuwen Xiong, **Ze Yang**, Sergio Casas, Rui Hu, Raquel Urtasun
In *International Conference on Learning Representations (ICLR)*, 2024

2023

C5 LightSim: Neural Lighting Simulation for Urban Scenes
Ava Pun*†, Gary Sun*†, Jingkang Wang*, Yun Chen, **Ze Yang**, Siva Manivasagam, Wei-Chiu Ma, Raquel Urtasun
In *Neural Information Processing Systems (NeurIPS)*, 2023

C6 Real-Time Neural Rasterization for Large Scenes
Jeffrey Yunfan Liu†, Yun Chen*, **Ze Yang***, Jingkang Wang, Sivabalan Manivasagam, Raquel Urtasun
In *International Conference on Computer Vision (ICCV)*, 2023

C7 Towards Zero Domain Gap: A Comprehensive Study of Realistic LiDAR Simulation for Autonomy Testing
Sivabalan Manivasagam*, Ioan Andrei Bârsan*, Jingkang Wang, **Ze Yang**, Raquel Urtasun
In *International Conference on Computer Vision (ICCV)*, 2023

C8 UniSim: A Neural Closed-Loop Sensor Simulator
Ze Yang*, Yun Chen*, Jingkang Wang*, Siva Manivasagam*, Wei-Chiu Ma, Anqi Joyce Yang, Raquel Urtasun
In *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2023 (Highlight)

C9 Reconstructing Objects in-the-wild for Realistic Sensor Simulation
Ze Yang, Siva Manivasagam, Yun Chen, Jingkang Wang, Rui Hu, Raquel Urtasun
In *International Conference on Robotics and Automation (ICRA)*, 2023

2022

C10 CADSim: Robust and Scalable in-the-wild 3D Reconstruction for Controllable Simulation
Jingkang Wang, Siva Manivasagam, Yun Chen, **Ze Yang**, Ioan Andrei Bârsan, Anqi Joyce Yang, Wei-Chiu Ma, Raquel Urtasun
In *Conference on Robot Learning (CoRL)*, 2022

C11 RBGNet: Ray-based Grouping for 3D Object Detection
Haiyang Wang, Shaoshuai Shi, **Ze Yang**, Rongyao Fang, Qi Qian, Hongsheng Li, Bernt Schiele, Liwei Wang
In *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022

2021

C12 S3: Neural Shape, Skeleton, and Skinning Fields for 3D Human Modeling
Ze Yang, Shenlong Wang, Siva Manivasagam, Zeng Huang, Wei-Chiu Ma, Xinchen Yan, Ersin Yumer, Raquel Urtasun
In *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2021

2020

C13 Recovering and Simulating Pedestrians in the Wild
Ze Yang, Siva Manivasagam, Ming Liang, Bin Yang, Wei-Chiu Ma, Raquel Urtasun
In *Conference on Robotic Learning (CoRL)*, 2020 (Spotlight)

C14 Dense RepPoints: Representing Visual Objects with Dense Point Sets
Ze Yang*, Yinghao Xu*, Han Xue*, Zheng Zhang, Raquel Urtasun, Liwei Wang, Steve Lin, Han Hu
In *European Conference on Computer Vision (ECCV)*, 2020

2019

C15 RepPoints: Point Set Representation for Object Detection
Ze Yang*, Shaohui Liu*, Han Hu, Liwei Wang, Steve Lin
In *International Conference on Computer Vision (ICCV)*, 2019

C16 Learning Relationships for Multi-view 3D Object Recognition
Ze Yang, Liwei Wang
In *International Conference on Computer Vision (ICCV)*, 2019

2018 and before

C17 Learning to Navigate for Fine-grained Classification
Ze Yang, Tiange Luo, Dong Wang, Zhiqiang Hu, Jun Gao, Liwei Wang
In *European Conference on Computer Vision (ECCV)*, 2018

C18 Single Image Super-Resolution with a Parameter Economic Residual-Like Convolutional Neural Network
Ze Yang, Kai Zhang, Yudong Liang, Jinjun Wang
In *International Conference on Multimedia Modeling*, 2017 (Oral)

Preprints & Tech Reports

R1 SaLF: Sparse Local Fields for Multi-Sensor Rendering in Real-Time
Yun Chen, Matthew Haines, Jingkang Wang, Krzysztof Baron-Lis, Sivabalan Manivasagam, **Ze Yang**, Raquel Urtasun
arXiv preprint arXiv:2507.18713, 2025

R2 On the Anomalous Generalization of GANs
Jinchen Xuan, Yunchang Yang, **Ze Yang**, Di He, Liwei Wang
arXiv preprint arXiv:1909.12638, 2019

R3 Single Image Super-resolution via a Lightweight Residual Convolutional Neural Network
Yudong Liang, **Ze Yang**, Kai Zhang, Yihui He, Jinjun Wang, Nanning Zheng
arXiv preprint arXiv:1703.08173, 2017

Patents

P1 Learning Unsupervised World Models for Autonomous Driving via Discrete Diffusion
Lunjun Zhang, Yuwen Xiong, **Ze Yang**, Sergio Casas Romero, Raquel Urtasun
US Patent App. 18/900,601, 2025

P2 Deferred Neural Lighting in Augmented Image Generation
Ava Pun, Gary Sun, Jingkang Wang, Yun Chen, **Ze Yang**, Sivabalan Manivasagam, Raquel Urtasun
US Patent App. 18/666,728, 2024

P3 Three Dimensional Object Reconstruction for Sensor Simulation
Ioan Andrei Bârsan, Yun Chen, Wei-Chiu Ma, Sivabalan Manivasagam, Raquel Urtasun, Jingkang Wang, **Ze Yang**
US Patent App. 18/209,609, 2023

P4 Real World Object Reconstruction and Representation
Ze Yang, Sivabalan Manivasagam, Yun Chen, Jingkang Wang, Raquel Urtasun
US Patent App. 18/182,491, 2023

P5 Systems and Methods for Simulating Dynamic Objects Based on Real World Data
Ming Liang, Wei-Chiu Ma, Sivabalan Manivasagam, Raquel Urtasun, Bin Yang, **Ze Yang**
US Patent App. 17/388,372, 2022

Teaching Assistant

University of Toronto
- CSC 490: Making Your Self-driving Car Perceive the World — 2021 Winter

Peking University
- EECS 04831210: Information Theory — 2018 Spring

Selected Awards

- Ontario Graduate Scholarship, University of Toronto — 2024
- Vector Institute Research Grant, University of Toronto — 2020 - 2024
- May 4th Scholarship, Peking University — 2019
- Merit Student, Peking University — 2019
- 1st Place in Alibaba TianChi AI Competition for Healthcare (lung nodule detection) — 2017

Professional Service

Journal Reviewer:
- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- IEEE Transactions on Circuits and Systems for Video Technology (TCSVT)
- IEEE Transactions on Multimedia (TMM)

Conference Reviewer:
- Conference on Computer Vision and Pattern Recognition (CVPR) — 2020 – 2024
- International Conference on Computer Vision (ICCV) — 2021 – 2025
- European Conference on Computer Vision (ECCV) — 2022 – 2024
- Asian Conference on Computer Vision (ACCV) — 2020, 2024
- Winter Conference on Applications of Computer Vision (WACV) — 2021 – 2024
- Conference on Neural Information Processing Systems (NeurIPS) — 2023 – 2024
- International Conference on Learning Representations (ICLR) — 2025
- International Conference on Machine Learning (ICML) — 2025
- AAAI Conference on Artificial Intelligence (AAAI) — 2025
- International Conference on Robotics and Automation (ICRA) — 2024
- International Conference on Intelligent Robots and Systems (IROS) — 2023
- ACM International Conference on Multimedia (ACM-MM) — 2025

Open Source Softwares

- Learning to Navigate for Fine-grained Classification.
  GitHub: `https://github.com/yangze0930/NTS-Net`
- RepPoints: Point Set Representation for Object Detection.
  GitHub: `https://github.com/microsoft/RepPoints`
- Dense RepPoints: Representing Visual Objects with Dense Point Sets.
  GitHub: `https://github.com/justimyhxu/Dense-RepPoints`
- MMDetection.
  GitHub: `https://github.com/open-mmlab/mmdetection/pull/1256`

Invited Talks

T1 Toward Scalable World Modeling and Simulation for Autonomy
University of Maryland @ Iribe Center for Computer Science, College Park, MD, USA — 2025/07

T2 Toward Scalable World Modeling and Simulation for Autonomy
Cross Future AI Summit, Vancouver, BC, Canada — 2025/07

T3 Toward Scalable World Modeling and Simulation for Autonomy
Wallenberg AI, Autonomous Systems and Software Program (WASP Sweden), Online — 2025/06

T4 Toward Scalable World Modeling and Simulation for Autonomy
Princeton Computational Imaging Lab, Online — 2025/05

T5 Learning in-the-wild Sensor Simulation for Autonomous Driving
Mila Robot Learning Seminar, Online 2023/12

T6 Learning in-the-wild Sensor Simulation for Autonomous Driving
OpenDriveLab @ Shanghai AI Lab, Online 2023/07

T7 Learning in-the-wild Sensor Simulation for Autonomous Driving
Toronto Computational Imaging Group @ UofT, Toronto, ON, Canada 2023/07

T8 Learning 3D Reconstruction in the Wild for Realistic Sensor Simulation
ByteDance Research, Online 2022/10

T9 Deformable Asset Reconstruction and Animation for Sensor Simulation
CVPR21 Tutorial: All about Self-Driving, Online 2021/06

T10 Learning Fine-grained Regions for Long-tail Visual Perception
Microsoft Research Asia, Beijing, China 2019/09

T11 Representing Objects as Point Sets for Visual Perception
Noah's Ark Lab, Shenzhen, China 2019/07

T12 Learning Representative Regions for Fine-grained Classification
Noah's Ark Lab, Shenzhen, China 2018/11

Mentorship and Support

George Chen (University of Waterloo Undergrad & Waabi Internship)
- Working on *Neural Sensor Calibration* project

Jeffrey Liu (University of Waterloo Undergrad & Waabi Internship)
- Working on *Neural Scene Rasterization* project

Ava Pun (University of Waterloo Undergrad & Waabi Internship)
Gary Sun (University of Waterloo Undergrad & Waabi Internship)
- Working on *Neural Light Simulation* project

Haiyang Wang (Peking University Ph.D.)
- Working on *Ray-based Grouping for 3D Object Detection* project

Shengcao Cao (Peking University Undergrad)
- Working on *Video Object Detection* project

Jinchen Xuan (Peking University Undergrad)
- Working on *Anomalous Behaviour of GANs* project

Press Coverage

- Simulator Realism: The New Safety Standard for the AV Industry. Waabi Blog [link]. 2025/03.
- Waabi's Game-Changing Approach to Self-Driving Trucks. Fox News [link]. 2024/07.
- Waabi's GenAI promises to do so much more than power self-driving trucks. TechCrunch [link]. 2024/06.
- In It for the Long Haul: Waabi Pioneers Generative AI to Unleash Fully Driverless Autonomous Trucking. Nvidia Blog [link]. 2024/03.
- Introducing Copilot4D: A Foundation Model for Self-Driving. Waabi Blog [link]. 2024/03.
- Accelerating AVs through the next generation of Generative AI. Waabi Blog [link]. 2023/09.
- Introducing UniSim, one of the core groundbreaking technologies powering Waabi World. Waabi Blog [link]. 2023/06.
- Solving Self-Driving with Waabi World. Radical Ventures [link]. 2022/02.
- Welcome to Waabi World, the "ultimate simulator" for autonomous vehicles. The Verge [link]. 2022/02.
- Getting a better visual: RepPoints detect objects with greater accuracy through flexible and adaptive object modeling. Microsoft Research Blog [link]. 2019/10.