

EDUCATION

Stanford University 2021–Present
Doctor of Philosophy in Computer Science

Co-advisors: Jeannette Bohg, Marco Pavone

Coursework: interactive and embodied learning, multi-task and meta-learning, differentiable graphics

University of Toronto 2016–2019, 2020–2021

Bachelor of Applied Science in Engineering Science, Robotics

Advisor: Prof. Florian Shkurti. Graduation with Honours, Dean's Honour List 2018–2021

Coursework: robot perception, planning and control, geometric deep learning, reinforcement learning, statistical ML

RESEARCH EXPERIENCES

Autonomous Systems Lab, Stanford University Stanford, CA, USA

Graduate Researcher advised by Prof. Marco Pavone and Dr. Edward Schmerling 2022-03 – Present

Topics: uncertainty quantification for deep regularized offline reinforcement learning

Interactive Perception and Robot Learning Lab, Stanford University Stanford, CA, USA

Graduate Researcher advised by Prof. Jeannette Bohg 2022-01 – Present

Topics: robot manipulation via affordance modelling, reinforcement learning, and task and motion planning

Stanford Vision and Learning Lab, Stanford University Stanford, CA, USA

Graduate Researcher advised by Prof. Jiajun Wu 2021-09 – 2022-02

Topics: neuro-symbolic propositional models for long-horizon robot task planning

Robot Vision and Learning Lab, Vector Institute & University of Toronto Toronto, Canada

Undergraduate Researcher advised by Prof. Florian Shkurti 2020-05 – 2021-05

Topics: learning to plan in symbolic 3D scene graphs with graph neural networks [Paper, Project page, Code]

Mobile Robotics Lab, MILA & McGill University Montreal, Canada

Research Intern co-supervised by Prof. Gregory Dudek and Prof. David Meger 2020-01 – 2020-05

Topics: depth prediction for visual SLAM [Paper], *visual representation learning for self-driving control* [Paper]

Noah's Ark Lab, Huawei Research Canada Markham, Canada

Deep Learning Research Intern, perception and localization with Dr. Bingbing Liu 2019-05 – 2020-05

Topics: 3D semantic understanding for scene reconstruction [Paper, Video], *road estimation and SLAM* [Paper]

Autonomous Systems and Biomech. Lab, University of Toronto Toronto, Canada

Research Intern supervised by Prof. Goldie Nejat 2018-05 – 2018-08

Topics: sim2real transfer of deep reinforcement learning based autonomous navigation policies [Paper, Video]

INDUSTRY EXPERIENCES

Mixed Reality and Robotics, Microsoft Redmond, WA, USA

Software Engineering Intern on the Scene Understanding and Data Teams (HoloLens) 2021-05 – 2021-08

Topics: bridging multi-agent reinforcement learning scenarios into mixed reality environments

Cloud, Google San Francisco, CA, USA

Software Engineering Intern building ABI simulators with the Istio Networking Team 2020-05 – 2020-08

HONORS AND AWARDS

Stanford School of Engineering Fellowship, Computer Science 2021

Awarded to outstanding students pursuing doctoral degrees in computer science and engineering

Ontario Engineering Competition 2019

Awarded first prize at Toronto's district and Ontario's provincial programming competitions

NSERC Undergraduate Student Research Award

2018

Awarded to undergraduate science and engineering students on the basis of research aptitude

President's Scholarship Program

2016

Awarded to top engineering candidates pursuing studies at the University of Toronto

PUBLICATIONS

REFEREED CONFERENCE PAPERS

- [4] Ran Cheng, Christopher Agia, Florian Shkurti, David Meger, and Gregory Dudek, "Latent attention augmentation for robust autonomous driving policies,"
- [3] Christopher Agia, Krishna Murthy Jatavallabhula, Mohamed Khodeir, Ondrej Miksik, Vibhav Vineet, Mustafa Mukadam, Liam Paull, and Florian Shkurti, "Taskography: Evaluating robot task planning over large 3d scene graphs," in *5th Annual Conference on Robot Learning*, 2021.
- [2] Ran Cheng, Christopher Agia, David Meger, and Gregory Dudek, "Depth prediction for monocular direct visual odometry," in *2020 17th Conference on Computer and Robot Vision (CRV)*, IEEE Computer Society, 2020, pp. 70–77.
- [1] Ran Cheng, Christopher Agia, Yuan Ren, Xinhai Li, and Liu Bingbing, "S3cnet: A sparse semantic scene completion network for lidar point clouds," *arXiv preprint arXiv:2012.09242*, 2020.

REFEREED JOURNAL PAPERS

- [2] Han Hu, Kaicheng Zhang, Aaron Hao Tan, Michael Ruan, Christopher Agia, and Goldie Nejat, "A sim-to-real pipeline for deep reinforcement learning for autonomous robot navigation in cluttered rough terrain," *IEEE Robotics and Automation Letters*, vol. 6, no. 4, pp. 6569–6576, 2021.
- [1] Yuan Ren, Bingbing Liu, Ran Cheng, and Christopher Agia, "Lightweight semantic-aided localization with spinning lidar sensor," *IEEE Transactions on Intelligent Vehicles*, 2021.

INVITED TALKS

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| Facebook AI Research. Taskography: Evaluating robot task planning over large 3d scene graphs | 2021-07 |
| Microsoft Research. Robot task planning in structured world models | 2021-07 |
| Embodied AI Lab, MILA. Contextual graph representations for task-driven 3d planning | 2021-06 |

PATENTS

- Agia, C.G., Cheng, R., Ren, Y., Liu, B. (2022). *Systems and Methods for Generating a Road Surface Semantic Segmentation Map from a Sequence of Point Clouds* (U.S. Application No. 17/676,131). U.S. Patent and Trademark Office.
- Cheng, R., Agia, C.G., Ren, Y., Liu, B. (2022). *Methods and Systems for Semantic Scene Completion for Sparse 3D Data* (U.S. Application No. 17/492,261). U.S. Patent and Trademark Office.

COMMUNITY SERVICE AND LEADERSHIP

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| Stanford AI Salon , Stanford University | 2021-10 – Present |
| Organizer of Stanford's AI Salon, a platform facilitating open-ended discussion between graduate students, industry, and academic leaders on contemporary ML & AI topics and their societal implications | |
| Stanford CS Mentorship Program , Stanford University | 2021-10 – Present |
| Advising students from underrepresented and minority groups to lead fruitful careers in computer science research | |
| Frosh Scholars Mentorship Program , Stanford University | 2021-10 – Present |
| Mentoring first generation college students towards balanced progress in academics, career and well-being | |
| Pro Bono Research Mentoring | 2021-01 – Present |
| Guided three driven undergraduate research students through to applications at top graduate engineering schools | |
| NSight Student Mentorship Program , University of Toronto | 2018-09 – 2019-05 |
| Provided academic, social and personal support to first and second year Engineering Science students | |

SKILLS

Languages: (*Proficient*) Python, C/C#/C++, MATLAB, Rust, L^AT_EX, Bash - (*Working*) Java, Assembly

Tools: Git, Linux/Unix, Unity, Docker, Wasmtime (WebAssembly), Kubernetes

Libraries: PyTorch, TensorFlow, ROS, NumPy, ml-agents, PCL, OpenCV, SciPy, scikit-learn, Pandas, Jupyter