

# Yi Ao (Jack) Lu

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🔄 Jacklu0831

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## Education

### New York University

*Sept 2023 - Present*

PhD Computer Science

**Advised by:** Mengye Ren

**Research focus:** deep generative models, few-shot learning, representation learning, concept learning

### University of Waterloo

*Sept 2018 - Present*

BMATH Computer Science, Honours, Co-op

BMATH Statistics, Honours, Co-op

BMATH Combinatorics & Optimization, Joint Honours, Co-op

Overall Cumulative GPA 95.62%

## Research Experience

### Research Intern | Waabi

*Toronto, Canada / Sep 2022 – present*

*Supervised by Prof. Raquel Urtasun*

- Conducting research for traffic scene generation with set-generation models, deep generative models, and graph neural networks
- Developed SceneControl: a novel diffusion model for realistic and controllable traffic scene generation

### Research Intern | NVIDIA

*Toronto, Canada / Sep 2021 – Mar 2022*

*Supervised by Prof. Sanja Fidler*

- Conducted research for improving AV perception models with synthetic data training, domain adaptation methods, and domain randomization techniques
- Achieved significant mAP improvement on the nuScenes 3D object detection dataset through domain-adversarial training techniques and novel asset-randomization methods
- Engineered a data evaluation pipeline with all major distribution matching metrics (e.g., IS, FID, KID)

### Deep Learning Engineer | DarwinAI

*Remote / Sep 2020 – Dec 2020*

*Supervised by Prof. Alexander Wong*

- Developed Fibrosis-Net: a pulmonary fibrosis progression prediction network for clients in the pharmaceutical industry
- Conducted investigation in distributed training performance of computer vision models with Slurm and Horovod. Significantly improved distributed training performances of various computer vision models

### Research Assistant | Vision and Image Processing Lab

*Waterloo, Canada / Sep 2019 – Dec 2019*

*Supervised by Prof. David Clausi*

- Developed object detection and classification models for hockey player identification and jersey number recognition from hockey game footage

## Industry Experience

### Deep Learning Engineer | NVIDIA

Remote / May 2021 – Aug 2021

- Reduced the failure rate of NVIDIA autonomous vehicle's path detection model by 21% by training it against synthetic data with adversarial scenarios.
- Accelerated collision detection in NVIDIA DriveSim by ~7 times with a quadtree-based search algorithm.
- Engineered scene randomization interfaces in NVIDIA DriveSim with support for 5+ diversity features (e.g., lighting, object placement); scaled data generation to 2M+ frames for training AV perception DNNs.

### Cognitive Software Developer | IBM

Ottawa, Canada / Jan 2020 – Apr 2020

- Developed and deployed a tabular data column clustering algorithm with word embeddings and ontology trees. Co-authored a patent application on the novel approach.
- Significantly improved IBM Cognos Analytics chatbot's NER model accuracy with BERT model backbone.

### Full Stack Developer | Deep Trekker

Kitchener, Canada / May 2019 – Aug 2019

- Engineered a location tracking application with OpenStreetMap API that allows remote tracking of robots.
- Refactored robot controller UI/UX with custom QML templates, reducing the codebase by over 30%.

## Publications

**Jack Lu\***, Ryan Teehan, Mengye Ren. *ProCreate, Don't Reproduce! Propulsive Energy Diffusion for Creative Generation*. In *European Conference on Computer Vision (ECCV)*, 2024

**Jack Lu\***, Kelvin Wong\*, Chris Zhang, Simon Suo, Raquel Urtasun. *SceneControl: Diffusion for Controllable Traffic Scene Generation*. In *International Conference on Robotics and Automation (ICRA)*, 2024

Alexander Wong, **Jack Lu**, Adam Dorfman, Paul McInnis, Mahmoud Famouri, Daniel Manary, James Ren Hou Lee, Michael Lynch. *Fibrosis-Net: A Tailored Deep Convolutional Neural Network Design for Prediction of Pulmonary Fibrosis Progression from Chest CT Images*. In *Frontier in Artificial Intelligence*, 2021

## Awards

Winston and Diana Cherry Scholarship - \$2,250	2023
Engineering Faculty/Staff Upper Year Scholarship - \$500	2021
President's Research Award - \$1,500	2020
University of Waterloo President's Scholarship of Distinction – \$5,000	2019
Term Dean's Honours List/Term Distinction (all undergraduate terms)	2018

## Skills

**Languages:** Python, C++, C, Scala, JavaScript, Java, R, SQL, HTML, CSS

**Libraries/Frameworks:** PyTorch, Tensorflow, Keras, Scikit-learn, Pandas

**Others:** Docker, Slurm, Spark, Hadoop, Bazel, Linux