


# Emily Zhi Xuan Zeng

## LINKS

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## EDUCATION

### UNIVERSITY OF WATERLOO

MASc

VISION AND IMAGE  
PROCESSING LAB

2021-present

Supervised by  
Dr. Alexander Wong

### UNIVERSITY OF WATERLOO

BASc

MECHATRONICS  
ENGINEERING

2016-2021

## SKILLS

### LANGUAGES

Python • C++

### TOOLS

Pytorch • Keras/Tensorflow  
• Scikit-learn • Docker

### SUBJECTS

Computer Vision  
• Object Detection  
• Image Segmentation  
• Pose Detection  
Explainable AI  
Reinforcement Learning  
Text to speech  
General Machine Learning

## WORK EXPERIENCE

### NVIDIA | COMPUTER VISION INTERN

May-Aug 2021

Incorporated synthetic data for training lane detection model

- Developed data pipeline and experimented with ways to incorporate synthetic data to best target challenging scenarios in dangerous driving conditions
- Resolved critical failure scenarios blocking PathNetV4 release and improved quantitative performance metrics
- Developed tools to better visualize and identify challenging scenarios

### NVIDIA | COMPUTER VISION INTERN

May-Aug 2020

Time series light signal detection for autonomous vehicles

- Detection of blinking light signals, eg. turn signal, brake signal, hazard lights, etc.
- Laid groundwork by defining labelling guidelines, potential model architectures
- Trained proof of concept classification network using public data

### MIOVISION | COMPUTER VISION INTERN

Sep-Dec 2019

Traffic data analysis with computer vision

- Led project to introduce active learning techniques to data ingest pipeline
- Optimized selection of images for labeling from large unlabelled pool via estimating model uncertainty (monte carlo dropout)
- 42% improvement in mean average precision between model trained on most uncertain images compared to the least

### SYNAPSE TECHNOLOGY | COMPUTER VISION INTERN

Jan-April 2019

Developed and analyzed CNN models for detecting threats in security x-ray scans

- Developed fine grain rotational data augmentation method for object detection through automatic bounding box labelling on rotated images
- Significantly improved model performance in underrepresented classes

### PRAEMO | DATA SCIENTIST

May-Aug 2018

Used LSTM to detect anomalies in time series vibration data and predict machine failure in industrial robots

### ESI | ROBOTICS SOFTWARE DEVELOPER

Sep-Dec 2017

Robotic navigation using reinforcement learning (Deep Q-learning) and IR sensors

- 95% success rate in simulation and 85% success rate on physical robot

## PUBLICATIONS

Zeng, E Zhixuan, Yuhao Chen, and Alexander Wong (2023). "ShapeShift: Superquadric-based Object Pose Estimation for Robotic Grasping". In: *CVPR 2023. WICV workshop*.

Zeng, E Zhixuan, Hayden Gunraj, et al. (2023). "Explaining Explainability: Towards Deeper Actionable Insights into Deep Learning through Second-order Explainability". In: *CVPR 2023. XAI4CV workshop*.

Chen, Yuhao et al. (2022). "MetaGraspNet: A Large-Scale Benchmark Dataset for Vision-driven Robotic Grasping via Physics-based Metaverse Synthesis". In: *2022 IEEE International Conference on Automation Science and Engineering*.

Zeng, E Zhixuan, Adrian Florea, and Alexander Wong (2022). "COVID-Net US-X: Enhanced Deep Neural Network for Detection of COVID-19 Patient Cases from Convex Ultrasound Imaging Through Extended Linear-Convex Ultrasound Augmentation Learning". In: *CVPR 2022. WICV workshop*.

## AWARDS

- Finalist at 2022 IEEE International Conference on Automation Science and Engineering

## PROJECTS

### AUTOREAD |

April 2021

Text to speech model for fiction novels trained using automatically labeled audiobook dataset