Angus Fung

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RESEARCH SUMMARY AND INTEREST

My research focuses on leveraging advanced deep learning techniques such as self-supervised learning, imitation learning, neural radiance fields, diffusion models, and large language models to solve challenges in computer vision and robot control.

I am particularly interested in the application of generative AI for the design and optimization of assistive and service robotic systems, exploring novel form factors for human-centric environments. My research goal is to uncover performance-optimized, robotic designs that push the boundaries of current biomimetic and wheeled paradigms.

EDUCATION

University of Toronto, Robotics Institute Sept. 2019 - Oct. 2024
Doctor of Philosophy (Ph.D)
Topic Mobile Robot Architecture for Finding Any Person in Any Environment
Supervisor Goldie Nejat

University of Toronto, Engineering Science Sept. 2014 - May 2019
Bachelor of Applied Science (BASc), Specialization in Robotics
Topic Population-based Hyperparameter Optimization
Supervisor Jimmy Ba

PUBLICATIONS

Forthcoming Contributions:

A Zero-Shot Approach to Find Any Person in Any Environment using Multimodal Large Language Models
A. Fung, A. H. Tan, H. Wang, B. Benhabib, and G. Nejat
Submitted, *IEEE Robotics and Automation Letters*, 2024

LDTrack: Dynamic People Tracking by Service Robots using Diffusion Models
A. Fung, B. Benhabib, and G. Nejat
Submitted, *International Journal of Computer Vision*

Find Everything: A General Vision Language Model Approach to Multi-Object Search
A. Fung, D. Choi, H. Wang, and A. H. Tan
Submitted, *IEEE International Conference on Robotics and Automation*, 2024

Mobile Robot Navigation with Hand-drawn Maps: A Vision Language Model Approach
A. H. Tan, **A. Fung**, H. Wang, and G. Nejat
Submitted, *IEEE Robotics and Automation Letters*, 2024

Cross-embodiment Navigation using Consistency Policy Distillation
H. Wang, A. H. Tan, **A. Fung**, and G. Nejat
Submitted, *IEEE Robotics and Automation Letters*, 2024

Voxel-based Neural Implicit Mapping of Human Centric Environments via Contrastive Learning

Y. Zhu, A. H. Tan, and **A. Fung**
Submitted, *IEEE Robotics and Automation Letters*, 2024

Social Media for International Surgical Skills Transfer: Using Pneumatic Retinopexy as a Model
J. Xie, **A. Fung**, A. H. Tan, A. Pecaku, K. Akiyama, *et al.*
Submitted, *Journal of Ophthalmology Retina*, 2024

Referred Contributions:
Robots Autonomously Detecting People: A Multimodal Deep Contrastive Learning Method Robust to Intraclass Variations
A. Fung, B. Benhabib, and G. Nejat
Accepted at *IEEE Robotics and Automation Letters (RA-L) + IROS*, 2023

A Multi-Robot Person Search System for Finding Multiple Dynamic Users in Human- Centered Environments
S. Mohamed, **A. Fung**, and G. Nejat
Accepted at *IEEE Transactions on Cybernetics*, 2022

Robots Understanding Contextual Information in Human-Centered Environments using Weakly Supervised Mask Data Distillation
D. Dworakowski, **A. Fung**, G. Nejat
Accepted at *International Journal of Computer Vision*, 2022

Using Deep Learning to Find Victims in Unknown Cluttered Urban Search and Rescue Environments
A. Fung, L. Wang, K. Zhang, G. Nejat, B. Benhabib
Accepted at *Springer Nature*, *Current Robotics Reports* 2020

AC/DCC : Accurate Calibration of Dynamic Camera Clusters for Visual SLAM
J. Rebello, **A. Fung**, S. Waslander
Accepted at *IEEE International Conference on Robotics and Automation*, 2020

Non-referred Contributions:
Jeeves, the Ethically Designed Interface
Angus Fung, Aaron Hao Tan, Michael Pham-Hung, Cristina Getson
Technical Report, Talk at *RO-MAN: Roboethics Competition*, 2021

Socially Assistive Service Robots at the Autonomous Systems and Biomechatronics Lab
Angus Fung, Aaron Hao Tan, Shane Saunderson
Poster at *University of Toronto Engineering Research Days*, 2021

Population-based Hyperparameter Optimization (Undergraduate Thesis)
Angus Fung, Jimmy Ba
Technical Report, Talk at *University of Toronto Engineering Science*, 2018

RESEARCH EXPERIENCE

Autonomous System and Biomechatronics Lab, University of Toronto Sept 2019 - Present
Ph.D Candidate

- Developed robot perception and planning algorithms using contrastive learning, diffusion models, and multimodal large language models
- Deployed robots in real world settings including grocery stores, long-term care homes, school campuses, and hotels
- Contributed to peer-reviewed journals and conferences in the fields of computer vision and robotics, including IJCV, RA-L, ICRA, IROS, and Transactions on Cybernetics

Temetry Faculty of Medicine, University of Toronto Sept 2023 - Present
AI Researcher

- Developing an AI model to classify diseases using 3D brain scans, with a focus on detecting early-stage Parkinson's disease with Dr. Anthony Lang and Dr. Alexandre Boutet
- Developing an AI model focused on identifying and distinguishing between typical and atypical types of optic neuritis using clinical and MRI data, with Dr. Edward Margolin and Dr. Heather McDonald
- Built LLM-powered patient screening tool and deploying through SMS to increase healthcare accessibility with Dr. Edward Margolin

Toronto Robotics and AI Lab, University of Toronto May 2019 - Sept. 2019
Research Intern

- Developed controllers for high speed trajectory tracking/landing, supervised by Dr. Steven Waslander
- Outdoor field testing and demos to industry partners on the DJI Matrice 210 drone

Vector Institute March 2018 - May 2019
Research Intern

- Developed distributed learning algorithms, supervised by Dr. Jimmy Ba

Advanced Micro Devices (AMD) May 2017 - Sept. 2018
Machine Learning Engineer

- Developed machine learning solutions to EDA problems during place and route of chip design

TEACHING

2020-2024 MIE443: Mechatronics Systems: Design & Integration, Head TA
2022-2024 ROB501: Computer Vision for Robotics, TA

MENTORING

2023-2024 Michelle Quan, Undergraduate Thesis Student
2022-2023 Grace Bae, Undergraduate Thesis Student
2021-2022 Giro Ele, Undergraduate Thesis Student

ACADEMIC SERVICE

Conference Reviewer

- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE International Conference on Intelligent Robots and Systems (IROS)

Journal Reviewer

- IEEE Robotics and Automation Letters (RA-L)
- Journal of Supercomputing (Springer Nature)
- IEEE Transactions on Cognitive and Developmental Systems

RECOGNITION

2024 Doctoral Completion Award ($4k)

2024 LocalHost Fellowship ($3k)

2024 Microsoft Startup Grant ($150k)

2023 Ontario Graduate Scholarship (OGS) ($15k)

2022 Rimrott Memorial Graduate Scholarship ($4k)

2021 RO-MAN Roboethics Competition, **1st Prize Winner** ($1k)

2020 Queen Elizabeth II Graduate Scholarship ($15k)

2019-2023 University of Toronto MIE Fellowship ($14k)

2019-2021 Healthcare Robotics NSERC Fellowship

2014-2019 Dean's Honour List

2014 Delta Tau Delta Award ($3k)

2014 University of Toronto Scholars (Academic Excellence) ($7.5k)

2013 Associate of Royal Conservation of Music Diploma (ARCT) - Piano Performance

2013 Associate of Royal Conservation of Music Diploma (ARCT) - Organ Performance

INDUSTRY EXPERIENCE

Syncere AI June 2024 - Present
CTO, Co-founder

· An AR platform for remote control of mobile robots in service settings (i.e., hospitality, food, and domestic), with the goal of bring robots into society

Scholarply Sept 2023 - June 2024
CTO, Co-founder

· Accelerating the scholarship application process via LLM agents to help students secure funding while focusing on their studies
· Selected by Microsoft Startup Hub Program, receiving grants worth $150k
· Succesfully raised at $1.4M Valuation

ONE800 Jan 2023 - Sept 2023
CTO, Co-founder

· Co-founded ONE800, an AI-powered personal assistant on iMessage
· Developed multimodal large language models (LLMs) agents for text, images, and audio, incorporating multi-lingual capabilities with short/long-term memory
· Developed the software stack including the front-end, back-end, 3rd party integrations (*e.g.*, payment providers, communication channels), and security protocols/systems

EXTRACURRICULAR

Pupil Nov. 2022 - Present
ML Engineer

· Collaborating with with 2x Grammy Award recipient Sean Leon to build AI technology for their Herd Immunity and God's Algorithm Project.
· Using SOTA natural language and vision models to generate art, music, and conversation bots for advertisement (*e.g.,* billboards, social media), album releases, and other creative mediums

aUToronto, Self-driving Car Team, University of Toronto Jan. 2020 - Jan. 2021
Software Engineer

· First prize winner of the SAE Autodrive Challenge

Musician
Organist, Corpus Christi Church Sept. 2014 - Present

· Providing music and improvisation for weekly rehearsals, masses and seasonal concerts
· Leading the children's choir

Organ Scholar, Metropolitan United Church Sept. 2013 - Sept. 2014

- Provided music for Sunday services, recitals, weddings, funerals, seasonal and orchestral concerts, supervised by Dr. Patricia Wright
- Rehearsal accompanist for the children and adult choir

Organist, St. Bartholomew's Anglican Church Sept. 2012 - Aug. 2013

TV Organist, St. Basil's Catholic Parish Sept. 2011 - Feb. 2012