Ihab Tabbara

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EDUCATION

Washington University in St. Louis 2024 - 2029
PhD. Computer Science and Engineering
Focus: Machine Learning, Optimization, Safe Control

American University of Beirut 2020 - 2024
BE Computer and Communication Engineering **GPA: 4.0/4.0**
Focus: Machine Learning, Estimation and Detection Theory, Robotics

University of Toronto (Exchange Semester) 2022 - 2023
Engineering-Science **GPA: 85%**
Relevant Courses: Machine Learning - Advanced Algorithms - Control Systems

RESEARCH EXPERIENCE

Washington University in St. Louis
Researcher August 2024 - Present
- Applying machine learning techniques to learn robust control barrier functions for dynamic, real-time systems in vision-based autonomous control
- Designing and learning safe, formally-verified policies and optimization frameworks for autonomous vehicles with unknown control dynamics

University of Virginia
Research Assistant (Eye Tracking) with Prof. Sara Riggs May 2023 - February 2024
- Implementing an adaptive velocity threshold eye tracking algorithms and bench marking it against other algorithms such as such as HMM, and Local Nearest Neighbor algorithms
- Studying how real-time gaze is effective with complex and dynamic tasks through allowing teammates to view each others gaze points on their displays
- Worked on developing a software to control functionalities of small vibrating devices (tactors) using tools such as docker, C, Rust, linux

American University of Beirut *Research Assistant in AI, Neuroscience, and Robotics*
Research with Prof. Arij Daouo (Machine Learning & Neuroscience) November 2023 - June 2024
- Modeled neurons in the cortex of birds using deep neural networks
- Developed novel techniques for translating excitatory-inhibitory neuronal relationships into adaptive and learnable activation functions for artificial neural networks.

Research with Prof. Hussein Hussein (Robotics) September 2022 - Present
- Designed and researched modular robots (Kubits) utilizing Electro-Programmable Magnets (EPMs)
- Conducted comprehensive optimization of module parameters, including magnet dimensions, cube geometry, H-bridge configurations, and gear sizing to improve size and power efficiency.
- Investigated electromagnetic force modeling between repelling and attracting robotic modules, contributing to the understanding of modular robotic system interactions.

PUBLICATIONS

- Tabbara, I., Sibai, H. (2024). Learning Ensembles of Vision-based Safety Control Filters. arXiv preprint, arXiv:2412.02029. **Submitted to Learning for Dynamics and Control - Proceeding of Machine Learning Research**
- Reducing Barriers in Analyzing Eye Tracking Data: The Development of a GUI to Preprocess Eye Tracking Data. Atweh, Jad A., Ihab Tabbara, et al. 2024. **Accepted in IEEE SIEDS.**

WORK EXPERIENCE

Murex
Software Engineer June 2023 - May 2024
- Designing and developing financial data structures in C++ for pricing and risk analysis
- Managing sprint planning, daily standups, and sprint retrospectives as scrum master

Electrical and Computer Engineering Department - AUB
Lab Assistant - Teaching Assistant December 2022 - September 2023
- Provided assistance and guidance to over 100 students in electronics and microprocessors within the ECE 410 Lab (System Integration Laboratory)
- Designed new experiments involving controllers using Raspberry Pi, Arduino and MATLAB for the revamped ECE460L (Control Systems Laboratory)
- Created detailed lectures powerpoints and tutorials and assisted in teaching the lab.