

Luc Edes

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RESEARCH INTERESTS

Deep Learning, (Deep) Reinforcement Learning, Imitation Learning, Robotics, Autonomous Systems, Control Theory

EDUCATION

University of Waterloo

Bachelor of Computer Science

Sep 2021 – Present

EXPERIENCE

AI Research Engineer

LMNT

Jan 2025 – Apr 2025

Palo Alto, California, USA

- Generative AI for lifelike text-to-speech (autoregressive models, diffusion models, GANs, VAEs)

Autonomy Research Lead

WATonomous - Data-Driven Autonomy Team under Dr. Mohammad Al-Sharman

Jan 2023 – Present
Waterloo, Ontario, Canada

- Investigating contrastive learning to enhance autoencoder feature extraction for RL (aiming for submission EOY)
- Developed and integrated MPC Oracle with Hybrid Policy Optimization algorithm to provide optimal control actions for demonstration-based reinforcement learning, using MuJoCo for experimental validation
- Co-authored "*Autonomous Driving at Unsignalized Intersections: A Review of Decision-Making Challenges and Reinforcement Learning-Based Solutions*" (under review at IEEE T-ITS, [arXiv](#))
 - Outlined state-of-the-art Deep RL algorithms for autonomous driving (DDPG, TD3, T-TD3, SAC, RNNs, LSTM, attention-based models, GPT-based models, learning from demonstrators, etc.)
 - Designed figures to illustrate curriculum learning, unsignalized intersection variations, and heterogeneous directed graph representations of intersection topologies
- Co-led research project into novel MPC architecture for autonomous driving on unknown friction surfaces
 - Designed and trained Neural Network and Gaussian Process models for motion prediction on CARLA simulation data; achieved >0.99 R-squared in training results
 - Embedded TensorFlow machine learning models into CasADi symbolic representation and integrated them with Acados optimizer to develop a real-time MPC pipeline

Undergraduate Research Assistant

University of Waterloo - CL2 Group under Professor Yash Vardhan Pant

Sep 2023 – Aug 2024
Waterloo, Ontario, Canada

- Developed Model Predictive Control (MPC) pipeline in Python, integrating CARLA simulator for odometry data collection, aimed at training a Gaussian Process (GP) for motion prediction
- Designed and conducted experiments with CommonRoad into the performance of hybrid MPC models
- Conceptualized novel approaches to Out-of-Distribution (OOD) detection and handling

Undergraduate Research Fellow

University of Waterloo - Professor Mina Tahmasbi Arashloo

Jan 2024 – Apr 2024
Waterloo, Ontario, Canada

- Designed inductive synthesis algorithm to identify problematic network traffic patterns by broadening search space from a single example, reducing Z3 calls by 90% relative to previous stochastic approach

Research Assistant

Technical University of Hamburg - Institute of Maritime Logistics under Professor Carlos Jahn

May 2023 – Aug 2023
Hamburg, Germany

- Led "On Estimating the Required Yard Capacity for Container Terminals" (Accepted to LDIC 2024, [Springer](#))
 - Modelled container terminal operations using ConFlowGen synthetic data, demonstrating superior performance of Monte Carlo simulations over traditional methods in estimating fluctuating yard capacity
- Awarded bonus scholarship by Technical University of Hamburg for research excellence

PROJECTS

Ray-tracer | [GitHub Repository](#)

- Developed recursive ray tracer in C++ to simulate realistic 3D scenes with shadows, reflections, Phong shading

TECHNICAL SKILLS

Languages: Python, C++, R

Libraries/Frameworks: TensorFlow, PyTorch, ROS, CARLA