Ryan Rahman

416-999-4327 | r8rahman@uwaterloo.ca | **LinkedIn** | GitHub

Education

University of Waterloo Waterloo, ON

Candidate for Bachelor of Applied Science in Mechatronics Engineering
with Artificial Intelligence option *Sep. 2023 – May 2028*

Technical Skills

Languages: Python, C++, JavaScript, SQL, Java, HTML/CSS, Swift
Frameworks: React.js, Flutter, Flask
Developer Tools: Linux, CUDA, Tensorboard, Ray, Docker Compose, AWS, Cursor, FFmpeg, Git, Vagrant, Kubernetes
Libraries: PyTorch, Tensorflow, OpenCV, HuggingFace, OpenAI Gym
Machine Learning: LLM, Diffusion Models, Computer Vision, Reinforcement Learning, CNN, RNN/LSTM
Hardware: Arduino, Raspberry Pi, NVIDIA GPU, VPU

Experience

AI Advancement Engineer Co-op Jan. – Apr. 2025

NETINT Technologies *Burnaby, BC*

- Developed a real-time generative video streaming pipeline utilizing Stanford's LTX-Video model, achieving seamless AI-driven video generation at 30 FPS on an RTX-3090 GPU
- Integrated Quadra VPU hardware acceleration to compress generative video streams from 10,000 kbps to 100 kbps, achieving approximately 50% higher PSNR compared to software encoding, demonstrating significant performance advantages
- Collaborated closely with the Bitstreams team to build a video corruption analysis tool leveraging the MaxVQA model, effectively detecting visual encoding artifacts with over 85% precision across 200+ hours of streaming data.
- Prepared technical demonstrations showcasing Quadra VPU's performance advantages, targeted at major generative video streaming companies for adoption in large-scale data center deployments

Junior Python Developer Apr. – Aug. 2024

Linea *Toronto, ON*

- Designed and implemented algorithms to optimize office space layouts, enhancing spatial efficiency and fulfilling specific client requirements
- Implemented Natural Language Processing through LLMs to automate the creation of 5 personalized tour packages for commercial brokers, which cut down 80% of the time needed to produce each package
- Automated the delivery of critical property information using Google Cloud Platform, reducing package creation time from 7 days to under 48 hours, significantly enhancing client service efficiency

Portfolio Highlights

ROS 2-Based Autonomous LiDAR Navigation System | *ROS2, Foxglove, LiDAR, Control Systems* Jan. 2025

- Developed an autonomous navigation system in ROS 2, enabling a robot to complete point-to-point navigation tasks with obstacle avoidance
- Processed LiDAR data at 10 Hz to generate real-time occupancy grids and constructed global maps using odometry with <5 cm positional drift over a 50m simulated path
- Implemented the A* path planning algorithm to compute optimal routes with an average path efficiency of >90% compared to ground truth shortest paths
- Designed and tuned a pure pursuit controller to maintain <10 cm lateral deviation from planned paths at speeds up to 1.5 m/s

Wildfire Prediction Model | *LSTM Network, Feature Engineering, Model Training* May 2023

- Enhanced a predictive AI model designed to predict wildfire growth over a 20-day period using 10 days of historical data, in order to achieve the highest score at the UWaterloo WatAI Wildfire Hackathon
- Integrated a Convolutional Neural Network with a Long Short Term Memory network for improved wildfire growth prediction, leveraging temporal data
- Integrated three additional variables (precipitation, humidity, air temperature) based on academic research to enhance model accuracy

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MECHATRONICS ENGINEERING + AI AT THE UNIVERSITY OF WATERLOO

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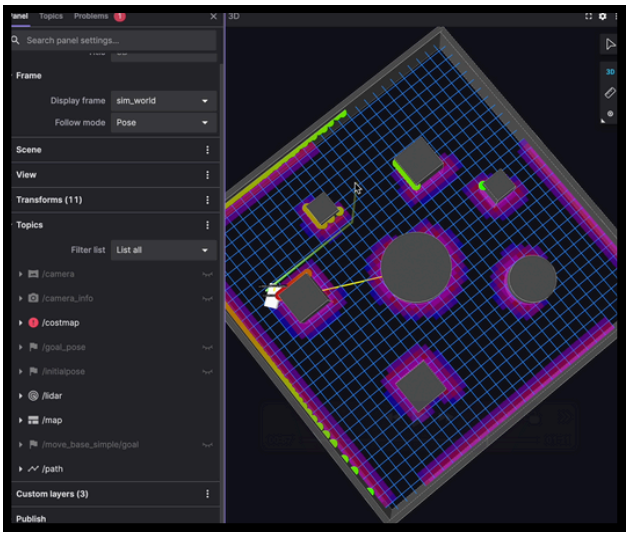
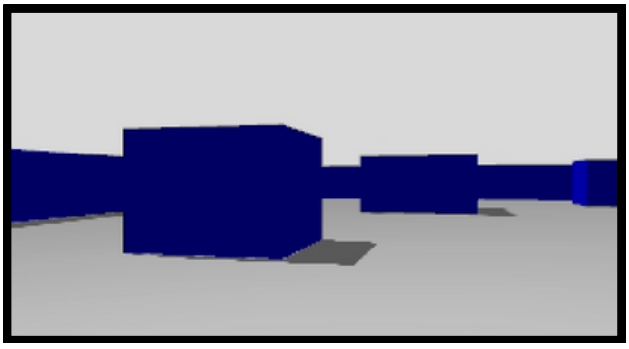
ROS 2-BASED AUTONOMOUS LIDAR NAVIGATION SYSTEM - REPOSITORY





What?

- Developed a fully autonomous robot navigation system capable of point-to-point movement with obstacle avoidance using LiDAR in a ROS 2 simulation environment.

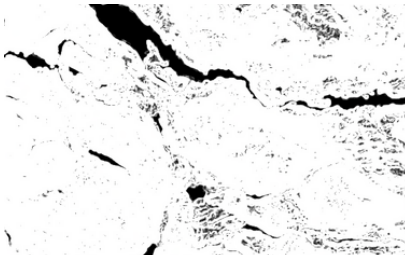
Results

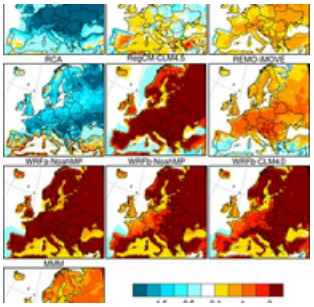
- Successfully navigated 5+ complex scenarios with <2s planning latency and >90% path efficiency, showcasing core skills in perception, planning, and control.

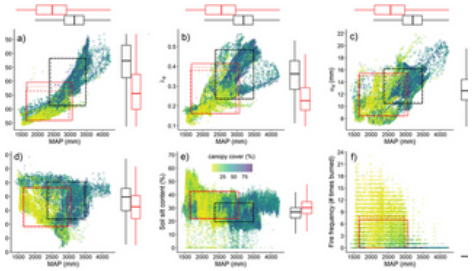
How?

- Processed LiDAR data at 10 Hz to generate occupancy grids and map the environment with <5 cm drift using odometry-based transformations.
- Implemented the A* path planning algorithm to compute efficient routes in real time, dynamically updating with environmental changes.
- Designed a pure pursuit controller for smooth path-following, maintaining <10 cm deviation from planned paths.
- Deployed all ROS 2 nodes in a modular Docker-based infrastructure and used Foxglove for real-time visualization and debugging.

WILDFIRE PREDICTION MODEL - REPOSITORY







What?

- Enhanced a predictive AI model designed to predict wildfire growth over a 20-day period

How?

- Integrated a Convolutional Neural Network with a Long Short Term Memory network for improved wildfire growth prediction, leveraging temporal data
- Integrated three additional variables (precipitation, humidity, air temperature) based on academic research to enhance model accuracy

Results

- Resulted in a successful predictive model based off input data
- Achieved the highest accuracy score at the UWaterloo WatAI Wildfire Hackathon

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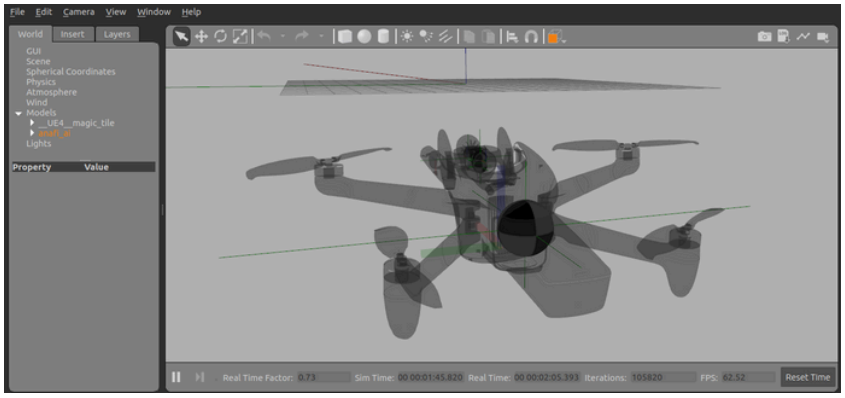
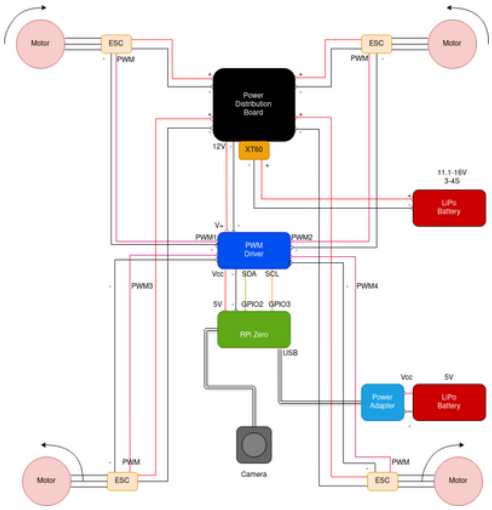
T.E.D.D: TARGETED EXPRESS DELIVERY DRONE (IN PROGRESS)





What?

- Developing a prototype for an **autonomous** food delivery drone, focusing on **real-time obstacle avoidance** and **efficient navigation**

How?

- Utilized **OpenCV** for real-time obstacle detection and **visual navigation**
- Integrated **reinforcement learning** models using **TensorFlow** and **OpenAI Gym** to optimize **drone navigation**
- Simulated drone flight and obstacle avoidance using **ROS2** and **Gazebo** for pre-deployment testing.
- Configured drone hardware, including **Raspberry Pi 5** and **camera modules**, to ensure **low-latency** processing.

Results

- To be determined