RODRIGUE DE SCHAETZEN

Website · Google Scholar · LinkedIn · GitHub

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RESEARCH INTERESTS

Mobile Robots, Motion and Path Planning, Model Predictive Control, Machine Learning, Differentiable Physics

EDUCATION

University of Waterloo   Waterloo, ON
MASc in Electrical and Computer Engineering; Advisor: Prof. Stephen L. Smith   *May 2021 - Present*
Research: Autonomous Ship Navigation in Dynamic and High Concentration Ice Fields

University of British Columbia   Vancouver, BC
BSc (Honours) in Computer Science and Physics; Advisor: Prof. Alison Lister   *Sept 2015 - May 2021*
Thesis: Exploring Machine Learning Models to Improve the Classification of Displaced Hadronic Jets in the ATLAS Calorimeter

PUBLICATIONS

Real-Time Navigation for Autonomous Surface Vehicles In Ice-Covered Waters
R de Schaetzen, A Botros, R Gash, K Murrant, SL Smith
IEEE International Conference on Robotics and Automation (ICRA), London, UK, May 2023.

· **Abstract:** Vessel transit in ice-covered waters poses unique challenges in safe and efficient motion planning. We exploit a lattice-based planner with a cost that captures the ship interaction with ice. The performance of our planner is evaluated across several levels of ice concentration both in simulated and real-world experiments.

Efficient Ground Vehicle Path Following in Game AI
R de Schaetzen, A Sestini
IEEE Conference on Games (CoG), Boston, MA, August 2023.

· **Abstract:** In this work, we consider the path-following problem for controlling ground vehicles in game AI. We used an analytical result to calculate the maximum curvature of a quadratic Bézier curve in a novel algorithm for computing the target speed.

A Fully Automated Method for Bladder Segmentation in PSMA PET/CT Scans
Y Farag*, **R de Schaetzen***, G Chausse, F Yousefirizi, I Klyuzhin, A Rahmim, C Uribe
European Association of Nuclear Medicine (EANM), Oct 2021.

· **Abstract:** We developed an automated bladder segmentation method for PSMA PET/CT scans, using deep 3D convolutional neural networks, enabling better detection of prostate lesions.

WORK IN PROGRESS

An Optimization-Based Motion Planner for Autonomous Ship Navigation in High Concentration Ice Fields
R de Schaetzen, R Gash, K Murrant, SL Smith

· **Abstract:** In this paper, we extend our previous work by proposing an optimization-based improvement step formulated as an Optimal Control Problem. We define a smooth objective function that captures the accumulated cost from the ship footprint sweeping a costmap representation of the obstacle environment.

EXPERIENCE

Electronic Arts
Waterloo, ON
Software Engineer Intern
Sept 2022 - April 2023

- Developed an efficient path following solution for controlling ground vehicles in game AI (CoG 2023).
- Significantly improved path-following performance over an existing solution by achieving a 70% reduction in the number of instances where vehicles in the game Battlefield 2042 became stuck.

University of British Columbia (UBC)
Vancouver, BC
Undergraduate Researcher
May 2020 - Aug 2020

- Worked under Prof. Ian Mitchell at the Verification, Control & Robotics group on sampling-based MPC.
- Built a training pipeline to learn a nonlinear model of the system dynamics of a mobile robot.
- Configured an overhead vision system to collect real-vehicle state data.

Zurich University of Applied Sciences
Zurich, Switzerland
Research Intern
May 2018 - July 2019

- Worked under Dr. Giovanni Toffetti as a research intern on cloud robotics applications
- Extended the cloud robotics web application with additional features including the integration of cloud-based SLAM which significantly decreased on-board computation.
- Integrated vision sensors and configured a robust navigation system on a robot platform designed for warehouse automation using ROS.

PROJECTS

Prostate Lesion Segmentation in PSMA PET-CT Using Deep Learning
Jan 2021 - Aug 2021

- Collaborated with the Quantitative Radiomolecular Imaging and Therapy lab led by Prof. Arman Rahmim to develop a prostate lesion segmentation model on full-body PSMA PET/CT scans.
- Adopted the 3D U-Net architecture as our backbone and trained on a labelled dataset consisting of 59 scans.
- Leveraged predictions from prostate and bladder segmentation models (EANM 2021, SNMMI 2023) to improve lesion segmentation.

Wildfire Smoke Detection Model
Sept 2020 - Dec 2020

- Led the UBC team for the ProjectX international machine learning research competition focused on climate change related issues hosted by University of Toronto AI.
- Proposed a multi-label image classifier to predict forest fire smoke based on Pan-Tilt-Zoom (PTZ) image data.
- Created the first smoke-annotated video open dataset which consisted of 139 hours of footage from PTZ cameras across 678 videos scraped from the Nevada Seismological Laboratory.

SELECTED COURSES

- Introduction to Optimization, Dr. Oleg Michailovich, Spring 2023 (Grade: A+)
- Robot Dynamics & Control, Dr. Gennaro Notomista, Spring 2022 (Grade: A+)
- Model Predictive Control, Dr. Yash Vardhan Pant, Winter 2022 (Grade: A+)
- Algorithm Design and Analysis, Prof. Mahesh Tripunitara, Fall 2021 (Grade: A)
- Machine Learning and Data Mining, Dr. Frank Wood, Winter 2020 (Grade: A+)

SKILLS

- **Programming Languages**: Python, C++, C (*proficient*), MATLAB, Julia, Java, Bash (*familiar*)

· **Languages**:   French and English (*native*), German (*beginner*)
· **Libraries and Tools**:   PyTorch, Unreal Engine, OpenCV, NumPy, ROS, Gazebo, CasADi, AWS, Git

HONOURS AND AWARDS

· ICRA Travel Award (2023)	*University of Waterloo*
· Science Undergraduate Research Experience Award (2020)	*University of British Columbia*
· Dean's Honour List (2020)	*University of British Columbia*
· Go Global Self-Initiated Research Abroad Award (2018)	*University of British Columbia*
· Dr. Hal Weinberg Scholarship (2015)	*University of British Columbia*

PROFESSIONAL SERVICE & VOLUNTEERING

· **Teaching Assistant** in *Numerical Methods, Software Construction*, and *Algorithms and Data Structures*
· **Reviewer** for *American Control Conference* (ACC) 2024
· **Student Volunteer** for the *International Association for the Exchange of Students for Technical Experience* (IAESTE) Zurich Local Committee