

Shiyao Ni (Derek)

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Education

Bachelor of Engineering, Mechanical (Honours)

McGill University

Bachelor's degree program

Sept 2019 - Decemeber 2023(expected)

Final grade: 3.84/4.00

Thesis Supervisor: **Audrey Sedal, Prof**

Thesis keywords: **Co-optimization, Domain Randomization, Reinforcement Learning, Soft Robotics**

Awards: Dean's Honor List (2020), Rio Tinto-Evans Award & Robert D Harris Memorial Scholarship (2020), SURE(2022, 2023)

Publication

- A. Sedal, C. Scaff, **S. Ni**, M. Walter (2023), Sim-to-Real Transfer of Co-Optimized Soft Robot Crawlers, Autonomous Robots (*Accepted*)

Research Experience

McGill Undergraduate Honours Thesis

November 2022 - December 2023(expected)

Work submitted to Autonomous Robots (*under review*)

MACRObotics, CIM, McGill

- Research topic: How can we do domain randomization to achieve a more self-adaptive crawling soft robot while maintaining its peak performance
- Robustness of the co-optimization framework were investigated and positive result were returned
- Sim2real experiment were set up to test the control and design pair of each robot

Summer Visiting Research Student

June 2023

Robot Intelligence through Perception Lab, PI:Mathew R. Walter, Prof

TTI Chicago

- To perform extra experiments required from the reviewers of the previously submitted journal artical
- Visiting RIPL lab and learning about computer vision, natural language understanding, and machine learning for robotics

McGill Summer Undergraduate Research in Engineering and Honours Design Project

Faculty of Engineering, McGill University

May 2022 - Dec. 2022

- Exploring and creating a co-optimization design space between morphology and control for soft-robot grasper and mechanical models of human designed baseline graspers were established
- Creating simulation scenes in SOFA framework with a simple grasper and controller for model order reduction

Engineering-Related Experience and Awards

Montreal Robotics Summer School

Aug. 2023

MILA - Quebec AI Institute

- Hands on experience with deep reinforcement learning algorithms and policy training on a quadruped robotic
- Sim2real transfer from the simulated trained model onto the quadruped robot
- Experience with state estimation and ROS

McGill Engineering Competition 2021

Senior Engineering Group

Nov. 2021

2nd Place

- As part of a team of 4, built a moving robot with catching mechanism to move a ping-pong ball
- C were used to program Rasperry Pi to control the servo and DC motors. PWM were used for the control of DC motors
- Break the ground and used joysticks (linear input versus keyboard step input) for the control of the robot, which was well appraised by the judges

Member of Formula SAE Engineering Design Team

Aerodynamics sub-team

Sept. 2019 - Sept. 2021

- Formula SAE North America 2021 (Remote Competition) – 1st Place
- Formula Student Shootout Toronto 2019 (America Design Competition): 2nd place finish
- Optimized the load and certified the swan neck of the rear wing in Siemens NX

MIAE Case Competition with Bombardier and Bell

Electrical Drone Delivering Network

Jan. 2020

McGill Institute of Aerospace Engineering

- Combined E-commerce strategy, consumer psychology and logistics management to come up with a delivery network map as a team
- Researched about noise cancellation, battery constrain, drone control logic
- Designed a delivery system containing main and sub delivery vehicles, with main route cohesive with the public transportation and sub delivery drones to provide point to point service with sustainable design in mind

Technical Skills

Programming Languages/Tools

Java, Python, Bash, L^AT_EX

Operating Systems

Linux (Ubuntu), Windows, Mac OS

3D Printing, CADing and Machining

CURA, preform, Siemens NX, Solid Works, Vertical 3-axis CNC mill (TORMACH® PCNC 770) and 2-axis CNC lathe (TORMACH® 15L Slant-PRO)

Continuum Mechanics Simulator

SOFA Framework(FEM)

Language Proficiencies

Chinese (Native/Bilingual Proficiency),
English(Full Professional Proficiency),
French(Elementary Proficiency)