

ABHINAV GROVER

ROBOTICS RESEARCHER/ENGINEER





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EDUCATION

Expected Graduation: **MASTERS OF APPLIED SCIENCE, UNIVERSITY OF TORONTO**
Aug 2021 *Major: Aerospace Science and Engineering – Emphasis on Robotics*
Supervisor: Dr. Jonathan Kelly
Workspace: [S.T.A.R.S. Lab](#)

Graduation: **BACHELORS OF APPLIED SCIENCE, UNIVERSITY OF WATERLOO**
May 2019 *Major: Mechatronics Engineering, GPA: 91.47%, Top 5 students*

RESEARCH PROJECTS

- Submitted for review
IROS 2021
[Link](#)
- LEARNING TO PERCEIVE SLIP WITH BAROMETRIC TACTILE SENSORS**
Research Thesis, University of Toronto | Keras, Python, ROS
Supervisor: Dr Jonathan Kelly
- Developed a method to learn slip perception using low-cost low-fidelity barometric tactile sensors.
 - Slip perception generalizes to various object materials and curvatures. Moreover, the detector is able to perform well on multiple manipulation tasks with tactile feedback.
 - Used Temporal Convolution Networks to extract temporal features from raw time-series data.
 - Conducted rigorous data-collection, in an effort to generalize to multiple task domains.
- Jan 20 – Apr 20
 [Code](#)
- FAILURE-MODE ANALYSIS OF A LEARNED DEXTEROUS HAND CONTROLLER**
Graduate Course, University of Toronto | Tensorflow, Python, OpenAI gym
- Conducted a failure mode analysis on the learned DDPG based policies used to control a dexterous hand with tactile sensors, in an attempt to understand the utility of tactile information.
 - The experiments were conducted using the OpenAI gym, Mujoco Simulator and Tensorflow.
 - A full report and video are available along with the code.
- Sept 19 – Dec 19
 [Code](#)
- ACCURATE ROAD SEGMENTATION USING CAMERA AND LIDAR DATA**
Graduate Course, University of Toronto | PyTorch, Python
- Implemented a Fully Connected Network based Road Segmentation pipeline on Audi's *A2D2* dataset using *PyTorch* and *OpenCV*.
 - Implemented the late and early fusion strategy published L. Caltagirone et. al. and achieved average precision of more than 90% on the new dataset.
 - A full report and video are available along with the code.
- Jan 18 – Aug 18
 [Report](#)
- MODEL PREDICTIVE CONTROL IMPLEMENTATION FOR AUTONOMOUS DRIVING APPLICATIONS**
R&D Intern at Nvidia's Autonomous Driving team | C++, Git
Supervisor: Dr. Urs Muller
- Implemented a model predictive vehicle controller for the autonomous driving pipeline using a low latency & low complexity vehicle ego-motion model that generates steering angles based on a given reference trajectory.
 - Implemented a simplified vehicle ego-motion model to meet the MPC real-time constraints.
- Aug 16 – April 17
 [Paper](#)
- CHARACTERIZATION OF A NOVEL 3D-PRINTING PROCESS FOR SILICONE-BASED MATERIALS**
Research Assistant, Multi-scale Additive Manufacturing Lab, University of Waterloo
Supervisor: Dr. Mihaela Vlasea
- Characterized a first of its kind powder bed binder jetting process with a purpose of creating variable porosity 3D prints of Silicone based materials.
 - Prototyped a powder characterization apparatus for conducting standardized ASTM tests on metallic powders. Tests were related to density and flow of the powders.

WORK EXPERIENCE

- Jan 18 – Aug 18
8 Months
[Website](#)
- SOFTWARE ENGINEER AUTONOMOUS DRIVING AT NVIDIA CORPORATION, NEW JERSEY**
Worked in the Special Projects Autonomous Driving Team at the Holmdel, NJ Location
- Worked on the Research and Development of a Model Predictive Controller for Nvidia's fleet of autonomous vehicles (More details available in the Research Experience)
 - Rebuilt the data-collection application, used by the local team, to rectify dropping and data latency
- May 17 – Aug 17
4 Months
[Website](#)
- EMBEDDED SOFTWARE ENGINEER AT NVIDIA CORPORATION, SEATTLE**
Worked on the embedded software suite that powers the NVIDIA DRIVE platform
- Designed the incremental OS flashing feature for the "Tegra" boards which reduces the kernel flashing time by half, saving over 240 developer hours per year
 - Created low level software tools and flashing utilities for software profiling and evaluation, now part of the Product Development Kit (PDK) for Nvidia's Drive systems
 - Implemented safety-critical code for parsing and validating critical flashing configurations
- Sept 16 – Dec 16
4 Months
[Website](#)
- SOFTWARE ENGINEER AT INTELLIJOINT SURGICAL, WATERLOO**
Implemented a surgical tool-tracking solution as part of the Product Innovation team
- Created an OS X application that adapts the proprietary tool tracking framework towards a cranial navigation product for neurosurgical applications
 - Used Visualization Toolkit (VTK) for medical image segmentation, and used libraries like OpenGL for 3D image reconstruction and rendering cranial visualization
 - Implemented pre-release system verification and validation protocols
- May 15 – Aug 15
4 Months
[Website](#)
- SOFTWARE TEST ENGINEER AT SYNAPTIVE MEDICAL, TORONTO**
Conducted systems level tests on a neurosurgical planning & navigation solution
- Created python scripts to automate black-box testing strategy for the data-processing pipelines
 - Executed verification and validation protocols and conducted system level tests for a highly invasive medical device with a goal to achieve FDA clearance
 - Coordinated feature development in conjunction with the QA and the Development teams

AWARDS AND ACHIEVEMENTS

2020	Canadian Graduate Scholarship – Masters (NSERC)	\$ 17,500
2019	Vector Scholarship in Artificial Intelligence (VSAI)	\$ 17,500
2019	President's Research Award for research excellence	\$ 1,500
2019	First in Class Award for 3 undergraduate academic terms	\$ 400 x 3
2017	Multiple Sclerosis Research Grant by the MS society of Canada	\$ 15,000
2017	President's Research Award for research excellence	\$ 1,500
2016	University Student Research Award, USRA-NSERC	\$ 4,500
2016	Industrial University Student Research Award, IUSRA-NSERC	\$ 4,500
2015	University of Waterloo President's Scholarship of Distinction	\$ 2,000
2014 - 2018	Included in the Dean's Honours List for all consecutive academic terms	
2015	Elected as the Faculty Class Representative for two consecutive terms	