# SUMANT BAGRI

**Masters Student (MScAC) @ University of Toronto**

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## HIGHLIGHTS

One of the key moments of my life was publishing a research paper estimating EoL and wear-grade for non-linear tool-paths in microtools as part of my thesis. In addition to that, I really enjoyed working on a self-localizing omnidirectional robot designed and developed as part of a mechatronics course project at UofT. I am passionate about researching and implementing state-of-the-art deep learning techniques to solve complex, real-world problems in robotics and computer vision and that is exactly what I hope to kickstart through this internship and pursue as a career in the future

## EXPERIENCE

### Trading Operations Engineer

**Flow Traders Asia Pte. Ltd**

Oct 2020 – Apr 2022 | Hong Kong, Hong Kong

- Manage, maintain and optimize all internal, software and hardware stacks largely integrated with the Linux kernel
- Work with development to build and test exchange APIs for different APAC markets
- Implement automated ops-engines and relevant monitoring tools improving control and enabling streamlined deliveries

## RESEARCH/ACADEMIC PROJECTS

### Comparison of Sampling-Based Path Planners

Dec 2022 | UofT, Canada

- Performed a comparative study of three asymptotically optimal, sampling-based path-planners - FMT*, BIT* and NRRT* algorithms. Evaluated optimal path costs, execution times as well as success rates through simulations on characteristically different 2D maps with varying sample counts

### Synthetic Image Generation of Brain Tumor MRI Scans

Nov 2022 | UofT, Canada

- Implemented three different GAN architectures - DCGAN, WGAN and UNet-GAN - for synthetic image generation using PyTorch. Trained a CNN model for brain-tumor classification using synthetic images which achieved 90% accuracy on real images

### Capturing Cutting Tool Failure in Micro-Milling

Sep 2019 – Aug 2020 | IIT Bombay, India

- Developed an image processing pipeline to extract tool-wear data from captured tool images. Modelled and tuned ANN and DBN to classify and predict tool-wear and end-of-tool-life based on force and vibration data

### Autonomous Navigation and Obstacle Avoidance Robot

Oct 2018 | UofT, Canada

- Implemented a depth first search (DFS) path planning algorithm in C++ for self-localization of robot. Enabled optimal collision detection using 8 ultrasonic sensors and implemented PID control for obstacle avoidance

## EDUCATION

### MSc, Applied Computing

**University of Toronto, Department of Computer Science**

Toronto, Sept 2022 – December 2023*

Courses : Introduction to Machine Learning, Introduction to Mobile Robotics, Computational Imaging, Visual and Mobile Computing Systems, Neural Networks and Deep Learning

### B.Tech and M.Tech, Mechanical Engineering

**IIT Bombay**

India, Aug 2015 – Aug 2020

Minor in Electrical Engineering

## PUBLICATIONS

### Journal Articles

- Bagri, S., Manwar, A., Varghese, A., Mujumdar, S., & Joshi, S. S. (2021). Tool wear and remaining useful life prediction in micro-milling along complex tool paths using neural networks. *Journal of Manufacturing Processes*, *71*, 679–698.

## PROFESSIONAL SKILLS

**Programming Languages:** C/C++ | Python
**Robotics/CV:** ROS | Gazebo | OpenCV
**Machine Learning:** PyTorch | TensorFlow
**Cloud Computing:** Kubernetes | Docker
**Distributed Computing:** Hadoop | Disco
**Data Streaming:** Kafka | ELK Stack
**Databases:** BigQuery | PostgreSQL | MariaDB