

# Pranshu Malik

Robotics Enthusiast

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## Interests

Robotic Systems & Automation · Medical Devices · Computer Vision · Signal Processing · Circuit Design

## Education

### University of Toronto

Bachelor of Applied Science in Electrical Engineering; GPA: 3.87/4.0      Sept. '17 – June '21 (Exp.)

- Engineering International Scholar: Received full tuition-fee waiver for the entire duration of the program
- Key Courses: Control Systems, Signals & Systems, Electronics, E&M Fields, Digital Systems, Linear Algebra
- Minoring in Robotics and Mechatronics; candidate for Certificate in Artificial Intelligence Engineering

## Research & Professional Experience

### aUToronto, Self Driving Car Team

Toronto, ON

Electrical Team Lead

Feb. '19 – Present

- Synchronizing system clock, cameras, LIDAR, & GPS using chrony NTP with PPS signals received over RS232
- Designed an expandable controller PCB to create a software switch for the autonomous-mode indicator lights
- Built testing equipment, including traffic lights; setup power safe power distribution and routed data cables

### Planning and Controls Team Member

Aug. '19 – Present

- Developing framework for standardized testing of controller in simulation and generating performance reports
- Learning about model predictive controller (MPC) to update current implementation for new requirements

### Teaching Assistant, Department of Mathematics

Toronto, ON

MAT188, Linear Algebra

Sept. '19 – Present

- Facilitating 3 weekly tutorials; engaging with students to help them learn and apply concepts in linear algebra
- Using the "ask, not tell" philosophy of teaching; involved in invigilation duties for quizzes and midterm exams

### MAT135, Calculus 1A

Sept. '18 – Dec. '18

- Held weekly tutorials and office hours to help students learn various concepts in calculus
- Graded weekly assignments and midterm examinations; assisted with invigilating midterm and final exams

### Software Engineering Intern, Rocscience Inc.

Toronto, ON

Geotechnical Software Tools Design

May '19 – Aug. '19

- Developed an interactive geometry-import tool that supports file import within the software suite as well as several external formats like DXF and DWG, thereby improving synergy between the products
- Designed diagnostic tools to perform mesh queries and inspection to identify book-keeping and numerical errors

### Undergrad. Research Assistant, Rehabilitation Engineering Lab, TRI

Toronto, ON

Advisors: Prof. Kei Masani and Prof. Paul Yoo

May '18 – Aug. '18

- Developed finite element models (FEMs) of lower leg for computational study of neurostimulation applications
- Streamlined workflow for developing FEMs using Autodesk Inventor, COMSOL Multiphysics, and MATLAB
- Documented framework on using MRI datasets to develop FEMs; applicable for other bio-electric studies too

## Projects

**CollabBots:** A robotic system consisting of 2 robotic arms, built from scratch, that uses visual-servoing to collaboratively pick-up and stack blocks to make a structure. The sub-modules are partially complete and are under development.

**Object-tracking robotic arm:** Programmed to locate a cup in its radius and drop a coin into it; video from a camcorder, mounted on the arm, is processed in real-time by an FPGA which communicates with an Arduino to control the robot's actions. The system allows for calibration of thresholds to suit any environment.

**TRAECY:** Traffic and Emission Control System, aims to conjoin traffic management with real-time vehicle emission tracking & regulation, to ultimately reduce air pollution; it comprises of 3 disparate devices embedded in vehicles and street infrastructure that collect data for traffic-light control & traffic rerouting algorithms, and update users' quota.

## Skills

### Programming Languages:

Proficient: C, C++, C#, MATLAB, Verilog, Arduino

Intermediate: Python, Java, ARMv7 Assembly, Visual Basic, LATEX, PHP, HTML, CSS, JavaScript

Packages and Libraries: OpenCV, ROS, Git, .NET, WPF, GTK, Eyeshot, DevExpress

### Softwares:

EDA and Simulation Tools: KiCad, EAGLE, LTspice, Pspice, NI Multisim, ModelSim, Quartus Prime

3D CAD and CAE: SolidWorks, Autodesk Inventor, Autodesk Fusion 360, ANSYS, COMSOL Multiphysics, CATIA

Graphic design: Photoshop, Illustrator, Inkscape, GIMP

### Hardware familiarity:

Modules and Sensors: PCA-9685 (12bit-PWM servo driver), TB6600 and A4988 (stepper motor drivers), HC-05 (serial Bluetooth transceiver), MQ-135 (gas sensor), LTC-3108 (ultra-low voltage step-up), LTC-3588 (nano-power harvesting)

Hardware Development Platforms and Boards: DE1-SoC, ESP-8266, ESP-32, Arduino (Due, Mega/Uno/Nano, MKR-1000, Intel Galileo Gen-2), Raspberry Pi 3B, STEM-Du RDC-102 MCU

Data Acquisition and Computing Platforms: Muse headband, NI myDAQ, redpitaya, Hantek 6022-BL

## Professional Development & Certifications

Fundamentals of Image and Video Processing, Coursera: 2D signals and systems, sampling and filtering, motion estimation, color representation and processing; image enhancement, recovery, and compression

A Hands-on Introduction to Engineering Simulations, edX: Finite-element analysis and computational fluid dynamics simulations on ANSYS for real-world problems; verification and validation of results

Mechanical CAD Certification (in SolidWorks), CadZone India: Solid and sheet-metal modeling, advanced modeling tools, assembly modeling, SolidWorks Motion and Simulation tools

CATIA Certification, Institute for Multidisciplinary Design & Innovation, UoFT: Solid part design, assembly design, and drafting workbench for models

Basic, Advanced Machining, & Machining III, George Brown College: Machine shop safety; use of hand tools, lathe, mill, grinder, drill press, band saw; machine feed rates and cutting speeds

Introduction to Welding, George Brown College: Oxy-acetylene, manual-arc (stick), and gas-metal-arc (MIG) welding techniques; safety training

## Awards & Achievements

<u>First Place</u>
<u>First Year Summer Research Fellowship</u>
<u>Runner Up</u>
<u>Pete Conrad Scholar Finalist</u>
<u>First Prize (Grade XI, Large Team)</u>
<u>First</u>
<u>Second</u>

GM/SAE Autodrive Challenge	2019
Faculty of Applied Science and Engineering	2018
NASA Space Apps Hackathon, New Delhi	2017
Conrad Spirit of Innovation Challenge	2016
NASA Ames Space Settlement Contest	2016
Intel Make-a-thon, New Delhi	2015
Google Developers Group (GDG) College Hack	2014

## Other Interests & Activities

**Sports:** Love playing cricket and racket sports like squash and badminton; enjoy cycling, hiking, camping activities, and going on long walks. Have also played cricket competitively, at the state level.

**Spiritualism/Culture:** Have been attending Bhagavad Gita classes each week at ISKCON Temple for the past 13 years. Also associated with the Institute for Science and Spirituality at ISKCON; actively contribute to the newsletter and attend scientific conferences on the matter.