

# Tuan Minh Nguyen

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## EDUCATION

### University of Pennsylvania

Masters of Science in Engineering, *Robotics* (GPA: **3.9/4.0**)

- Honors and Awards: 3rd Place in Robotic Arm Pick-and-Place Competition (MEAM520 Course).
- Relevant Coursework: Linear & Nonlinear System Theories, Model Predictive Control, Intro. to Robotics.

Philadelphia, USA

September 2020 - May 2022

### University of Alberta

Bachelor of Science in *Electrical Engineering* (GPA: **Major: 3.9/4.0**, Cumulative: 3.7/4.0)

- Honors and Awards: 2016-2017 & 2017-2018 Academic Scholarships, Dean's Research Award, CL Bell Memorial Scholarship, Samuel J McCoppen Scholarship, Warren NW DuBois Memorial Scholarship
- Relevant Coursework: Control Systems, Engineering Mechanics, Embedded System, Power Electronics

Edmonton, Canada

September 2016 - June 2020

## TECHNICAL SKILLS

**Programming Languages:** C/C++, Python, Assembly x86, Verilog, VBA

**Softwares & Libraries:** Matlab & Simulink, ROS, SocketCAN, Arduino, MPT3, Gurobi, CVXPY, Pytorch, Carla

## WORK EXPERIENCE

### Clearpath Robotics Inc.

*Robot Platform Software Developer Intern*

- Developing test automation framework for **Hardware-in-the-loop** testbench.
- Maintaining and creating process automation tools for interfacing with third-party APIs and reporting test results.

Kitchener, Ontario, Canada

May 2022 – August 2022

### Viet Son Informatic JSC

*Data Analyst Intern*

- Designed tech platform that **optimizes price and quantity sold** in response to market demands.
- Automated data collecting and analyzing processes from **SAP server**.
- Implemented Excel as user interface for easy integration of the platform into current works of product managers.

Ho Chi Minh, Vietnam

June 2021 – August 2021

### F1/Tenth Autonomous Racing Group at mLAB

*Graduate Student Researcher*

- Developed a **motion planning** stack where 3 control algorithms, HMPC, MPCC and LMPC, can be used interchangeably.
- Led the implementation of **HMPC** which uses **mixed-integer programming** for obstacle avoidance.
- Participated in Generalized Racing Intelligence Competition (GRAIC) and outperformed the baseline controller's score by 37%.

University of Pennsylvania, USA

January 2021 – May 2021

### Donadeo Innovation Center for Engineering

*Research Assistant*

- Developed **embedded system** to interpret data from high-resolution RF sensor that detects minute concentration of chemicals.
- Implemented **ARM Cortex M7** microcontroller to process high frequency (gigahertz-range) signals from the RF sensor.
- Demonstrated a prototype to undergraduate research committee and local oil-and-gas industrial partners.

University of Alberta, Canada

November 2019 – March 2020

## PROJECTS - ROBOTICS & MOTION PLANNING

### Bezier Curves Tracking for Mobile Robots | C++

- Created a framework for constructing road networks for mobile robots using Bezier curves.
- Embedded the dynamics of pursuit curves into path planner which drives a robot to smoothly approach and make progress along a target path.

Fall 2022

### Reactive Obstacle Avoidance using Dynamical Systems | Matlab

- Applied dynamics modulation and contraction theory to generate a collision-free path from mobile robot's current position to goal point.
- Expanded the planner's capability to **avoid dynamic obstacles** by manipulating relative motions between the robot and obstacles.

Summer 2022

### Motion Planning for 7-DOF Robotic Manipulator (UPenn-MEAM520) | Python

- Controlled the Franka robotic arm through **forward/inverse kinematics** and **Jacobian/velocity kinematics**.
- Planned robot's trajectories using **RRT\*** with obstacle avoidance.
- Got 3rd place in the Final Robot Pick-and-Place Competition.

Spring 2022

### Time-optimal Trajectory Planning for Mobile Robots | Python, CVXPY

- Applied **Convex Elastic Smoothing (CES)** algorithm to improve robot's kinematic feasibility along trajectories resulting from **RRT** path planner.
- Optimized robot's feedforward controls for minimum time traversal using **Second Order Cone Program (SOCP)**.
- Added robot's feedback controls using **PID** to improve robustness to disturbances and modeling errors.

Fall 2021

### Two-Wheeled Balancing Robot | Arduino, Matlab&Simulink

- Implemented **Extended Kalman Filter** to optimally estimate robot's tilt angle in the presence of sensor drifting and disturbances.
- Optimized **LQR controller** using **SPSA algorithm** which improves the robot's balancing performance by 55%.

Summer 2021

## VOLUNTEERING

### MIT Driverless

*Planning and Controls Subteam*

- Integrating Model Predictive Path Integral (MPPI) controller to improve vehicle's race line tracking and dynamic obstacle avoidance capabilities.

Cambridge, Massachusetts, USA

October 2022 – Current