

# Larry Kvitnevskiy

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## Skills

### Programming

- Python
- Bash / Linux
- Docker
- C/C++

### Hardware

- Machine Shop Tools
- CAD/CAM
- Embedded

### Some other things

- Control theory
- Signal Processing
- Numpy
- Fourier Analysis
- Making Things

## Education

### University of Waterloo

MaSc. Mechatronics Eng.  
2017 - 2019 | Canada

### University of Waterloo

BaSc. Mechatronics Eng.  
2012 - 2017 | Canada

## Excited About

- Using Math to solve problems
- Making CNC machines smarter
- Deriving meaning from large data sets
- Rock Climbing
- Sailing

## Published Paper

Detecting machine chatter  
using audio data and machine  
learning

DOI:10.1007/s00170-020-  
05571-9

## Professional Experience

### Boston Dynamics, Pick team | Release Manager / Software Engineer

April 2020 - ongoing | Mountain View, CA

*Python, Bash, Docker, Jenkins, Release Management*

- Implemented and enforced release life cycle, resulting in no software release failures at customer sites. All issues were caught during testing.
- Improved operational efficiency by creating tools for technicians/engineers to test any version of the software on lab hardware.
- Introduced workflow (branching strategies, PR templates, merge strategies). Enforced thorough testing coverage for manual tests.
- Improved usability and maintainability of ML scripts by refactoring them to be more pythonic. This allowed for more cross-team collaboration.
- Made ML training sessions reproducible by saving all parameters of the training session.

### Multisensory Brain and Cognition Lab | Mechatronics Eng. Intern

May 2016 - Aug 2016 | Waterloo, Ontario

*C, Real-time embedded, C#, Python, CAD, PyOpenGL*

- Designed and implemented software to control a human-sized Stewart platform for 6DoF motion experiments.
- Used for understanding how human perception changes when they are in motion.
- Implemented interface to write custom trajectories. Included visualization and safety checks.
- Designed and built chassis to mount equipment on motion platform.

### Intellijoint | Software Engineer Intern

Sept 2015 - Dec 2015 | Waterloo, Ontario

*Objective C, C++, Linear Algebra, 3D geometry, Visual Toolkit*

- Used the existing surgical 3D tracking system to implement new workflows.
- Designed and implemented cranial navigation tool meant for brain surgery, which maps 3D MRI data to the patient's head.
- Designed and implemented software to help surgeons complete hip surgery.
- Designed and implemented algorithms for finding the position and orientation of a femur bone using different types of probing methods.

### Athos | Software Engineer Intern

Jan 2015 - April 2015 | Redwood City, California

*Python, C, Manufacturing Test Infrastructure*

- Automated all development processes.
- Overhauled testing infrastructure for assembled PCBs. This includes: increased reliability, modular test suites, resilience to test fixture hardware, and more thorough test coverage.
- Generated battery discharge curves for accurate remaining battery life indicators.

### Datera | Software Engineer Intern

May 2014 - Aug 2014 | Mountain View, California

*Python, C++, Bash*

- Wrote production code that interfaced between the high level software and low level configuration of Linux-IO.
- Wrote an event log parser that would parse the system-daemon logs, and pass the information to the cluster control plane.
- Implemented a watchdog feature for all agents (custom daemons) in the work environment.

# Thesis Work

## Automated tap tester for determining milling machine dynamics

Sept 2017 - Aug 2019 | Waterloo, Ontario

*Embedded, C++, Force sensors, Laser sensors, Python, Vibration analysis, CAD, Prototyping*

- Came up with a novel approach to automatically determine machine dynamics.
- Designed and built prototype which uses a linear motor and load cell to measure impact force. Prototype allows for automatic tapping with multiple tools.
- Used Python, and various vibration analysis concepts to process data and provide optimal cutting conditions tap.

## Tool path generator using optimization and constraints

Sept 2017 - Aug 2019 | Waterloo, Ontario

*Python, Numpy, Scipy*

- Created an algorithm that, given a part and physical constraints, generates an optimized tool trajectory for milling.
- Optimized for constant tool engagement and smooth path, which limits shock loading on cutting tool.
- Outperforms recent paper on adaptive tool path algorithm - theirs: 50% maximum error, mine: 8.8% maximum error.

## Detecting machine chatter using audio data and machine learning | DOI:10.1007/s00170-020-05571-9

Sept 2017 - Aug 2019 | Waterloo, Ontario

*Python, Keras, Numpy, Neural Network, Audio processing*

- June 2020 The International Journal of Advanced Manufacturing Technology 108(11-12)
- Trained a neural network that can determine, in real-time, if a CNC mill is chattering.
- Used Sliding Fourier transform to convert audio data to high dimensional frequency features.
- Parameter-swept NN hyperparameters to identify optimal parameters.
- Visualized encoded data for intuitive understanding of the data. 95% accuracy when tested on TAIG CNC mill using 30% holdout of the data.

# Making Stuff

## CNC MILL conversion

Sept 2014 - Oct 2019 | Waterloo, Ontario

- Converted Taig mill into a CNC mill.
- Made and sold enough parts on the machine to cover the initial purchase price.
- Learned how to calibrate the machine by adjusting the gib, tramming the machine and compensating for backlash. Achieved a repeatable part accuracy of 4 thou (0.1 mm) in aluminum.
- Created rotary dampers to mount on the stepper motors to remove resonance. The stepper motors could move faster before losing steps.

## Built for fun

All my life | Everywhere

- Experimented with various strain gauges and geometrical designs to optimize force sensitivity for a touch off plate.
- Made prototype connectors for a YC-funded furniture company.
- Built a sentry turret that shoots NERF darts at moving targets.
- Made mounting plates for UWaterloo's FSAE team.
- Bought a broken antique soviet mechanical calculator and fixed it for my brother's birthday.
- Machined a 3D moon crater (Copernicus crater) out of aluminum.
- Machined a pair of matching aluminum containers with a magnetic hinge as a wedding gift.
- Copper and Aluminum roses for various loved ones' special occasions.
- Grew potatoes and radishes for a season.