

Lincoln M. Roth

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EDUCATION

Rutgers University—New Brunswick

New Brunswick, NJ

B.S. in Computer Science and Mechanical Engineering, minor in Mathematics

May 2023

- » GPA: **3.64** | Dean's List | Engineering Honors Academy
- » Coursework: Robot Learning (**Graduate**), Computational Robotics, Artificial Intelligence, Computer Architecture, Data Structures, Linear Algebra, Calculus 1-5, Dynamics Systems & Controls,

EXPERIENCE

ASML | *Mechatronics Intern*

June 2021 — August 2021

- » Developed mechatronics systems for improved reliability and function on machines responsible for manufacturing 70% of the worlds computer chips. Worked on the internal robot arms (SCARA and standard) as well as all Reticle Handling components, both in vacuum and out of vacuum.
- » Created **diagnostic tools in Matlab/Simulink** to analyse dynamic behaviour of the Reticle Handling system which then allowed faster robot movements while minimizing vibrations. Interfaced with internal control structure to create **control systems for vibration compensation and response**.

Rutgers Aresty Undergraduate Research Center | *Undergraduate Researcher*

September 2020 — May 2021

- » Used parallel processing and **CUDA acceleration with MATLAB** to improve processing speed of a 3D insect flight simulator used for development of micro-aerial robots. This allows for over **50x increases in program speed** greatly reducing computational costs associated with simulation.

MLH (Major League Hacking) Fellow | *Software Engineering Intern*

June 2020 — August 2020

- » Contributed to Adafruit's CircuitPython, a Python version for micro controllers, through the inaugural class of MLH Fellows. Worked with a cohort of other developers as well as an industry professional mentor, allowing for rapid growth within the Open Source community.
- » Worked on Glider, a live, mobile code editor using React Native for the app, embedded C for the microcontroller, as well as Bluetooth Low Energy (BLE) for the live code updates. Made biweekly pull requests, featuring over a dozen different commits. Stubbed out the entire BLE aspect for a **5x decrease in development time** as well as increased the accessibility of the app to any potential user. Also added many features and bug fixes, such as dark mode and increased device support.

Rutgers Solar Car Club | *Mechanical Lead*

July 2019 — Present

- » Lead a subteam responsible for designing, analyzing, validating, manufacturing and testing the mechanical components for a solar powered race car. Taught members the fundamentals of mechanical design and analysis, as well as designed the suspension, drivetrain components, and the brakes and steering systems.

WINLAB | *Research Intern*

June 2017 — August 2019

- » Built a vehicle control system using OpenCV for localization and closed-loop control vehicles to control a system of vehicles in a small-scale autonomous vehicle testbed.

PROJECTS

Firefighting Robot | github.com/phsrc/ogrebot

February 2020

- » Built a firefighting robot for the Trinity International Robot Contest. The robot was built to autonomously navigate a maze to find and extinguish a fire. The robot used custom servos for locomotion, a 2D Lidar and an IMU for localization, as well as a host of other sensors and actuators for detecting and extinguishing the flame. | *ROS, Gazebo, Python, Robotics*

LMRBot - Chess Bot Algorithm Comparison

June 2021

- » Used a variety of techniques to develop a set of chess engines capable of playing each other to allow research into which techniques are more effective. Neural Fitted Q iteration, Deep Reinforcement Learning, and traditional Alpha-Beta search-based techniques were all implemented. | *Reinforcement Learning, Python, Deep RL, NFQ*

ML Basketball | <https://github.com/lincolnmroth/basketball-RL>

May 2021

- » Used Q-Learning and Neural Fitted Q iteration to have a robot arm teach itself how to shoot a basketball into a hoop. Used a Epsilon-Greedy approach for exploration, and neural network for Q-Value estimation | *Reinforcement Learning, Python*

Strobe Scope (PennApps XVI) | apps.apple.com/us/app/strobr-scope/id1330331187

September 2017

- » Developed a camera-based stroboscope mobile app that used a variable frame rate instead of persistence of vision, which allows for non-intrusive operation and ability to measure frequency of flashing objects. | *Swift/iOS Development*

SKILLS

Programming Languages and Tools: Python, MATLAB, Julia, C/C++, Java, Swift/iOS, Git/GitHub, ROS/Gazebo, CUDA, React Native, React Machine Learning (PyTorch, Keras, TensorFlow, OpenAI Gym), Heroku, AWS, Docker, Firebase
Technologies: Linux, Reinforcement Learning, Control Theory, Embedded Systems (STM32, Espressive, Arduino), Hardware (Raspberry Pi, Nvidia Jetson, BeagleBoard)