

## EDUCATION

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- **Cornell University, College of Engineering** Ithaca, NY  
*Bachelors of Science in Computer Science, Dyson Business Minor — GPA: 4.14* Aug. 2023 - Present
  - **Relevant Coursework:** Object Oriented Programming and Data Structures, Discrete Structures and Algorithms, Differential Equations, Linear Algebra, Introduction to Operations Research
- **Choate Rosemary Hall** Wallingford, CT  
*High School Diploma — GPA: 4.35 Weighted* Sept. 2019 – May 2023

## EXPERIENCE

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- **Cornell Electric Vehicles (CEV)** | Software-Autonomy Subteam Member Oct. 2023 - Present
  - **Global and Local Planning:** Created a custom simulation for occupancy grid-based planning algorithms. Implemented various algorithms like RRT\*, LQR, MPC and developed my own which outperformed RRT\* by a factor of 8. Connected everything to ROS simulators as well to incorporate into our autonomous vehicle pipeline.
  - **Auto-braking and steering:** Created an auto-braking system incorporating Arduino, Raspberry Pi, and an RPLidar with ROS and ROSSerial which automatically brakes a physical autonomous vehicle upon seeing an object within a certain distance threshold. Currently working on developing auto-steer using IMU odometry and local planning as well.
- **Choate FRC Robotics Team** | Lead Programmer, Technician Sept. 2021 - May 2023  
Led the programming team of the FRC Wired Boars (7407). Won multiple regional and district competitions and helped bring the team to semifinals at FRC Worlds, winning the Innovation in Control award.
  - **Autonomy and Pose Estimation:** Incorporated Computer Vision for ball shooting and tracking, an IMU, April Tag tracking for pose estimation, and other sensors (IR, color, limit, etc.) for mechanism and game piece handling.
  - **Open Source Library:** Developed a core library for the team and many other FRC teams to utilize across separate code-bases for different competitions (7407-Robotpy-Toolkit).
  - **Autonomous Route Planning GUI:** Created a GUI with PyGame to visualize and adjust robot autonomous pathing with regards to kinematics constraints (AutoBoard), which led to a 98.7% autonomous success rate at Worlds.
- **Cognite** | Robotics Engineering Intern June 2022 - Aug. 2022
  - **Web Dashboard Sensor Integration:** Created an acoustic gas leak detection system for Boston Dynamics Spot and integrated it with Cognite's data and robotics software platform using Java, Python, Linux + Bash, and JS.
  - **CV Leak Detection:** Used computer vision (OpenCV, Tensorflow) on acoustic gas leak detection output to estimate likelihood of gas leaks with ~93% accuracy and demoed the product to the client team.
- **Rovicare** | Software Engineering Intern June 2021 - Jan. 2022
  - **Medical Form Scanning API:** Created a Flask API containerized with Docker to allow fast, automatic extraction and transferring of data from scanned medical forms into databases using PyTesseract OCR, Google Cloud Vision, and GCS, reducing the processing time of medical data intake of patients by over 90%.
- **Robotics and Beyond** | Volunteer AI and Robotics Course Creator/Teacher Jan. 2021 - May 2023
  - **Teacher:** Taught Elementary school students basic Python skills. Taught ML to high school students.
  - **Course Creation:** Developed and taught courses in Machine Learning, AI with Edge Computers, and Tensorflow Lite to High School students.

## AWARDS

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- **PicoCTF 2022:** Captain of a team which placed 14th Nationally out of ~15000 competing students in 2022.
- **BB&N:** Hackathon Winner
- **Choate Rosemary Hall:** Excellence in Robotics Award, Dean's List All Terms
- **ACT:** 36
- **FRC Worlds:** Innovation in Control Award - Hopper Division

## SKILLS AND TOOLS

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**ROS, Python, Java, Rust, C++, Bash, SQL, Flask, OpenCV, TensorFlow, REST, gRPC, Docker, Git, React, GCP, Tesseract**

## SELECTED PROJECTS

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- **Cornell Electric Vehicles – Global and Local Path-finder, Optimizer, and Simulation**

Created a custom simulation in Python for occupancy grid path-finding, possible route displays, etc. Implemented algorithms like RRT, RRT\*, LQR, MPC, and more for global and local planning. Also developed my own algorithm based on RRT which performed over 8 times better than RRT\* (in terms of speed and efficiency to reach the same solution).

- **Cornell Electric Vehicles – Lidar-based AutoBrake**

Integrated an RPLidar, Ubuntu Raspberry pi, and Arduino along with motors in our autonomous vehicle to automatically disable the throttle and activate an auto-brake when objects above a certain size threshold were detected within a certain distance of the vehicle. Used ROS, ROSSerial, C++ (Arduino), Python.

- **FRC — AutoBoard**

Robot auto-pathing simulator written in Python and PyGame which our FRC team used to create and simulate better autonomous routines on the fly. This brought us to a near 100% accurate auto-routine at the FRC worlds competition in 2023.

- **Cryptography Directed Study — Decentralized, Cryptographically Secure Voting System**

Project I worked on for my Cryptography DS. Used RSA and hash chaining, along with decentralization principles to create a verifiable Schulze voting system that could function anonymously, securely, and without a central server. Used Rust to create a final product.

- **Linear Algebra — Inverse Kinematics Simulation with Gradient Descent and Jacobian Inverse Matrices**

Project for my linear algebra class in which a partner and I used gradient descent and a formula derived using Jacobian inverses to simulate a robot arm optimally routing to a target.

- **Modern Math & Research Course — Maze Generator and Pathfinder**

Created a program which randomly generated a maze with various algorithms, including DFS and minimum spanning trees, and then solved it with various pathfinding algorithms, including A\*, DFS, and BFS, and displayed an animation. Written in Rust.

- **N-Body Simulation**

Multithreaded N-Body-Problem simulator I wrote in Python using PyGame. Includes time and sampling controls.

- **OCR to Differential Diagnosis**

Scanned handwritten doctors' notes for various diseases and symptoms, and created a differential diagnosis mapping. Used Python, Pandas, Numpy, PyTesseract, and GCP.

- **Cryptography Directed Study — PRNG-Based Cryptography System**

Project I worked on for my Cryptography DS as a replacement for one-time-pad, which used a set random seed to regenerate new one-time-pad codes, allowing for users to indefinitely share messages with n-bit security. Used Python for the final product.

- **FRC — RobotPy-Toolkit-7407**

Python library toolkit for our team and other FRC teams to use across years. Created tools for automatic robot path planning and position tracking based on cameras. Also wrote interfaces for sensors and motors commonly used by FRC teams.

- **BB&N Hackathon — Snoway**

Social media app two partners and I created using React Native, MongoDB, and Flask, where users could share photos of fun spots to play with snow in winter and review them.

- **TaskNinja CLI**

CLI written in Rust to manage my tasks, TODOs, and appointments, which interfaces with Google Calendar.

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