Sidharth Rao | Freshman at Cornell University, College of Engineering | BS in CS

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EDUCATION

- **Cornell University, College of Engineering** — Ithaca, NY
  Bachelors of Science in Computer Science; GPA: TBA — *Aug. 2023 - Present*
  - ○ **Cornell Electric Vehicles (CEV) Software-Autonomy Subteam**: Collaborate with 75+ team members of varying disciplines to create hyper-efficient, autonomous electric vehicles
  - ○ **Relevant Coursework**: Object Oriented Programming and Data Structures, Differential Equations for Engineers, Multi-variable Calculus for Engineers, Discrete Structures, Data Structures and Functional Programming
- **Choate Rosemary Hall** — Wallingford, CT
  High School Diploma; GPA: 4.35 — *Sept. 2019 – May. 2023*
  - ○ **FRC**: Lead Programmer and Technician in the Advanced Robotics Concentration and Choate's FRC team.
  - ○ **Choate Aerospace Association (CAA) President**: Planned meetings, events, contests. Managed finances.
  - ○ **PicoCTF Captain**: Placed 14th Nationally out of 15000 competing students in 2022.
  - ○ **Relevant Coursework**: Cryptography (Directed Study), ML, Autonomous Robotics, Competition Robotics, Modern Math & Research

EXPERIENCE

- **Cornell Electric Vehicles (CEV)** | Incoming Software-Autonomy Subteam Member   Oct. 2023 - Present

- **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, *Gyroscopic Sensors*, *April Tag tracking* for pose estimation, and other sensors 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 to visualize and adjust robot autonomous pathing (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.
  - ○ **CV Leak Detection**: Used computer vision on acoustic gas leak detection output to estimate likelihood of gas leaks with 87% accuracy and demoed the product to the client team.

- **Rovicare** | Software Engineering Intern   June 2021 - Jan. 2022
  - ○ **Medical Form Scanning API**: Created a containerized API to allow fast, automatic extraction and transferring of data from scanned medical forms into databases using OCR, 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

- **PicoCTF 2022**: 14th Nationally out of 15000
- **BB&N**: Hackathon Winner
- **Choate Rosemary Hall**: Excellence in Robotics Award, Dean's List All Terms
- **ACT**: 36
- **FRC Worlds**: 14th Innovation in Control Award - Hopper Division
- **AP Computer Science A, AP Calculus BC**: 5

SKILLS AND TOOLS

Python, Java, Rust, C++, Bash, SQL, Flask, OpenCV, TensorFlow, Docker, GitHub, GCP Vision, GCS

Selected Projects

- **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.