Sidharth Rao | Freshman at Cornell University, College of Engineering

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Sidharth is primarily interested in Computer Science, Electrical and Computer Engineering, Robotics, Cybersecurity, server decentralization, and decentralized finance.In his freetime, he likes to design and 3D print stuff for his dorm.

EDUCATION

Cornell University, College of Engineering (BS in CS & ECE)   **August 2023 - May 2027**

Relevant Coursework: Object Oriented Programming and Data Structures, Differential Equations for Engineers, Multivariable Calculus for Engineers.
- Cornell Electric Vehicle Project Team (CEV) Software-Autonomy Subteam

Choate Rosemary Hall, High School Diploma - GPA: 4.35   **September 2019 – May 2023**

Relevant Coursework: Cryptography (Directed Study), Machine Learning, Autonomous Robotics, Competition Robotics, Modern Math and Research
- Lead Programmer and Technician in the Advanced Robotics Concentration and Choate's FRC team.
- President of the Choate Aerospace Association (Planned meetings, events, contests. Managed finances.)
- JV Cross Country
- Concert Orchestra (Cello, First Chair)
- Captain of Pico CTF Cybersecurity Team, solved Web Exploitation, Binary Exploitation, Cryptography, Reverse Engineering problems and placed 14th Nationally out of ~15000 competing students in 2022.

WORK EXPERIENCE

Robotics Engineering Intern - Cognite   **June 2022 – August 2022**
- Created an acoustic gas leak detection system for Boston Dynamics Spot and integrated it with Cognite's data and robotics software platform.
- 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.

Regularly used Python, Java, Linux (on SPOT, servers), Bash, Docker, Tensorflow (leak detection), OpenCV, SQL.

Lead Programmer, Technician - Choate FRC Robotics Team   **September 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.
- Developed reliable robot code, incorporating Computer Vision for ball shooting and tracking, Gyroscopic Sensors (Pigeon IMU) and camera Fiducial-tracking for robot odometry (position tracking), and a variety of other sensors including color, IR, and more to handle the robot's inner mechanisms and game pieces.
- Developed a core library for the team and many other FRC teams to utilize across separate code-bases for different competitions (7407-Robotpy-Toolkit).
- Created a GUI to visualize and adjust robot autonomous pathing (AutoBoard), which led to a 98.7% autonomous success rate at Worlds..

Worked regularly with Python, Github, Linux (on the robot, for vision, and for development).

Software Engineering Intern - Rovicare   **June 2021 – Jan 2022**
- 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%.

Used Python, Flask, GCP Vision API, GCS, Docker.

Volunteer AI and Robotics Course Creator/Teacher - Robotics and Beyond   **January 2021 – May 2023**
- Taught Elementary school students basic Python skills.
- Developed and taught courses in Machine Learning, AI with Edge Computers, and Tensorflow Lite to High School students.

COMPETITIONS, AWARDS, AND SCORES

- PicoCTF 2022, 14th Nationally out of ~15000
- Choate Rosemary Hall, Dean's List All Terms
- Choate Rosemary Hall, Excellence in Robotics
- ACT, 36
- BB&N 2023 Hackathon Winner
- FRC Worlds, Innovation in Control Award - Hopper Division
- AP Computer Science A, AP Calculus BC, 5

SELECTED PROJECTS

[AutoBoard - FRC](#)
- Robot autopathing 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.

[Decentralized, Cryptographically Secure Voting System - Cryptography Directed Study](#)
- 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.

[Inverse Kinematics Simulation with Gradient Descent and Jacobian Inverse Matrices - Linear Algebra](#)
- 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.

[Maze Generator and Pathfinder - Modern Math and Research Course](#)
- 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](#)
- N-Body-Problem simulator I wrote in Python using Pygame along with 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.

[PRNG Based Cryptography System - Cryptography Directed Study](#)
- 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.

[RobotPy-Toolkit-7407 - FRC](#)
- 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.

[Snoway - BB&N Hackathon](#)
- 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.