

# Anirudh Cowlagi

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## EDUCATION

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**University of Pennsylvania, Vagelos Integrated Program in Energy Research** – Philadelphia, PA  
*M.S.E. in Robotics (Concentration: Artificial Intelligence & Machine Learning)*  
*B.S.E. in Electrical Engineering*  
*B.A. in Physics*

**GPA: 4.00/4.00**

**May 2024**

Minors: Computer Science, Data Science, Math  
Concentrations: Computational Techniques, Robotics

## TECHNICAL EXPERIENCE

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**University of Pennsylvania, Electrical Engineering** | Undergraduate Researcher (VIPER) | Philadelphia, PA

**May 2021 - Present**

- Exploring the geometry of deep network representations by leveraging techniques from statistical physics and information theory
- Developing model-agnostic approaches to select training examples that may accelerate and optimize training in the *continual learning* framework (10x reduction in replay set size)
- Determine how training data structure induces capacity control in neural architectures; perform topology-preserving model reduction (removing ~93% of redundant parameters)

**University of Pennsylvania, Computer & Information Science** | Teaching Assistant | Philadelphia, PA

**January 2022 - Present**

- Courses: Data Structures & Algorithms, Machine Learning; Course Sizes: 220+
- Roles/Responsibilities: Developed course content on sublinear time graph algorithms (estimating connected components); Hold 1-hour weekly recitations; Grade student assignments; Answer questions and provide debugging assistance through office hours

**University of Michigan, Physics** | Data Analyst | Ann Arbor, MI

**April 2019 – November 2020**

- Generalized existing line-detection algorithms (probabilistic Hough transform), signal processing techniques (Lomb-Scargle periodogram) to efficiently detect minor planets in sparse, tabular astrometric survey data (Dark Energy Survey). Record selection using Python/MySQL.
- Approach identified, cataloged, and submitted detections of 500+ objects; recovered ephemerides of 200+ previously discovered objects

**University of Michigan, Nuclear Engineering** | Research Assistant | Ann Arbor, MI

**June 2019 – May 2020**

- Developed a Python toolkit to extensively characterize the lattice connectivity of semiconductor networks (tools: NetworkX, OpenCV)
- Applied image-processing techniques and elementary graph theory methods to automate the analysis of 10,000+ TEM images

## HONORS & ACTIVITIES

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**Citadel-Correlation One Summer Invitational Datathon 2022, 1st Place**

**July 2022**

- Conducted an in-depth analysis of the risk assessment methodology employed by peer-peer lenders, using a modified nearest neighbors model. Employed an original momentum-based model to gauge and forecast lender reactivity to macro-scale borrower behavior.
- Prize: \$10,000 and Invitation to Data Open Championship (November 2022, NYSE)

**36th AAAI Conference on Artificial Intelligence, Published Finalist Paper (Student Abstract)**

**February 2022 -March 2022**

- Paper: Does the Geometry of the Data Control the Geometry of Neural Predictions? (Anirudh Cowlagi, Pratik Chaudhari) — see work above.
- 1 of 110+ accepted abstracts (20% acceptance rate), 1 of 20 selected as “Best Student Paper” finalist

**Penn Electric Racing (FSAE), Hardware, Software, & Autonomous Team**

**January 2021 - Present**

- Designed, tested, and debugged battery management system to monitor and passively balance 8 55V substacks using isoSPI protocol
- Developing Rust firmware to perform high-speed (15+ kHz) PID-based field-oriented control (FOC) through space-vector modulation (SVM) on custom-built 3-phase motor controllers. Hardware: STM32F777xx (MCU) accelerated with ECP5 (FPGA) for current sensing optimization

**Wharton Undergraduate Data Analytics Club; AI@Penn (Education Committee & Venture Fellows)**

**September 2020 - Present**

- Aided a Philadelphia-based startup (Highlight) by leading the development of a robust and accurate model for automated product review helpfulness assignment with 90+% OOS accuracy
- Model Architecture: Shallow network with self-trained embedding layers, output chained with XGBoost regressor evaluating density of product specific content (using a original TF-IDF based metric)

**Regeneron International Science and Engineering Fair, Science and Engineering Fair of Metro Detroit**

**March 2018 - March 2020**

- Regeneron ISEF Finalist (top 1200 out of 7,000,000+ students); SEFMD Grand Award; Physics: Best of Category (top 5 out of 650+ projects)

## RELEVANT COURSEWORK

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**Math:** Linear Algebra & Optimization, Introductory Analysis, Math Research, Multivariable Calculus, Ordinary/Partial Differential Equations

**Physics:** Mechanics, Electromagnetism, Statistical Physics & Thermodynamics, Quantum Mechanics; Analytical Mechanics

**Electrical Engineering & Computer Science:** Data Structures & Algorithms; Machine Learning; Theory of Deep Learning; Control for Autonomous Robots; Information Theory; Feedback Control; Electrical Circuits & Systems; Laboratory Electronics

## TECHNICAL SKILLS

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**Languages:** Python, Java, MATLAB, C++, OCaml; JavaScript, HTML5/CSS3 **Technologies/Frameworks:** PyTorch, TensorFlow/Keras, Scikit-Learn, Numpy, OpenCV, Altium, AWS EC2, React, SolidWorks/Fusion, Linux **Developer Tools:** Git, VSCode, IntelliJ, Eclipse