

Jacob Shin

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Education

Temple University **Philadelphia, PA, United States** Aug 2020 - May 2024
Bachelor of Science in Physics
Cumulative GPA: 3.94 out of 4.00

Research Experience

Research Intern **Max Planck Institute for Plasma Physics** May 2023 - August 2023
Greifswald, Germany
E5 - Turbulence Group
Advisors: Dr. Adrian von Stechow and Sean Ballinger

- Utilized machine learning computer vision methods to track plasma "blobs" in Gas Puff Imaging (GPI) data from the Wendelstein 7-X. GPI is a diagnostic that uses light emitted from gas injections in order to quantify plasma density. Blobs are structures found in the edge of the W7X.
- Applied new research techniques that used Mask-Recurrent Neural Networks for object segmentation to blob tracking. Obtained blob velocity, size, and frequency distributions that fell within the range measured by other diagnostics.
- Performed sensitivity analysis to optimize detection thresholds and machine learning parameters
- Tools: Pytorch, Jupyter Notebook, Python

Undergraduate Research Assistant **Temple University** August 2022 - May 2023
Department of Physics
Water Science Research Group
Advisor: Dr. Xifan Wu

- Analyzed density functional theory (DFT) simulation data to determine the role Van Der Waals forces play in water's unusual properties (e.g. negative thermal expansivity and density maximum at 4 °C)
- Processed 5 Terabytes of raw simulation data on a high performance computing cluster by vectorizing computations and using parallel processes

Undergraduate Research Assistant **Temple University** December 2021 - May 2022
Department of Physics

- Simulated the interactions of particles (e.g. electrons and protons) with detectors of different geometries and analyzed the resulting interactions using C++

Undergraduate Research Assistant **Temple University** January 2021 - May 2021
Department of Computer Science

- Implemented a web program to interface with the IoT (Internet of Things) devices to detect anomalies that could indicate security concerns in a smart home
- Navigated a codebase with over 40k lines of code and added 10k lines of code

Work Experience

Amazon Seattle, WA May 2022 - Aug 2022
Software Development Engineer Intern

- Created a Machine Learning (ML) Platform to automate the process of securely transferring ML data.
- Automated the retrieval and encryption of customer data, saving approximately 8 hours of engineering time per request
- Created a query API to filter through 10 terabytes of data using Typescript and Java

Security Innovation, Inc. Seattle, WA June 2021 - Aug 2021
Security Engineer Intern

- Wrote and reviewed 20 reports detailing the scope and severity of the vulnerabilities in code and recommended remediation steps
- Conducted independent research exploring the security of platforms using the ez80 CPU and presented it to the company

Princeton Plasma Physics Lab Princeton, NJ Oct 2019 - Dec 2019
Intern

- Created schematics for a Langmuir probe, which is used to measure plasma properties such as temperature and density based on the I-V (Current-Voltage) curve.
- Performed component selection for the Langmuir probe based on the specifications of the plasma parameters and the signal filtering requirements.

Other Experience

Classroom Assistant Philadelphia, PA February 2023 - May 2023
Mathematical Physics

- Created learning material on Git and the basics of Mathematica
- Taught students to use Mathematica to solve physics/math problems (Diff. Eq., Lin. Algebra, Probability)

Skills

Programming Languages/Frameworks: Python, Jupyter Notebooks, Mathematica, C, C++, Javascript

Markup Languages: \LaTeX , Markdown, HTML, CSS

Programming Tools Linux, Bash, Git/Github, Vim, SSH/SCP

Other Multisim, Soldering, KiCAD PCB, 3d FDM Printing, Basic Machine Shop Training

Human Languages: English

Activities

- **Temple Robotics** - Contributed to the code base for the robot to be used in the NASA Robotics Mining/Lunabotics Competition and operated the mill in the machine shop to create components
- **Temple Data Science Club** - Created challenge problems for students to learn programming and computer security
- **Temple Physics Club** - Member
- **Schuylkill Center Wildlife Clinic** - Volunteer (2021-2022)

Awards and Honors

- **Temple Presidential Scholarship** - Full Tuition Merit Scholarship for 4 years
- **Science Scholars Program** - Selective research program that offers a \$4,000 stipend per summer for research
- **Temple Dean's List** - Granted to the top 16% of students: Fall 2020, Spring 2020, Fall 2021, Fall 2022, Spring 2023
- **Philly Codefest American Water IoT Prize** - Won \$1000 in prizes for the best IoT electronics and coding project
- **Temple Honors Program** - Selective program for high-achieving students which offers advising and advanced honors level classes

Courses

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|------------------------------------|---|
| • Analytical Mechanics | • Differential Equations with Linear Algebra |
| • Optics | • Calculus III (Multivariable and Vector Calculus) |
| • Introduction to Modern Physics | • Computer Systems and Low Level Programming |
| • Mathematical Physics | • Data Structures |
| • Thermal Physics | • Mathematical Concepts in Computing I (Discrete Mathematics) |
| • Quantum Mechanics I & II | • Principles of Electric Circuits |
| • Electricity and Magnetism | • Microelectronics |
| • Scientific Computing III | • PCB Design |
| • Classical Mechanics | • Probability Theory I |
| • Physics 1 & Physics 2 | • Partial Differential Equations |
| • Real & Complex Analysis I | • Foundations of Machine Learning |
| • Basic Concepts (Intro to Proofs) | |