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Education

Bergen County Academies (BCA) - Hackensack, New Jersey *September 2018 - Present*
Academy for Engineering and Design Technology (AEDT)

- GPA: 3.906 / 4.0 (unweighted); on high honor roll for all 4 years
- SAT: 1560 (Math 800; 760 ERW), SAT Subject: Math II 800
- AP: Calculus BC 5, Physics C Mechanics 5, Physics C Electricity & Magnetism 4, Computer Science A 4; awarded AP Scholar with Distinction (2021)
- Inducted member of National Honor Society and National Spanish Honor Society
- **Columbia University School of Engineering and Applied Sciences Class of 2026** expected Mechanical Engineering major

Work Experience

Princeton Plasma Physics Lab (PPPL) *September 2021 - Present*
Research Intern

- Interned 8 hours weekly to write a Python code to read, analyze, plot and spline tokamak experiment data
- Worked on parallelizing Lower Hybrid Simulation Code (LSC) using OpenMP and Message Passing Interface
- Presented work to post-doctoral researchers at PPPL
- Working 40 hours weekly to create Python visualizations of plasmoids during magnetic reconnection using FFmpeg, Matplotlib, h5py, TurboVNC, Cygwin, Jupyter notebook and multiprocessing

National Aeronautics and Space Administration (NASA) *June 2021 - August 2021*
STEM Enhancement in Earth Science (SEES) Intern

- Interned 15 hours weekly to **lead 5-person wildfire research team**; **first author** of co-authored paper
- Used Python and Excel to analyze data from the GLOBE Observer Database and Landsat satellite
- Research published in Earth and Space Science Open Archive (DOI: 10.1002/essoar.10508247.1) and displayed in University of Texas Center for Space Research
- Wrote "Thoughts on Being a SEES Mosquito Habitat Mapper," **published on NASA GLOBE Program site**
- Presented research at 2021 American Geophysical Union Fall Meeting and with live Q-and-A to over 600 people at 2021 NASA SEES Internship Final Symposium
- Presented research at 2022 GLOBE International Virtual Science Symposium and won the "Data Scientist", "Make an Impact", and "Student Researcher" awards

New York University Agile Robotics and Perception Lab *June 2021 - June 2022*
Research Intern

- Interned 8 hours weekly to develop a Unity app in C# that uses the HoloLens 2 and communicates with Robot Operating System (ROS) to allow humans to control drone flight trajectory with hand gestures; integrated code into pre-existing pipeline; utilized Mixed Reality Toolkit (MRTK) and XRLineRenderer package
- Wrote technical documentation for lab research to be used as a guide by future interns and NYU students
- Co-author of symposium paper detailing drone control pipeline

Research

Bergen County Academies Mechatronics Research Lab *October 2019 - March 2020*

- **Designed and built** an environmentally friendly buoy system that measures various properties of water in order to monitor and help prevent coral reef bleaching
- **Won the National Oceanic and Atmospheric Administration (NOAA) Taking the Pulse of the Planet Award** at the 2020 BCA Research Expo

Bergen County Academies Applied Mathematics Research Lab *December 2018 - June 2019*

- **Conducted self-directed research project** on applications of mathematics in roller coaster design
- **Won Engineering Medal** at 2019 New Jersey Young Science Achievers Program (YSAP) Research Symposium
- Designed roller coasters on NoLimits 2 Roller Coaster Simulation program and conducted a case study of a local roller coaster, in order to develop formula for G-force at given point on roller coaster

Nipmuc Innovative Conceptual Engineering Design (ICED) Epic Challenge Convention *November 2019*

- Delivered a presentation on applications of mathematical modeling in astronomy to over 200 attendees

Physics Unlimited Explorer Competition *March 2020*

- Created a mathematical model for orbital resonance and **submitted a research paper** on the model

Special Programs

Kean University Group Summer Scholars Research Program *July 2021*

- Attended program for 24 hours weekly
- Used **machine learning** to fit and model data, such as points in 3D space and house prices in San Francisco
- Used support vector machines, linear regression and neural networks to **create model that predicts COVID vaccination rate** by zip code to over 90% accuracy, and analyze which factors impact vaccination rates most

Bergen County Academies Arduino/C Programming Boot Camp *June 2021 - July 2021*

- Attended for 12 hours weekly to design and assemble robots with various functions, including a robot able to maneuver its way out of a large, gated enclosure, a motion-detecting robot, and an object-avoiding robot

Columbia University Summer High School Academic Program for Engineering *June 2019 - July 2019*

- Attended for 35 hours weekly
- **Designed solar array** fit to power a student center on Columbia's campus
- Built a solar oven and a battery-operated light meter/temperature probe
- **Conducted experiments** on photovoltaic cells, transformers, heat transfer and more; assembled and tested various circuits, including a guitar distortion circuit

Girls Who Code Summer Immersion Program *July 2020*

- Attended for 30 hours weekly to use web development languages to make several websites, including a personal portfolio

Books

The Scream Formula: Into the Hidden World of Roller Coasters *November 2020 - June 2022*

- Published on June 2, 2022; ISBN: 979-8-218-01441-4 (print)
- Nonfiction book educating general audience on science, technology and math behind roller coaster design
- Organized and conducted interviews of roller coaster designers and researchers
- Created cover from scratch and formatted book

Design Thinking *June 2021 - April 2022*

- Expected publishing in late 2022
- Engineering workbook co-authored through selective Princeton University IgniteSTEM Ambassador Program
- Developed collaborative design exercises educating elementary and middle school students on complex topics such as fusion energy, advanced personalized learning and mixed reality
- Helped organize IgniteSTEM 2022 Design Thinking Challenge with fellow co-authors; led an in-person demonstration of design exercises

Awards, Honors, and Honorary Mentions

Honorable Mention, 2021 Physics Unlimited Premier Competition *November 2021*
Winner, 2021 New Jersey Transportation Planning Authority "On Air" Contest *March 2021*
Honorable Mention, 2021 Princeton University IgniteSTEM Conference *January 2021*
Top 20% Division, 2020 Online Physics Brawl *November 2020*
Highest Score on Team, 2019-20 BCA New Jersey Science League Physics 1 Team *2019 - 2020*

Extracurriculars

Physics Team *October 2019 - June 2022*
Senior Captain

- Manage duties of 3 junior co-captains, run team Discord server of 40 members, plan meetings and events, recruit members, write lesson plans and mentor team members
- Founded BCA's first-ever Online Physics Brawl contest team, and led it to place in top 20% of division in 2021 contest
- Brought in guest lecturers from 2021 United States Astronomy Team to lead F=mA prep series

Math Team *September 2016 - June 2022*
Member

- Attend meetings and competitions and volunteer with the team to proctor and grade at school-hosted competitions

Harvard Physics Circle *October 2020 - June 2022*
Member

- Participate in competition-level physics lectures run by Harvard professors and graduates

BCA Flash Steering Committee *November 2021 - March 2022*
Director of Technology

- Run website and manage registration and virtual classroom technology for annual school outreach event

BCA First Tech Challenge (FTC) Robotics Team *September 2019 - March 2020*
Member of Outreach Committee

- Researched and reached out to potential sponsors and connected team with other FTC teams

Skills

Languages: fluent in Russian, proficient in Spanish, beginner in Japanese and Hebrew
Programming languages: Python, C++, C#, Java, C, LaTeX, HTML, CSS, JavaScript, Fortran, SQL, Matlab, Solidity and G-code
CAD and circuit design programs: Autodesk Inventor, Fusion 360, TinkerCAD, Autodesk Revit, SketchUp, KiCAD, EasyEDA, and Force Vector Design
Other STEM skills: mathematical modeling, machine learning, Arduino, soldering, Unity, Ubuntu, ROS, using laser cutters, 3D printers, milling machines or drills, conducting and documenting research
Non-STEM skills: public speaking, public relations and social media management, audio/video editing