

# Vivaan Singhvi

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## EDUCATION

**University of Michigan**

August 2024 – May 2028

*Ann Arbor*

**Farragut High School**

August 2020 – May 2024

*Knoxville, Tennessee*

*GPA: 4.74/4.0*

## EXAMINATIONS

**ACT** | 36: 36 Science, 36 Math, 36 Reading, 36 English

**SAT** | 1580: 800 Math, 780 Reading

**AP Physics C: Mechanics** | 5

**AP Macroeconomics** | 5

**AP German** | 4

**AP Computer Science A** | 5

**AP Chemistry** | 5

**AP Physics 1** | 5

**AP Calculus BC** | 5

**AP Calculus BC: AB Subscore** | 5

**AP Statistics** | 5

**AP English Language** | 4

**AP US History** | 4

**AP Research** | 4

**AP Seminar** | 4

**AP Biology** | 5

**AP US Government** | 5

**AP World History** | 4

**AP Human Geography** | 5

**AP Comparative Government** | 5

## EXPERIENCE

**Oak Ridge National Laboratory Internship** | Adversarial Image Detection

June 2024 – July 2024

- Familiarized myself with the Python framework PyTorch for AI research.
- Learned various topics in the field of adversarial AI, such as types of attacks, types of defenses, and the nature of neural networks themselves.
- Developed a system to detect adversarial images using nothing but input examples at high accuracy.

**Oak Ridge National Laboratory Internship** | Database Administration

June 2023 – July 2023

- Worked 40 hours a week developing experience in database administration and operation using Python and PostgreSQL.
- Developed crucial workplace skills for the first time.
- Attended dozens of talks and workshops to expose myself to all kinds of professions.

**National Youth Leadership Forum** | Medicine and Healthcare Camp

June 2021

- Spent 9 days at an intensive medical camp, in which I participated in activities all day long, such as learning how to suture, how to draw blood, and how to use a tourniquet.
- Watched many presentations on innovations in healthcare (like a surgical robot), careers in healthcare, and various other topics pertaining to medicine.

## COMMUNITY SERVICE — ABOUT 140 HOURS

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**Second Harvest Food Bank** | Product Recovery Volunteer 2021 – Present  
Worked about 80 hours packaging foods that would be delivered to pantries all over East Tennessee. Examples include bagging cereal and coffee, preparing boxes of assorted foods, and more.

**National Honors Society** | Member, Volunteer 2021 – 2023  
Worked for about 40 hours total in on-campus projects like school beautification and trash cleanup, and in out-of-campus projects like Halloween parades and Christmas festivals.

## EXTRACURRICULARS

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**Programming Personal Projects** 2022 – Present  
Spent about 2 hours a day, every day, making more than 50 projects, ranging from web & game development to machine learning to database operations.

**Knoxville Youth Symphony Orchestra** | Percussionist 2021 – 2023  
Played as a percussionist in 6 concerts, attending weekly 2-hour rehearsals.

**Drumming Student** 2015 – 2024  
Spent nine years performing at concerts, developing skills in jazz, orchestral, funk, pop, and rock drumming at various institutions.

## CLUBS

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**Anatomy Club** | Vice President 2023 – 2024  
Assisted with the preparation of activities for the club and with presentations at club meetings.

**Mu Alpha Theta** | Member, Volunteer, Competitor 2021 – 2024  
Competed in several math competitions such as Rocket City Math League, TMTA, and MAO, volunteered for Mini Mu, a math competition at my school for 6<sup>th</sup> and 7<sup>th</sup> graders, and tutored about 15 hours.

**Science Club** | Member, Competitor 2020 – 2024  
Attended weekly meetings featuring presentations about science and competed in events such as Science Olympiad.

**Computer Science Club** | Social Media Manager, Volunteer 2022 – 2024  
Participated in various activities like solving CodeForces problems, listening to talks about computer science, and more.

**Health Occupations Students of America** | Member, Volunteer, Competitor 2021 – 2023  
Competed in fast-paced tests, twice state-level and once internationally. Attended various immersive workshops and volunteered for the club..

## ACADEMIC AWARDS / HONORS

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**NMSQT Finalist** 12<sup>th</sup> grade  
Awarded for meeting a score benchmark on the PSAT

**AP Capstone Diploma** 11<sup>th</sup> grade  
Awarded for taking AP Research and AP Seminar

**AP Scholar with Distinction** 10<sup>th</sup> & 11<sup>th</sup> grade  
Awarded for an average score of 3.5+ on 5 or more exams.

**AP Scholar** 9<sup>th</sup> grade  
Awarded for getting a 3 or higher on 3 or more exams.

## EXTRACURRICULAR AWARDS / HONORS

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<b>SMC Data Challenge</b>   Best Paper Award	12 <sup>th</sup> grade
Won the award for best solution paper at the Smoky Mountains Computational Sciences and Engineering Conference Data Challenge. The paper is also published.	
<b>HOSA International Leadership Conference: General Chemistry</b>   1 <sup>st</sup> place	12 <sup>th</sup> grade
Won first place in the National Geographic Learning Academic Testing Center General Chemistry test, competing against students from all over the world.	
<b>HOSA State Leadership Conference: Medical Math</b>   2 <sup>nd</sup> place	11 <sup>th</sup> grade
Won second place in the Medical Math event, competing against students from all over Tennessee.	
<b>TMTA: Statistics Test</b>   1 <sup>st</sup> place	11 <sup>th</sup> grade
Achieved a perfect score on the Tennessee Math Teachers Association Statistics exam.	
<b>TN Regional Science Olympiad: Flight</b>   1 <sup>st</sup> place	11 <sup>th</sup> grade
Won first place in the Flight event for the East Tennessee Regional Science Olympiad.	
<b>TN Regional Science Olympiad: Chemistry Lab</b>   2 <sup>nd</sup> place	11 <sup>th</sup> grade
Won second place in the Chemistry Lab event for the East Tennessee Regional Science Olympiad.	
<b>TN Regional Science Olympiad: Detector Build</b>   3 <sup>rd</sup> place	11 <sup>th</sup> grade
Won third place in the Detector Build event for the East Tennessee Regional Science Olympiad.	
<b>HOSA Upper East Tennessee Regionals: Medical Math</b>   1 <sup>st</sup> place	11 <sup>th</sup> grade
Won first place in the Medical Math event in my region.	
<b>HOSA State Leadership Conference: Dental Science</b>   5 <sup>th</sup> place	10 <sup>th</sup> grade
Won fifth place in the Dental Science event, competing against students from all over Tennessee.	
<b>Trinity College of Music Certification</b>	10 <sup>th</sup> grade
Passed the Grade 7 exam for Drumset, equivalent to 8 US Undergraduate college credits.	
<b>HOSA Upper East Tennessee Regionals: Dental Science</b>   1 <sup>st</sup> place	10 <sup>th</sup> grade
Won first place in the Dental Science event in my region.	
<b>USA Biology Olympiad</b>   Certificate of Merit	10 <sup>th</sup> grade
Awarded after taking the 50-question test online.	

## PROGRAMMING SKILLS

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**Languages:** Python, C, JavaScript/TypeScript, HTML/CSS, SQL, Java, Shell, C++  
**Libraries:** OpenCV, Scikit-Learn, React, NumPy, Pandas, Tensorflow, PyTorch  
**Tools:** Git/GitHub, MacOS, Unix Shell, WSL, Neovim, VS Code, Vim, PostgreSQL

## MAJOR PROGRAMMING PROJECTS / ACTIVITIES

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<b>SMC Data Challenge</b>   Python, OpenCV, Scikit-Learn, Shell	July 2023 – August 2023
<ul style="list-style-type: none"><li>• Worked for dozens of hours on an extensive solution for problem 1 of the Smoky Mountains Computing Sciences Data Challenge 2023: Machine Learning Approaches to High-Throughput Phenotyping.</li><li>• Developed expertise in computer vision processes using the OpenCV library and in simple machine learning programs with Scikit-Learn, and strengthened expertise in Python.</li><li>• Used machine learning, optical character recognition, and image segmentation models to complete tasks such as label reading, leaf morphology classification, and data analyses.</li><li>• Wrote a published, award-winning paper and a research poster presented at the conference.</li><li>• Gave a well-received 5-minute lightning talk about the research.</li></ul>	

- Created my personal website, leaning on an interactive user interface to allow the important information about me to be presented in the best way.
- Learned how to use React, a powerful and convenient JavaScript/TypeScript framework, which I plan on using in future web development projects.
- Improved upon feedback from friends and family to even further improve the user experience.
- **Dozens of other projects that are not reflected here are shown on the website.**

**MandelPlot** | JavaScript, HTML/CSS

April 2023

- Created a beautiful visualizer for the Mandelbrot Set, a fascinating set of points generated from repeating a simple function, supporting fast zooms by about a dozen orders of magnitude.
- Developed skills using asynchronous and synchronous operations to optimize performance.
- Got significant familiarity with JavaScript and how to code websites, such as manipulating event listeners and optimizing the user experience.

**CodeForces Problems** | Python, Java, C/C++

January 2023 – Present

- Solved hundreds of problems on the online competitive programming website CodeForces.
- Achieved a personal highest problem rating of 2200, from an 800-3500 scale.

**Soccer Database** | Python, PostgreSQL

February 2023 – April 2023

- Developed the structure for a simple database storing information about most aspects of soccer (leagues, teams, players, awards, matches, etc.)
- Learned how to effectively use PostgreSQL to manipulate a database to add, modify, and interpret data.
- Learned how to use Python in conjunction with a PostgreSQL database in order to use both simultaneously.

**DreamBerd Interpreter** | Python

2024

- Developed an interpreter for the previously-fictional programming language <https://github.com/todepond/dreamberd>.
- Learned how programming languages work under the hood using lexers, parsers, and code executors.
- Implemented features unique to the language such as reversing code, storing keywords as variables, runtime parsing, insignificant parentheses, and more.

PUBLICATIONS

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Singhvi, V., Lunga, L., Nidhi, P., Keum, C., & Prakash, V. (2023). High-Throughput Phenotyping using Computer Vision and Machine Learning. *Smoky Mountains Computational Sciences and Engineering Conference*. <https://doi.org/10.17605/osf.io/r6djq>