

# Ishwar Suriyaprakash

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## Education and Relevant STEM Coursework

<b>University of California, Berkeley</b> , Applied Math major with CS focus Fall '24: Linear Algebra & Differential Equations (MATH 54), Structure and Interpretation of Computer Programs (CS 61A), Introduction to Quant Finance (IEOR 198 DeCal) Spring '25: Abstract Linear Algebra (MATH 110), Data Structures (CS 61B), Principles & Techniques of Data Science (DATA C100)	2024-2028
<b>Homestead High School (HHS)</b> (CEEB: 053462), Cupertino, CA (GPA: 4.0 / 4.0) <i>Valedictorian</i> in graduating class of 589 students; SAT 1570 (Math: 800, Reading/Writing: 770) AP Calculus BC, AP Computer Science, AP Physics C: Mechanics, Computer Programming Java, AP Statistics, Precalculus Honors, AP Chemistry, Chemistry Honors, Biology	2020-2024
<b>Skyline College</b> , San Mateo, CA (concurrent with high school) (GPA: 4.0 / 4.0) Introduction to Data Science, Ordinary Differential Equations	2023-2024
<b>Laney College</b> , Oakland, CA (concurrent with high school) (GPA: 4.0 / 4.0) Discrete Math, Linear Algebra, Multivariable Calculus	2022-2024

## Computer Skills

**Languages:** Python (36K lines of code), C++ (38K lines of code), Java, Linux Shell, Tcl, Pascal  
**Data structures:** Array, linked list, stack, queue, map, trees, set, segment tree  
**Algorithms/Paradigms:** Sorting, recursion, graph search (breadth-first, depth-first), union-find, topological sort, range queries, object-oriented programming  
**Machine Learning (ML) Libraries:** Pytorch, Keras/TensorFlow, Scikit-Learn; **ML Algorithms:** regression, classification, unsupervised learning; **Neural Network Architectures:** Deep Neural Networks, Convolutional Neural Networks, Autoencoders, Generative Adversarial Networks  
**VLSI Design:** OpenROAD digital design flow, NG-SPICE, Static Timing Analysis, Artificial Netlist Generator

## Mentored Research

Research intern, Arizona State University Advisor: Prof. Vidya Chhabria 2022-present  
*Developed a machine learning method to perform voltage-and-timing-aware reduction of power delivery network (PDN) congestion to reduce turnaround time in the design of digital integrated circuits*

- Developed **voltage-aware static timing analyzer in Python** & showed that PDN resistances increase circuit delay by 10.4%.
- Wrote an iterative algorithm to reduce PDN congestion while meeting delay constraints, considering voltage drop.
- Automatically generated several Verilog netlist benchmark circuits for ML.
- Investigated accelerating reduction of PDN congestion using **convolutional neural network method**.

## Publications

I. Suriyaprakash and G. Burroughs, "[DeepSPICE: Accelerating Digital Cell Characterization Using Deep Learning](#)", *Journal of Student Research*, Vol. 11 No. 3 (2022) (published [here](#)).

## Independent Projects

- Accelerating library cell characterization for digital logic design using simulation-assisted machine learning
- Music analysis using deep learning with autoencoders and generative adversarial networks
- Developed a k-means clustering algorithm in Python to group people with similar interests
- Developed a Python simulator to render elastic collisions of objects and gravitational orbits of multiple planetary bodies
- Quantified finger fatigue by frequency domain analysis of time series electromyography signals from finger muscles
- Identified household light sources that most affect sleep by analyzing their spectral intensities
- Investigated decomposition of periodic waves to sinusoidal waves of different frequencies using Python

## Enrichment Courses and Programs

Canada/USA Mathcamp, Champlain College	Summer 2023
Ross Mathematics Program, Ohio Dominican University (Expository paper: <a href="#">Celebration</a> )	Summer 2022
Olympiad Physics Level 3, AwesomeMath Academy	Winter 2023
Worldwide Online Olympiad Training (WOOT), Art of Problem Solving (AoPS)	8/2021-2/2022
Combinatorial Game Theory, Euler Circle (Expository paper: <a href="#">Classical Impartial Games</a> )	Summer 2021
Combinatorics, Euler Circle (Expository paper: <a href="#">Catalan Objects</a> )	Summer 2021
Topics including Algebraic Topology & Graph Theory, Stanford Math Circle	Spring 2021

## Extracurricular Achievements

### Mathematics

4X American Invitational Mathematics Examination (AIME) Qualifier	2020-2024
Distinction in American Mathematics Competition 12 (AMC 12)	2022
2X Honor Roll in American Mathematics Competition 10 (AMC 10)	2020-2021

### Physics

USA Physics Olympiad Semifinalist, Honorable Mention	2024
USA Physics Olympiad Semifinalist, Bronze Medal	2023
USA Physics Olympiad Qualifier	2022

### Computer Science

USA Computing Olympiad Silver Division Qualifier (usaco.org)	2019
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## Awards

AP Scholar with Distinction  
National Merit Scholarship Winner

## Leadership & Mentoring

**HHS Math Club:** President ('23-'24), Vice President ('22-'23), Activities Director ('21-'22)

*Led enrollment drive and increased club participation by 2.5X; Introduced out-of-curriculum ideas such as combinatorics and game theory: delivered lectures on Retrograde Analysis, Catalan Objects, and Generating Functions. Arranged guest talks on geometric constructability and algebraic geometry. Coached and facilitated participation in AMC & AIME.*

**HHS Computer Science Club:** Vice President ('23-'24), Workshops Director ('22-'23), Competitions Director ('21-'22)

*Introduced out-of-curriculum computer science ideas: led tutorial and group project on Cryptography, delivered workshops on K-Means Clustering, Autoencoders, Topological Sort algorithm. Led Python workshop at hackathon for middle schoolers. Arranged guest talk on fairness in machine learning. Shared weekly algorithmic programming challenges.*

## Community Service

Tutor at [schoolhouse.world](https://www.schoolhouse.world), an international platform for peer-to-peer tutoring Nov 2021-present  
*Certified in Geometry, Algebra 2, Precalculus. Taught 50 students from 9 countries by hosting 26 hourly sessions.*

AVID Tutor for Seniors 2023-2024  
*Mentor first generation students in preparing for college.*

Student Tutor for Precalculus class at Homestead High School 2022-2023  
*Helping students with in-class activities. Working with groups of students to improve understanding of concepts.*

Teaching Assistant for Precalculus class at Homestead High School 2021-2022  
*Helped students in table groups with classwork. Assisted the teacher with grading assignments.*