

Ishwar Suriyaprakash

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Education and Relevant STEM Coursework

University of California, Berkeley , Applied Math major with Data Science 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 (expected): Abstract Linear Algebra (MATH 110), Data Structures (CS 61B), Probability for Data Science (DATA C140)	2024-2028
Homestead High School (HHS) (CEEB: 053462), Cupertino, CA (GPA: 4.0 / 4.0) Valedictorian 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
Skyline College , San Mateo, CA (concurrent with high school) (GPA: 4.0 / 4.0) Introduction to Data Science (DATA C8), Ordinary Differential Equations	2023-2024
Laney College , 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 and Class Projects (implemented predominantly in Python)

- [Accelerated library cell characterization](#) for digital logic design using simulation-assisted machine learning
- Performed music analysis using deep learning with autoencoders and generative adversarial networks
- Developed an interpreter for the Scheme programming language (CS 61A class project)
- Developed a k-means clustering algorithm to group people with similar interests
- Developed a k-nearest-neighbors classifier to predict movie genre based on word content (DATA C8 class project)
- Developed a two-player dice game simulator implementing multiple intelligent strategies (CS 61A class project)
- Developed a multiplayer typing game with integrated autocorrect (CS 61A class project)
- Developed a tower-defense game using Object Oriented Programming (CS 61A class project)
- Developed a 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
- Determined the [factors affecting the propagation of sound](#) through a tube to study interference

Enrichment Courses and Programs

Canada/USA Mathcamp, Champlain College	Summer 2023
Ross Mathematics Program, Ohio Dominican University (Expository paper: Celebration)	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: Classical Impartial Games)	Summer 2021
Combinatorics, Euler Circle (Expository paper: Catalan Objects)	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](#), 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.