Ishwar Suriyaprakash

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Education and Relevant STEM Coursework

University of California, Berkeley 2024-2028
Planned Fall 2024 courses: Linear Algebra & Differential Equations, Structure and Interpretation of Computer Programs

Homestead High School (HHS) (CEEB: 053462), Cupertino, CA (GPA: 4.0 / 4.0) 2020-2024
AP Calculus BC, AP Statistics, AP Computer Science, AP Physics C: Mechanics, AP Chemistry, Precalculus Honors, Computer Programming Java, Chemistry Honors, Biology

Skyline College, San Mateo, CA (concurrent with high school) (GPA: 4.0 / 4.0) 2023-2024
Introduction to Data Science (ongoing), Ordinary Differential Equations

Laney College, Oakland, CA (concurrent with high school) (GPA: 4.0 / 4.0) 2022-2024
Discrete Math, Linear Algebra, Multivariable Calculus

Mentored Research

Research intern, Arizona State University Advisor: Prof. Vidya Chhabria 2022-present
Voltage-and-timing-aware reduction of power delivery network congestion through a convolutional neural network approach to reduce turnaround time in the design of digital integrated circuits.

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 visualize elastic collisions of objects and gravitational orbits of multiple planetary bodies
Quantified relative fatigue with writing, typing, and texting by analyzing 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

Computer Skills

Languages: C++ (38K lines of code), Python (36.1K 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

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

Extracurricular Achievements (cont'd)

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

Awards

AP Scholar with Distinction
National Merit Scholarship Finalist

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.

Volunteering

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.

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.