AMRUTHA KALLE

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EDUCATION

- University of California, Berkeley
  - Bachelor of Science in Electrical Engineering and Computer Science, Minor in Astrophysics
  - Graduation: December 2023 (Final GPA: 3.767)
- University of California, Santa Barbara
  - Master of Science in Computer Science
  - Expected Graduation: June 2026

PROJECTS AND COURSEWORK (COMPUTER SCIENCE)

- Encrypted File Sharing System (CS161: Computer Security)
  - Applied cryptographic functions to build the client application of a end-to-end file sharing system
  - Added functionality for users to store, append to, and retrieve files from an insecure server, while making sure that adversaries cannot view the contents of or tamper with the files without detection
  - Implemented functions for users to share files with other users and to revoke access from users
- Pintos (CS162: Operating Systems and Systems Programming)
  - Worked with the Pintos OS to implement various aspects of modern operating systems
  - User programs: added functionality for process control syscalls and file operation syscalls
  - Threads: added support for multithreaded user programs, implemented strict priority scheduler for kernel threads
  - File Systems: implemented buffer cache, added support for extending files, implemented ability to manipulate directories
- Lower-Division Projects
  - Built CPU with 2-stage pipeline in Logisim (program that simulates digital logic circuits) that runs RISC-V assembly code
  - Coded matrix operations such as multiplication with SIMD instructions and Open MP directives to implement data-level and thread-level parallelism
  - Built version-control system that mimicked basic features in Git, including add, commit, checkout, etc.
- H_2O Hackathon
  - Competed against other schools in a coding competition with a team of four as part of the Space and Engineering Academy
  - Won 2nd place in 2017, 1st place in 2018, 1st place in 2019
  - 2019 competition
    - Problem: how to avoid dam failures like the Oroville Dam failure in 2017
    - Team devised a program that analyzes real-time data of dam infrastructure and automatically sends out alerts when a calculated collapse threshold is reached
    - I had the most experience, so I took the lead and delegated tasks to teammates based on their strengths
    - An essential aspect of our success was our ability to communicate our ideas to the judges of the competition, a mixed panel of water experts and programmers, and build off of their advice

PROJECTS AND COURSEWORK (ASTROPHYSICS)

- Astro 160: Stellar Physics (Fall 2023)
  - Covered physics and evolutions of stars
  - Plotted evolutionary tracks and isochrones of stellar populations using Matplotlib, Numpy, and Astropy with simulation data from MIST
- EPS 109: Computer Simulations with Jupyter Notebooks (Fall 2022)
  - Introduction to computer simulations used in Earth and planetary science, coded with Python
  - Coded random walks and diffusion limited aggregation, Monte Carlo simulations, partial differential equations (heat transfer), landscape evolution (erosion), ordinary differential equations (Keplerian orbits, spacecraft trajectories)
  - Final project: modeling the orbits of the bodies in the Kepler-47 binary system (2 stars and 3 planets) using Kepler's and Newton's Laws and solving the ordinary differential equations using the Runge-Kutta method
    - Also modeled how the habitable zone (as defined as the range of radii where liquid water can exist) moves as the stars orbit their center of mass
- ULAB Physics and Astrophysics Decal (Fall 2021-Spring 2022)
  - Completed a year-long research project about habitability in the Kepler-47 system under the guidance of an undergraduate mentor
    - Generated light curve for Kepler 47c using data from MAST
  - Attended weekly workshops on Python and how to use Matplotlib and Numpy to manipulate and plot data

ADDITIONAL CLASSES AND EXPERIENCE

- Databases
- Algorithms and Intractable Problems
- Artificial Intelligence
- Introduction to Astrophysics
- Relativistic Astrophysics and Cosmology
- Atmospheric Physics
- Reader for 3 lower-division astronomy classes (Astro7A: Intro to Astrophysics, Astro7B: Intro to Astrophysics, AstroC10: Intro to General Astronomy)
  - Graded students' assignments and exams
- Academic Intern for lower-division CS class (CS61C: Machine Structures)
  - Assisted teaching assistants with answering students' question in office hours and on online forum

SKILLS

- Proficient in C, Java and Python (including Numpy and Matplotlib)
- Experience managing significant projects with Git
- Skilled in Microsoft Excel, Word, PowerPoint
- Passionate about productivity and impact