Rahel Joshi

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Education

Caltech (4.15 GPA) Anticipated Graduation of June 2026

Bachelor of Science in Computer Science *Pasadena, CA*

Taken Courses: Linear Algebra, Intermediate Computer Programming, Data Structures, Software Design, Theory of Computation, Tensorflow, Computer Systems & Architecture, Learning Systems & Machine Learning

2024-2025 Planned Courses: Functional Programming, Algorithms, Relational Databases, Large Language & Vision Models, Machine Learning & Data Mining, Discrete Math, Applied Linear Algebra

Achievements: 1580 SAT (800 Math), National Merit Scholar, USACO Silver

Experience

Undergrad Research Fellow | ***Python, Pytorch, Tensorflow, Astropy, Xspec*** June 2024 – August 2024

Caltech *Pasadena, CA*

- Developed a machine learning approach to emulate x-ray spectroscopy of black holes and neutron stars from a set of physical input parameters as an alternative to x-ray reflection simulations
- Exploring the possibility of using machine learning to recover physical information from the x-ray spectra of black holes and neutron stars
- Emulating x-ray spectra more accurately than current techniques of linear interpolation of precomputed x-ray spectra tables while utilizing significantly less storage space
- Working under NASA/JPL NuSTAR PI Fiona Harrison and Postdoc Joanna Piotrowska

Anson L. Clark Scholar | ***Python, Jupyter Notebook, Scipy, Numpy, Pandas*** June 2022 – August 2022

Texas Tech University *Lubbock, TX*

- Selected as 1 of 12 Clark Scholars from 700+ applicants
- Developed an ECG Sonification System to convert ECG signals into auditory data, enhancing the detection and diagnosis of heart irregularities.
- Conducted in-depth research on ECG Sonification and ECG data analysis under Dr. Bashir Morshed
- Collected ECGs with electrodes, AD8232 heart rate monitor, & Arduino, and applied signal processing methods

Research Assistant | ***C++, Linux*** 2021 Summer

University of Texas at San Antonio *San Antonio, TX*

- Researched various Swarm Foraging algorithms under UTSA Professor Qi Lu
- Presented demos of different foraging algorithms in ARGoS and ARGoS-Khepera IV physics simulators
- Wrote comprehensive guides for installing the physics simulators

Crew Member 2021 Summer

Burger King *San Antonio, TX*

- Part-time, 20 hours/week
- Worked as drive-thru cashier, dishwasher, front register cashier, food prepper, cleaner

Projects

Physics Engine | *C, Gitlab, Emscripten, SDL2*

- Created a custom physics engine from scratch, for simulations and game development
- Implemented forces (gravity, springs, etc), collision handling, efficient memory handling, and input management
- Created simulation and game demos like N-Body Simulation, Frogger, Pacman, Space Invaders, and more

Chess Bot | *Python*

- Implemented a chess bot using the Minimax algorithm
- Utilized alpha-beta pruning and Zobrist Hashing for optimization

Hand Gesture Classifier | *Python, OpenCV, Tensorflow*

- Developed a CNN to classify different hand gestures in real-time

Technical Skills

Languages: Java, Python, C, C++, HTML, CSS, JavaScript
Developer Tools: Git, GitHub, VS Code, Visual Studio, PyCharm, IntelliJ, Eclipse, Jupyter Notebook
Libraries: Pandas, NumPy, Matplotlib, TensorFlow, PyTorch, OpenCV, Scikit, BeautifulSoup, Selenium, Next.js, React