Rahel Joshi

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Education

Caltech (4.15 GPA) Pasadena, CA

Bachelor of Science in Computer Science

Relevant Coursework: Linear Algebra (Math 1b), Intermediate Computer Programming (CS 1x), Data Structures (CS 2), Software Design (CS 3), Theory of Computation (CS 21), Tensorflow (CS 12)

Johnson High School San Antonio, TX

Valedictorian, Ranked 1 out of 770

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