Dhruv Ahlawat

dhruvahlawat573@gmail.com | 8454961441| LinkedIn | github/DhruvAhlawat

Website

EDUCATION

Sophomore-Btech. in Computer Science and Engineering Delhi, India | current

Indian Institute of Technology

Among top 7% in institute

NOTABLE ACHIEVEMENTS

INTERNATIONAL OLYMPIAD ON ASTRONOMY AND ASTROPHYSICS - Won **Silver Medal** and represented India as a student-team member at IOAA 2021 hosted by Colombia.

JEE ADVANCE - Achieved an All India **Rank 82** out of nearly **200,000 candidates** in October, 2021.

JEE MAINS - Achieved an All India **Rank 120** out of nearly **1,200,000 candidates** in April, 2021.

IOQA - Achieved an All India **Rank 6** and got qualified to be in the Indian team at IOAA-2021

KVPY SA and SX - All India **Rank 147** at KVPY SA 2019, and **Rank 149** at KVPY SX 2020.

GAME-JAM Tryst - **Won First place** in the game-jam of 3 days hosted in IIT Delhi during Tryst 2021. Link to Web and Windows game files

DECOHERENCE - PRAVEGA IISc - were Among top 5 teams from India in Decoherence Physics competition, and went on to give the finals at **IISc. Bangalore** and won third place.

PHYSICS BRAWL - 2021 - Scored **Third Place worldwide** in the Online Physics Brawl 2021 in the open category.

COMPETITIVE PROGRAMMING- Expert on Codeforces and **5-star** on Codechef

PROJECTS

ANDROID AND WINDOWS GAMES C#, Unity, Blender, Game design

Developed Several playable games on my own using **C#, Unity and Blender** and uploaded their descriptions and download links on my website.

ECHO-WARS C#, Unity, Blender,Object-Oriented-Programming

Successfully created a game in under 3 days for a Game-Jam competition with the theme 'Science V/s Magic' and **Won First Prize**. Competition was held under **TRYST** technological festival of Indian institute of technology, Delhi.

QUANTUM-MECHANICAL WAVEFUNCTION SIMULATION Python, matoplotlib | Ongoing

Built a system for animating the **time evolution of any initial quantum wavefunction** inside a one-dimensional box. A detailed description along with animation gifs are provided in the enclosed github link.

MACHINE LEARNING LIBRARY Python, numpy, pandas, matplotlib | Ongoing

Built a Machine learning library for implementing linear and logistic regression to solve classification ML problems. a working implementation on Kaggle's competitions also added, and currently working on creating neural networks.

KMEANS IMAGE COMPRESSION Python, numpy, matplotlib

Implemented the K-means clustering algorithm to compress/stylize images in various resolutions. The resultant image is made up of only K colors, and hence this is a way of compression.

REMOTE CONTROLLED TWO-WHEEL DRIVE SYSTEM C++, Arduino

Designed and developed a 2-wheel-driven radio controlled vehicle with an omnidirectional ball caster wheel for support and 2 driven wheel using Arduino and 2.4Ghz radio controllers.

COURSE PROJECTS

FIND-NEARBY PYTHON, 2D- RANGE TREES

Implemented 2-Dimensional Range Querying to find number of Data-points within a certain distance of any position in just $O(log^2(n))$ And Advanced Query of returning all such points in $O(log^2(n) + m)$ where m is the number of points returned, and n the total number of points in Data set.

POINTS-COLLIDER PYTHON, PRIORITY QUEUE, MODIFIABLE-HEAP

Developed a Modifiable-Heap to solve One-Dimensional Collision of n points in just $O(n + mlog(n))$ where m is the total number of collisions. The standard Naive algorithm runs much slower at $O(mn)$. Heap provides option for modifying priority of a stored element, unlike a standard priority-queue.

ADVANCED PATTERN MATCHING PYTHON, ALGORITHMS

Achieved Pattern-Matching between 2 strings with 'Wildcard' characters (characters that needn't match) through a similar approach to Rabin-Karp Pattern-Matching. Also Implemented a function to gauge the upper bound on false-positives.

BOOLEAN FUNCTION SIMPLIFIER PYTHON

Created a program that can reduce Boolean functions of upto 20 variables to a simpler form using python dictionaries. Resulting function may not be completely optimal but program runs in faster than exponential time.

MATRIX-MULTIPLIER FSM VHDL, PYTHON | NOV, 2022

successfully created a Finite State Machine capable of doing 128x128 matrix multiplications and storing them in RAM memory and several other components in VHDL that are handled by the FSM to achieve this. Also implemented it to take input of address and display the number stored at that address of the matrix on a 4x7segment-Display

RELEVANT COURSES TAKEN

Completed, along with grades out of 10

- Datastructures and Algorithms - 9 (A-)
- Digital Logic and System Design - 10 (A)
- Probability and stochastic processes - 10 (A)
- Discrete math for computer science - 9 (A-)
- Differential Equations and Linear Algebra - 10 (A)
- Introduction to Programming - 10 (A)
- Introduction to Electrical Engineering - 9 (A-)
- Quantum Mechanics and Electromagnetism - 9 (A-)
- Machine Learning Specialisation(by Andrew Ng on Coursera)

Ongoing (spring)

- Signals and Systems
- Computer Architecture
- Programming Languages
- Microeconomics
- Computing Laboratory

SKILLS

Programming Languages: proficient in C++, Python, C, MATLAB, BASH (shell) , VHDL and intermediate in SML, Prolog, C#, HTML, CSS
Softwares and Technologies: Jupyter notebook, MATLAB, Matplotlib ,Scikit-learn, tensorflow, Unity, numpy, pandas, Blender, Autodesk Inve
Languages: English, Hindi and basic French (Learnt french for 4 years in school)

POSITIONS HELD

Aeromodelling Club - An Executive of the Aeromodelling Club of IITD, which builds RC planes and drones and participates in competitions.
Physics and Astronomy Club -As An active member of this club, we host themed events and stargazing sessions, and I also write blogs as short lectures.
Creative team - Rendezvous-2021 Was a part of the creative team for the college fest Rendezvous 2021, designed multiple smoke simulations in blender for effects used in the theme release video.