

ARASH DEV AHLAWAT

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EDUCATION

- **Indian Institute of Technology Bombay, Mumbai** Jul 2023 – Present
Bachelor of Technology Majoring in **Engineering Physics** CPI: 8.13 / 10
Minor in **Artificial Intelligence and Data Science** CPI: 10.00 / 10
- **Delhi Public School, Karnal (CBSE)** Apr 2021 – Mar 2023
Class XII (Intermediate) 93.80%
- **St. Theresa's Convent School, Karnal (CBSE)** Apr 2019 – Mar 2021
Class X (Matriculation) 96.80%

SCHOLASTIC ACHIEVEMENTS

- Secured **99.90** percentile in the Joint Entrance Examination (JEE) - Main among **1.1 million+** candidates [2023]
- Attained AIR **1655** in the Joint Entrance Examination (JEE) - Advanced among **0.18 million+** candidates [2023]
- Attained an AIR of **426** in the **Kishor Vaigyanik Protsahan Yojana (KVPY)** Scholarship, out of **50k+** students [2022]
- Secured an AIR of **111** in the esteemed **IISER Aptitude Test (IAT)**, among over **34k+** candidates nationwide [2023]
- Received a **Certificate of Merit** in the prestigious Indian Olympian Qualifier in Mathematics (**IOQM**) [2022-23]
- Awarded Certificate of Merit as state topper **top 1%** in the National Standard Examination in Physics (**NSEP**) [2022]

KEY PROJECTS

Binary Black Holes from Scratch

[May 2023 - Jul 2023]

Krittika Summer Project | Krittika - The Astronomy Club, IIT Bombay

- Analyzed binary system interactions such as **Roche lobe overflow**, stellar mergers and **common envelope evolution**
- Simulated **100,000+** stellar structures and **Compact Binary Objects**(binary black holes/neutron stars) using Compact Object Mergers: Population Astrophysics and Statistics (**COMPAS**) a rapid stellar/binary population synthesis code
- Parallelized simulations via splitting runs through batch processing, reducing large-scale runtime by **90%**
- Illustrated stellar evolution and compact object formation using scatter plots, **HR diagrams**, and **chirp mass** distribution
- Investigated the evolution of **gravitational wave** emissions from binary systems, rigorously comparing simulated data to real observations from **LIGO-Virgo**, and iteratively adjusting parameters to achieve accurate matches of **29%**

Song Classification using Machine Learning

[Oct 2024 - Nov 2024]

Course Project | DS203: Programming in Data Science | Instructor: **Prof. Vinay Kulkarni**

- Built a **CNN-RNN** based audio classifier using the **PyTorch** library to identify song patterns from feature vectors
- Reconstructed Mel-frequency cepstral coefficient **MFCC** files into **.wav** audio for manual classification and validation
- Analyzed **116** MFCC samples using heatmaps, **PCA**, scatter plots, and elbow curves to study feature distribution
- Constructed a custom-labeled dataset of **180** external songs, achieving a model training accuracy of over **90%**
- Trained the model with an NVIDIA P100 GPU, using the **Adam optimizer** and **Cross-Entropy** loss functions

How to Train Your Dinosaur

[Nov 2024 - Dec 2024]

Course Project | PH227: AI and Data Science | Instructor: **Prof. Alok Shukla**

- Developed a clone of the Chrome T-Rex game using **Pygame**, incorporating personalized hand-drawn sprite animations
- Collected gameplay data by logging 6 key features (e.g., **time**, **object distance**, **object height**) in **CSV** format
- Trained a **Convolutional Neural Network (CNN)** on the collected data and integrated it with a **Reinforcement Learning** system using **Genetic Algorithms**, evolving over **50** generations to achieve a peak score of **40,000+**
- Managed a collaborative **GitHub** repository for version control and seamless coordination across the development team

RAVEDM 4X4X4 [Programmable LED Cube with Dynamic Visualizations]

[Apr 2025 - Present]

Course Project | PH222: Digital Electronics and Microprocessors | Course Instructor: **Pradeep Sarin**

- Designed and built a fully-functional 4x4x4 **LED cube** using **shift registers**, **Arduino MEGA**, and a layered circuit design
- Developed visually dynamic 3D light animations in the **Arduino IDE**, including **firefly synchronization** using the **Kuramoto model** and **wave propagation** effects driven by distance-based mathematical functions
- Implemented efficient **state-machine logic** and **multiplexing** using Pulse Width Modulation(**PWM**) for smooth animation
- Achieved smooth 3D animations of up to **80 FPS** using **70 μ s** per-LED PWM and real-time multiplexing across **64** LEDs
- Integrated **microphone input** to perform real-time audio visualization, with **beat detection** and amplitude control

Personal Website Development

[May 2025 - Present]

Self Project | Front-End Development with a creative UI design

- Created a personal website using **GitHub Pages** to display my portfolio and projects with an **artsy**, street-inspired design
- Employed **HTML**, **CSS**, and **JavaScript** for developing interactive features and achieving **mobile-responsive** functionality
- Customized an **interactive UI** reflecting personal branding while balancing between **creative expression** and usability
- Integrated version control using **Git**, organized code for modularity and enhanced site efficiency using **code refactoring**

OTHER PROJECTS

Customised Linux Desktop Configuration

[May 2025 - July 2025]

Self Project | | Custom Dotfile Configuration for Personalised Experience

- Configured an **Arch Linux** environment with **Hyprland compositor**, tailored for performance and aesthetic consistency
- Implemented **dynamic theming** using **pywal**, integrating it across terminal, VS Code, Firefox, Eww bar, and **Glava**
- Customized window management behavior, gaps, animations, and keybindings for an efficient tiling experience
- Automated environment setup using **shell scripts and dotfile versioning** with Git for seamless portability
- Integrated media tools like **spotify-player**, and real-time audio visualizations with **GLava** synced to system theming

Universal Testing Machine

[Sep 2023 - Nov 2023]

Course Project | MS101: Introduction to MakerSpace | Course Instructor: **Prof. Joseph John, Prof. Krishna Jonnalagadda**

- Worked in a team of 6 to build a **Universal Testing Machine**, measuring **tensile strength** of material using an **Arduino**
- Used tools such as **dremel, lathe** to create a fully-functional semi-automated machine after designing through AutoCAD
- Utilized software such as **Fracttory**, and **LaserCAD** in order to optimise the project and ensure high-end performance
- Designed a **horizontal UTM** system, recognized as one of the best designs for its **minimalist** approach and **efficiency**

Stop-Motion Animation

[Mar 2023 - Apr 2023]

Course Project | DS109: Introduction to Design | Course Instructor: **Swati Agarwal**

- Created a stop motion animation by illustrating over **50 detailed sketches**, showcasing strong artistic skills
- Utilized a range of software tools, including **Adobe Premiere Pro**, along with various online resources, to compile, edit, and refine the animation, showcasing advanced proficiency in **video editing** and post-production workflows

Dynamic Obstacle-Avoiding Gesture-Guided Operator 1.0 (DOGGO 1.0)

[Dec 2024 - Feb 2025]

Electronics and Robotics Club | IIT Bombay

- Designed a quadruped robots mechanical structure with dog-like leg geometry using **SolidWorks**
- Simulated motion and leg coordination using **ROS Gazebo**, refining inverse kinematics and locomotion strategies
- Implemented a camera-based gesture recognition system using **OpenCV** to interpret human hand gestures in real-time
- Developed **reinforcement learning algorithms** enabling the robot to **autonomously** adapt to navigate dynamic terrain
- Manufactured and Assembled **3D-printed parts**, electrical components, connected **actuators** and sensors for control and implemented basic coding for standing and walking, ensuring motor control and sensor feedback are functional

Remote Controlled Bot XLR8

[Sep 2023]

Electronics and Robotics Club | Institute Technical Council

- Collaborated in a four-member team to design an RC bot and successfully navigate a competition-grade obstacle course
- Built a wireless **gyroscopic controller** using the **MPU-6050** and connected it to the bot via **ESP-32 microcontroller**
- Integrated **L298N motor driver** with bot's drive system using **PWM-based speed control** for precise maneuvering

POSITIONS OF RESPONSIBILITY

Convener | Krittika - The Astronomy Club | IIT Bombay

[Apr 2024 - Mar 2025]

Selected among **8** out of **150+** applicants to promote **Astronomy** among a strong community containing **12, 000+** students and staff

- Developed proficiency in processing astrophotographs using **Siril**, and **GIMP**, gained hands-on experience to use **Dobsonian** and **Equatorial** Telescopes and created a detailed inventory for the astronomical observatory under construction
- Planned and led a **2-day** astronomy trip to **Udaipur** and **Mount Abu**, visiting the **PRL Solar and Infrared Observatories**; also organized a stargazing camp to **Bhandardara**, successfully managing **50+** participants across both events
- Coordinated a **3-day** Astrophotography Exhibition on **National Space Day 2024**, promoting public engagement in astronomy; also conducted an **Introduction to Astrophotography Workshop** during **PG Tech Week**
- Ideated, planned and organized **Astromania** - The Annual Astronomy Quiz, which was attended by **150+** students
- Headed the design team, responsible for creating designs for **club merchandise** such as t-shirts and hoodies through software like **Illustrator** and **Figma**; created one of the most viewed posts on the official club page with **10k+** views
- Built a comprehensive module on **Photometry** and delivered a lecture on **Distance Ladder** under the LS program

Observation Round Evaluator | International Olympiad of Astronomy and Astrophysics

[Aug 2025]

- Selected to join the **Academic Team**, assessing the observation skills of **300+ students** representing **63 countries**
- Evaluated proficiency in **telescope operations, instrument handling** in the observation component of the olympiad

Football Coordinator | Aavhan - Sports Fest | IIT Bombay

[Feb 2023 - Mar 2023]

- Experienced organizing a large-scale tournament overseeing schedules, team **coordination**, and match **logistics**
- Improved **communication** and **negotiation skills** by securing multiple college participation throughout **Maharashtra**
- Enhanced **leadership** by coordinating volunteers to ensure smooth execution while fostering a competitive environment

TECHNICAL SKILLS

Programming Languages	Python (Numpy, Matplotlib, Sklearn, Scipy, Pytorch, Pygames), C/C++, HTML, CSS, JS
Softwares	Git, Solidworks, AutoCAD, LaserCAD, Fracktory, VSC, Jupyter, Adobe Illustrator, GIMP, Siril, Starnet++, ROS Gazebo, Open CV, \LaTeX ,
Others	Adobe Fresco, Figma, Kittl, Op-Amps, Digital Storage Oscilloscopes, MOSFETs, Krita

KEY COURSES

Physics	Classical Mechanics, Thermal Physics, Oscillations and Waves, Physics Lab, Statistical Mechanics, Quantum Mechanics, ElectroMagnetic Theory, General Physics Lab, Astrophysics*, Non-Linear Dynamics*, Condensed Matter Physics*, Nuclear Physics Lab*
Computer Science	Computer Programming and Utilization, Programming for Data Science, AI and Data Science, Numerical Analysis*
Electronics	Analog Electronics, Digital Electronics and Microprocessors, Electronics System Design*
Mathematics	Calculus, Linear Algebra, Differential Equations, Complex Analysis and Integral Transforms
Miscellaneous	Makerspace, Introduction to Design, Introduction to Psychology, Economics, Biology, Design Thinking, Computational Multinomics, Decision Analysis & Game Theory

* To be completed in Nov 2025

EXTRA-CURRICULAR ACTIVITIES

Football	• Secured the Silver Medal in the Institute Football League 202324	[2024]
	• Won the Gold Medal with Hostel 16A in the Freshiesta Tournament 2023	[2023]
	• Represented Hostel 5 as a core team member in the Inter-Hostel General Championship	[2025]
	• Emerged as Champion in the institute-wide FIFA Open , competing against 30+ participants	[2025]
	• Completed a year-long intermediate football course under the National Sports Organization	[2024]
	• Underwent one year of training with the Karnal District Football Team	[2019]
Others	• Participated in the Aavhan Half Marathon, completing 21 KM in less than 150 minutes	[2023]
	• Secured 3rd place in the annual Chemistry Quiz Competition - Heisenberg	[2023]