

Jay Patel

Fourth Year Undergraduate
Department of Physics

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in Jay Patel | 📞 +91-7770802744

Academic Qualifications

Year	Degree/Certificate	Institute	CPI/%
2022-2026	B.S.	Indian Institute of Technology Kanpur	6.0/10
2021	MPBSE(XII)	Swaraj Bal Niketan, Badud	96%
2019	MPBSE(X)	The Palladian House, Barwaha	96%

Scholastic Achievements

- Secured **All India Rank 14695** in **JEE Advanced 2022** among the 2.5 Lakh shortlisted candidates *Sept'22*
- Secured **All India Rank 17817** in **JEE Mains 2022** among the 1.1 Million candidates who appeared for it. *Aug'22*
- Secured **3rd rank** in **District Merit List** during High School, among top-performing students across the district. *May'19*

Key Projects

Portfolio | Self Project | 🔄 *June'24*

- HTML, CSS**
- Crafted and deployed a fully functional personal portfolio website using HTML and CSS, serving as an interactive platform to highlight academic background, technical skills, and projects.
 - Designed and structured a clean, visually appealing, and intuitive user interface, leveraging modern web design practices such as responsive layouts, consistent typography, and color harmony to ensure both aesthetics and usability across devices.
 - Project link :** [View Result](#).

Voting Management System | Self Project | 🔄 *June'24*

- C++**
- Engineered a console-based voting management system in C++ that incorporated user registration, authentication mechanisms, and restricted admin-only access to ensure secure handling of voting results.
 - Implemented a one-vote-per-user validation system with password hashing and file-based data persistence, enhancing reliability, preventing duplicate entries, and maintaining the integrity of the voting process.
 - Leveraged the C++ Standard Template Library (STL), (including `unordered_map`, `vector`, `fstream`), to efficiently manage user credentials, candidate information, and vote counts with optimal performance.
 - Designed and developed an intuitive, menu-driven interface, closely simulating the workflow of a secure electronic voting system and ensuring ease of use for end-users.

Sticky Notes Web | Self Project | 🔄 *July'24*

- HTML, CSS**
- Developed a lightweight sticky notes web application that runs directly in the browser using HTML and CSS, enabling users to create, view, and edit notes without the need for external storage or installation.
 - Integrated inline editing functionality through the `contenteditable` attribute, allowing users to seamlessly modify note titles and content in real time, thereby improving usability and reducing workflow friction.
 - Utilized jQuery for dynamic DOM manipulation, streamlining event handling and enhancing the overall responsiveness and interactivity of the application.
 - Designed and styled a clean, minimalistic, and user-friendly interface, ensuring an organized layout for multiple notes and providing a smooth editing experience across devices.
 - Project link :** [View Result](#).

Intro to Machine Learning & Deep Learning | Self Project | 🔄 *Jan'25-Feb'25*

- Python | Jupyter Notebook**
- Structured a modular, week-by-week repository using Jupyter Notebooks to guide learners through foundational concepts in machine learning and deep learning as part of IIT Kanpur's summer initiative.
 - Curated comprehensive instructions, resources, and assignments in the README.md, ensuring easy setup and reproducibility with Python and dependency management.
 - Facilitated hands-on learning by organizing code-based lessons that articulate core themes like model implementation, evaluation metrics, and algorithmic understanding.
 - Demonstrated educational design skills by packaging structured content in a way that helps learners progress methodically through ML and DL fundamentals.

Garbage Classifier | Self Project | 🔄 *May'25-June'25*

- Python | Jupyter Notebook**
- Designed and trained a deep learning pipeline using TensorFlow/Keras to classify waste into six categories with the TrashNet dataset, incorporating advanced augmentation, regularization, and class imbalance handling.
 - Developed a custom CNN architecture with dropout, L2 regularization, and BatchNorm, optimized using callbacks such as EarlyStopping and LR scheduling, and validated through confusion matrices and detailed classification reports.
 - Built an interactive web application with Streamlit, enabling users to upload waste images and receive instant predictions with confidence scores, making the model accessible beyond training.

- Delivered an end-to-end solution from dataset preparation to real-time deployment, demonstrating proficiency in both machine learning engineering and front-end integration.

Ultrasonic Diffraction Grating | Course Project
 Oct'23-Nov'23

prof. Venkata Jayasurya Y | Course: PHY224

- Outlined the objective of the experiment as measuring the vibration frequency of an ultrasonic piezoelectric plate using the optical diffraction grating technique.
- Employed the diffraction grating effect generated by an ultrasonic piezoelectric plate immersed in a water column to accurately determine vibration frequency.
- Analyzed how pressure variations in the propagating sound waves modified the refractive index of the liquid medium, thereby transforming the water column into a dynamic diffraction grating.
- Directed a monochromatic light beam perpendicular to the sound wave propagation, producing a clearly visible diffraction pattern with distinct bright and dark fringes.
- Studied the diffraction orders and fringe separations, which corresponded directly to the MHz-range vibration frequency of the piezoelectric plate, thereby validating the theoretical model.

Vibration Analysis of Guitar String using Lorentz Force | Course Project
 Oct'24-Nov'24

prof. Rajeep Gupta | Course: PHY315

- Conceptualized, designed, and simulated an experimental setup to measure the vibration frequency of a guitar string using the Lorentz force principle, bridging theoretical physics with practical experimentation.
- Applied a controlled magnetic field perpendicular to a current-carrying guitar string, generating measurable vibrations through electromagnetic interaction, which served as the foundation for frequency determination.
- Built, configured, and calibrated a virtual circuit in LabVIEW, enabling automated data acquisition and accurate computation of string vibration frequency from real-time experimental signals.
- Compared and validated the computed vibration frequencies with the audible pitch produced by the guitar string, ensuring alignment between theoretical predictions, experimental observations, and perceptual verification.
- Demonstrated integration of electromagnetism, wave mechanics, and computational tools by applying fundamental physics concepts to a real-world musical system, highlighting both technical precision and cross-disciplinary application.

Technical Skills

- Programming Languages:** C, C++, L^AT_EX, Python, Javascript, HTML/CSS
- Software and Libraries:** Numpy, Pandas, Matplotlib, jupyter notebook, colab, github, LabVIEW, Originlab*, Autocad*
**Elementary proficiency*

Relevant Courses
 (*:Ongoing)

Linear Algebra	Probability & Statistics	Engineering Graphics
Fundamental of Computing	Introduction to Management	Quantum Physics
Relativity	Single Variable Calculus	Classical Dynamics
Classical Electrodynamics	Introduction to Electronics	Thermal Physics
Computational Physics	Quantum technology	Statistical Mechanics
Optics	Mathematical Methods*	Experimental Physics*
Ordinary Differential Equations	Application of Single & Several Variable Calculus	Fluid Mechanics & Rate Processes
Principles of Lasers and Their Applications	Machine Learning in Particle Physics	Data Structure & Algorithm
Introduction to Astronomy; Planets & Stars	Cognitive Science of Multilingualism	Introduction to Electrical Engineering

Extra-Curriculars

- Participated in **dance** competition in **GALAXY**.
- Participated in **cricket** in **FRESHER’S INFERNO** & part of **FRESHER’S dance** group.
- Contributed in **HALL** management as a member of the **subcommittee HEC** (Hall Executive Committee) & played a role in managing hall events.
- Secured third position in **Institute Volleyball League (IVL)**.