Vansha Hansda

UNDERGRAD PHYSICS STUDENT

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EDUCATION

B.Tech. in Engineering Physics | IIT Bombay Oct 2022 - May 2026

SCHOLASTIC ACHIEVEMENTS

- Scored 97.5 percent in ICSE Board in Class 12, securing 2nd position in NHES Jamshedpur 2020
- Scored 98 percent in ICSE Board in Class 10, securing 2nd position in SHCS Jamshedpur 2022
- Attained a percentile of 86.62 in JEE Mains examination out of a total of 1 million+ candidates 2022
- Secured a rank of 308 in JEE Advanced examination out of a total of 14,000+ ST candidates 2022

PROJECTS

Development of Numerical Tool for Wave Force Estimation
Jan 2025 - present

Course Project | Offshore Engineering

- Studied two-photon absorption process, its energy requirements and non-linearity
- Analyzed the role of virtual states and the Fermi-Golden Rule in two-photon excitation
- Described how intensity-dependent absorption enables high-precision deep-tissue imaging

Comparative Analysis of NLP Models and ChatGPT
Sep 2024 - Nov 2024

Course Project | Speech and Natural Language Processing and the Web

- Compared SVM-NER and HMM-POS models with ChatGPT via confusion matrices
- Identified key misclassifications in capitalized text, temporal entities, and NOUN/ADJ words
- Assessed both models against gold standards to analyze strengths and weaknesses

Two-Photon Microscopy
Jan 2025 - Feb 2025

Course Project | Optical Physics

- Studied two-photon absorption process, its energy requirements and non-linearity
- Analyzed the role of virtual states and the Fermi-Golden Rule in two-photon excitation
- Described how intensity-dependent absorption enables high-precision deep-tissue imaging

Neutron Scattering for Phonon Dispersion
Sep 2024 - Nov 2024

Course Project | Introduction to Condensed Matter Physics

- Analyzed phonon dispersion in crystals using neutron scattering to study lattice vibrations
- Explored conservation laws in phonon interactions, linking energy and momentum transfer
- Presented findings on phonon dynamics in Fe, highlighting anisotropy and material properties

Laser Guitar
Mar 2024 - Apr 2024

Course Project | DIgital Electronics and Microprocessors

- Designed and implemented a laser based musical instrument with virtual string interaction
- Developed real-time signal processing to detect laser beam interruptions and generate notes
- Integrated sensors with Arduino to enhance accuracy and responsiveness of the instrument

Line Following Bot
Nov 2022 - Feb 2023

Course Project | Makerspace

- Designed and built a vehicle that can follow a black line, using input from an IR sensor
- Developed a robotic arm capable of detecting and removing light objects from its trajectory
- Employed Autodesk Fusion 360, LaserCAD and Arduino for for various tasks of the project

POSITIONS OF RESPONSIBILITY

Member | Editorial Team Aug 2023 - present
Department of Physics, IIT Bombay

- Authored articles featured in various issues of the Physics Department Newsletter : "Role of Atomic Physics in Astrophysics", "Solar Influence and Climate Dynamics", and "Active Galactic Nuclei"

Design Convenor Aug 2024 - present
Saathi, IIT Bombay

- Led the design efforts of Saathi, creating visuals for events, promotions, and branding

TECHNICAL SKILLS

- **Programming Languages :** Java, Dart, Python, C++, C, HTML, LATEX
- **Libraries :** Flutter, Pandas, NumPy, Matplotlib, BeautifulSoup
- **Software :** Canva, Figma, AutoDesk Fusion 360, LaserCAD, Arduino IDE, OriginLab, LTspice, MATLAB

COURSES UNDERTAKEN

- **Computer Science :** Speech and Natural Language Processing and the Web, Computer Programming and Utilization, AI and Data Science
- **Mathematics :** Linear Algebra, Introduction to Numerical Analysis, Calculus, Differential Equations, Complex Analysis and Integral Transforms
- **Physics and Electronics :** Analog Electronics, Digital Electronics and Microprocessors, Statistical Physics, Fundamental Themes in Physics, Introduction to Quantum Physics, Introduction to Classical Physics, Oscillations and Waves, Thermal Physics, Classical Mechanics, Quantum Mechanics, Electromagnetic Theory, Introduction to Condensed Matter Physics, Molecular Spectroscopy and Optical Physics*, Magnetism and Superconductivity*
- **Miscellaneous :** Design Thinking and Innovation, Economics, Physical, Organic and Inorganic Chemistry, Biology, Makerspace, Introduction to Psychology, Introduction to Literature, Environmental Studies, Language Acquisition and Developmental Dyslexia, Hydrogeomorphology*, Offshore Engineering*, Quantum Chemistry*, Climate Geology*, Biofuels : Technology and Policy Perspective*

*Courses to be completed by May 2025

EXTRACURRICULARS

Sports
- Won the 1st position in Basketball General Championship 2023 and 2024
- Won the 1st position in Institute Basketball Playoffs 2024
- Won the 1st position in JOGGA Inter School Basketball Tournament 2019
- Led the team and won the 1st position in JYOTI Inter School Basketball Tournament 2019
- Won the 1st position in CISCE Regional Basketball Tournament 2019

Leadership
- Held the position of the Assistant to the Crimson Squad Leader, Sacred Heart Convent School
- Championed Crimson Squad to in Spectra, the intra-school cultural and academic championship
- Led Crimson Squad to victory in Sacred Heart Convent School Sports Day

Cultural
- Won 1st position in singing in inter-school Odyssey Fest organized by LFS, Jamshedpur

Social
- Volunteered for Saathi in Rangavali, the LGBTQ+ fest of IIT Bombay
- Volunteered for Abhyudaya, IIT Bombay in Versova Beach Cleanup and Transgender Drive
- Volunteered for NSS, IIT Bombay in Van Mahotsav