**Paawan Nenwani**     23B2507
**Metallurgical Engineering and Materials Science**     B.Tech.
**Indian Institute of Technology Bombay**     Gender: Male
DOB: 19/09/2005

| Examination | University | Institute | Year | CPI / % |
|---|---|---|---|---|
| Graduation | IIT Bombay | IIT Bombay | 2027 | 8.67 |
| Intermediate | Maharashtra state board of Higher Secondary education | Sw. Radhatai Musale Jr. College | 2023 | 84.67% |
| Matriculation | Maharashtra state board of Secondary Education | Vidyaniketan English School | 2021 | 96.00% |

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Pursuing a minor degree in **Data Science and Artificial Intelligence**, at C-MInDS, IIT Bombay

## SCHOLASTIC ACHIEVEMENTS

- Secured position in the top **0.31%** nationwide in **JEE Main** examination among nearly 1 Million candidates*('23)*
- Ranked in the top **2.2%** nationwide in **JEE Advanced** examination among nearly 0.15 Million candidates *('23)*

## INTERNATIONAL EXPOSURE

**F1-TENTH Autonomous Grand Prix, Milan, Italy** | *SeDriCa | Guide: Prof. Archak Mittal*  *(Aug'24-Dec'24)*

*A 1:10 scale International competition of autonomous cars engineered for high speed racing and obstacle avoidance*

- Ranked **13th** out of **58+** teams in simulation and reached **quarter-finals** in physical round as **8-member** team
- Coded a velocity estimation model by integrating the **Lucas-Kanade Optical Flow** with **YOLO** object detection
- Mapped the surroundings of a bot using SLAM-based **Google's Cartographer** and **Synchronous Particle Filter**
- Tuned **Cartographer parameters** to balance localization precision and onboard computation of **Jetson Xavier**
- Implemented **Monte Carlo Localization** to localize the bot on the SLAM-generated map for real-time control

## RESEARCH AND DEVELOPMENT

**Siamese Dino-Swin Transformer for change detection** | *Guide: Prof Biplab Banerjee*     *(Feb'25-Jun'25)*

- Implemented **dual-branch Siamese** architecture combining **Swin Transformer** and **DINOv2** for feature fusion
- Devised a **multi-scale** difference computation precisely aligning Swin's local details and DINO's global details
- Designed modulated decoder with **cross-branch attention** and **progressive upsampling** for change mapping
- Achieved **87.52% F1** and **78.31% IoU** on **LEVIR-CD** using a custom DINO-Swin Siamese segmentation model

## KEY PROJECTS

**Federation of International Robot-Soccer Association** | *Guide: Prof. Archak Mittal*     *(Feb'24-Aug'24)*

*Placed 5th in an autonomous driving competition of urban environment in São Luís, Brazil, with a 22-member team*

- Designed & Engineered a compact **1:8 scaled** car featuring **two-layer chassis** to support autonomous driving
- Built a **3D printed car** from **CAD** design, integrating **Ackermann steering** and **open differential** mechanisms
- Executed **PWM-based control** algorithm on Arduino microcontroller for precise operation of DC geared motor
- Implemented a **PID controller** to follow target velocity from upstream control pipeline using **ROS framework**

**NutriChat : RAG Pipeline for Nutrition Textbook** | *Self-Project*     *(Jan'25-Feb'25)*

- Developed a PDF parser and preprocessor that handled PDF upto **1,200** pages with almost **95%** parse accuracy
- Enabled quick retrieval with **vector search** index of **5,000+** nodes for fast comparison and semantic matching
- Devised a **RAG pipeline** integrating **5k** vector index and LLM to generate contextual textbook-based responses
- Generated precise responses through **LLM Gemma 7b** with advanced retrieval and data augmentation pipeline

**Stock Trading Strategy optimization using RL** | *Finsearch'24 | Finance Club, IITB*     *(Jul'24-Aug'24)*

- Observed significant inconsistencies in **traditional methods** for forecasting market trends in financial markets
- Built **ARIMA**, **LSTM**, and **DDPG** based RL models on **NIFTY50** data to forecast trends and maximise the profits
- Enhanced accuracy to **95%**, enabling sharp data-driven investment insights and improved trading performance

**Quadruped Robot** | *Course Project | Guide: Prof. Abhishek Gupta*     *(Mar'25-May'25)*

- Designed and engineered 3D-printed **12-DOF quadruped robot** from CAD model for multi-directional motion
- Programmed **ESP32** with **HC-05** and **L298N** to enable remote wireless control of the bot via custom mobile app

**Air Canvas with Voice assistant** | *Data Science Project* | *Analytics Club, IIT Bombay* *(Dec'23-Jan'24)*

- Created an interactive **air canvas** to track fingertips using **Mediapipe** and **OpenCV**, allowing writing in mid-air
- Added **voice assistant** using **SpeechRecognition** library, allowing seamless hands-free operation of the canvas

**Sustainable Logistics Optimization** | *Course Project* | *Guide: Avinash Bhardwaj* *(Aug'24-Nov'24)*

- Designed **multi-modal transport** model, cutting warehouse and delivery cost by **20%**, under strict carbon caps
- Integrated **road**, **rail**, and **air** trade-offs in a supply chain model to balance costs and cut CO2 footprint by **15%**

**Human Emotion for image classification** | *WIDS 4.0* | *Analytics Club, IIT Bombay* *(Dec'24-Feb'25)*

- Developed **CNN-based** classifier to identify **5** different human emotions from a dataset of **12,000** facial image
- Used pretrained **ResNet50** transfer learning & targeted augmentations to boost emotion-specific recall by **15%**

**EnBuzz**| *Entrepreneurship and Business Club, IIT Bombay* *(Sep'23-Oct'23)*

- Conceived an **AI-powered consultancy firm** and composed an detailed investor pitch with a go-to-market plan
- Designed an extensive **buissness model canvas** outlining **three distinctive USPs** for market fit and scalability

## ENTREPRENEURSHIP PROJECTS

**CipherSolutions** | *Early-stage AI Solutions Initiative* *(Feb'25-present)*

*ENDORSED by **DCP(DSP), Mumbai Police** | Received a grant of **INR 50K** under the IIT Bomaby's IDEAS programme*

- Developing AI-powered chatbots to streamline **F.I.R. filing**, reducing average report time from **60** to **3 minutes**
- Achieved a **20%** improvement in classification accuracy of legal complaints using **NLP** and structured pipelines
- Held **20+ B2B** interviews in law, finance, education sectors to identify gaps & explore expansion opportunities
- Led on-ground pilot implementation in police environments, gathering insights from **10+ officers** & **end-users**

## POSITION OF RESPONSIBILITY

**Infrastructure Coordinator** | *Techfest, IIT Bombay* *(Jul'24-Dec'24)*

*Asia's largest science and technology fest | **5 million+** Online Reach | Footfal: **1,75,000+** | **2500+** National Colleges*

- Part of a **2-tier** team with **150+** members organising **5+** National competitions targeting over **2K+** participants
- Effectively arranged a captivating event for **freshers**, ensuring a footfall of about **450+** enthusiast participants
- Facilitated around **10** workshops across **4** diverse states, engaging and instructing a total of **3000** participants

**Class Representative** | *Metallurgical Engineering and Material Science* | *IIT Bombay* *(Sep'23-Mar'24)*

- Part of a **12+** member council serving over **500** students, while actively advocating interests of **130+ students**
- Assisted the department council in execution of events like **Traditional Day, Department Trip** & **Freshie Night**

## TECHNICAL SKILLS

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|---|---|
| **Programming** | Git | C++ | Python | CSS | LaTeX | MATLAB | Docker | HTML | Javascript | SQL |
| **Softwares** | Ansys | Solidworks | GitHub | Canva | Autodesk Fusion | Figma | Excel | Colab |
| **Libraries** | OpenCv | Tensorflow | Seaborn | NumPy | Matplotlib | Pandas | Scipy | SLAM |

## KEY COURSES TAKEN

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|---|---|
| **Computer Science** | Artificial Intelligence and data science, Optimisation models, Robotics, Computer programming and utilisation, Introduction to Machine Learning |
| **Department Courses** | Thermodynamics of Materials, Structure of materials, Electrochemistry of materials Sensor and measurment lab, Process Kinetics and Transport, It's a materials world |
| **Maths and Physics** | Linear Algebra & Differential Equations, Numerical methods for engineering materials Introduction to Classical & Quantum Physics, Computation Lab, Physics Lab, Calculus |
| **Miscellaneous** | Biology, Makerspace (Theory+Project), Classics of Popular Indian Cinema, Economics Introduction to management, Introduction to sociology, Design thinking for Innovation |

## EXTRACURRICULAR ACTIVITIES

| | |
|---|---|
| **Sports** | • Undertook **one** year of intensive **Hockey** training as part of the NSO(Jul'23-Apr'24)<br>• Secured a **Gold** in football and a **Silver** in hockey in Freshiesta tournament (Mar'24) |
| **Cultural** | • Secured **4th** place in the inter-college team dance competition at the **Freshiezza** (Sep'23)<br>• Successfully completed the **Film101**, an introductory course by **Silverscreen** (Oct'24) |
| **Mentorship** | • Mentored **2 teams** of **4 freshmen** each in XLR8, a robotics program by ERC (Sep-Nov'24)<br>• Guided **trainees** at SeDriCa to build a fully functional mobile cannon system (Jan'25) |
| **Miscellaneous** | • Awarded with **Inspire Award** and cash prize of **Rs.10,000** for developing a functional **emergency service model**, selected from a pool of **30+** innovative ideas(Jan-Nov'20) |