Vedant Singh Bedi

Bachelor of Technology
in Mechanical Engineering
Indian Institute Of Technology, Ropar

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Education

Degree	Institute/Board	CGPA/Percentage	Year
Bachelor's of Technology	Indian Institute of Technology, Ropar	9.12 (Till 4th Sem)	2023-2027
Senior Secondary	Central Board of Secondary Education	95.4%	2023
Secondary	Central Board of Secondary Education	96.3%	2021

Experience

- **Accelerating Thermoelastic Simulations for Functionally Graded Materials (FGMs)** *July 2024 - April 2025*
  Research Work under Dr Manish Agrawal IIT Ropar
  – Developed and researched uncertainty quantification techniques for Deep Neural Networks using Active Learning, leading to a 60% improvement over the industry standard.
  – Optimized indicator functions for uncertainty estimation using Genetic Algorithms, improving decision-making between FEM and neural network-based simulations. Reduced the time impact of predicting maximum stress values from 1 day to a matter of seconds

- **Making UNets Rotation and Scaling Invariant** *May 2025- Ongoing*
  Research Work under Dr Akshay Joshi and collaboration with ISRO IIsc Bangalore
  – Developed and Researched various methods to make Unets invariant to rotation and scaling, by modifying the CNN feed forward process, performing custom convolutions, changing the operating coordinate system of the CNN layers
  – Used this to help segment defects in a 3D print xtf file, significantly reducing the time required for classifying such defects from an hour to a matter of seconds

Projects

– **Deepfake Detection and Explainability Generation Pipeline for Enhanced Content Analysis of 32x32 images** *December 2024*
Adobe Mid Prep - Inter IIT 13.0 2024
∗ Developed a robust deepfake detection framework utilising Image Upscaling using RealESRGan and the ResNet with an accuracy of 96%.
∗ Fine tuned and locally ran a Vision Language Model generating visual and textual explanations. Implemented a Rule Based Prompting Framework to generate JSON output containing all explanations which reduced the time frame from around 5 minutes into 2 seconds.

– **Intelligent Surveillance System for Securing BOST Room Access** *Jan 2024 - Present*
Machine Learning
∗ Working on an Deep Learning driven surveillance system for real-time monitoring and anomaly detection in BOST room (Board of Science and Technology)
∗ Utilized computer vision algorithms for entry-exit logging, facial recognition for access control, and motion detection to identify unauthorized activities, ensuring enhanced security and operational efficiency.

– **Implemented Custom Reinforcement Learning on a Pygame Version of Flappy Bird** *January 2025 - Present*
Machine Learning
∗ Developed a Custom Deep Q Learning Pipeline and applied it on a Flappy Bird implementation custom made from Pygame.
∗ Currently Working on different reward functions to improve the training.

Technical Skills

–**Programming Languages**: C++, Python, Java
–**Mechanical**: CAD(Solidworks and Fusion 360), Arduino, Abaqus
–**Libraries**:
∗ Machine Learning - Matplotplib, Numpy, Pandas, Keras, Pytorch, Hugging Face, Transformers, OpenCV, Sklearn, Seaborn, NLTK, LangChain, Sympy
∗ Web Development - React, NextJS, Node JS, Express JS, MongoDB

Key courses taken

–**CSE & Core Courses**: Introduction to Computing and Data Structures (A), Solid Mechanics (A-), Thermodynamics (A-), Deep Learning for Physical Systems (Audit Pass)
–**Miscallaneous**: Differential Equations (A-), Basic Electronics (A-), Calculus (B), Linear Algebra - Integral Transforms and Special Functions (B)
–**Certifications**: Supervised Learning, | Advanced Learning Algorithms | Java Masterclass | Python Bootcamp

Positions of Responsibility

– **Student Executive**, Google Developer's Group, IIT Ropar *Jul 2024 - May 2025*
– **Computer Vision Coordinator**, Iota Cluster (AI/ML Club), IIT Ropar *Jul 2024 - May 2025*
– **Web Development Co -head**, Advitiya (College Fest), IIT Ropar *Dec 2024 - Feb 2025*
– **Harvard Health System Labs Hackathon Overall Coordinator**, IIT Ropar *Jan 2025 - May 2025*

Miscellaneous

- **Summer Research Fellow under the Indiam Academy of Sciences**, *2025*
- **Scholarship Recipient**,for 2nd, 3rd and 4th Semester for being in top 7% of Students at IIT Ropar *2024 and 2025*
- **JEE Advanced**,Secured an All India Rank of 8034 *2023*
- **JEE Mains**,came in the top 1 percentile overall *2023*
- **Unified International Maths Olympiad**,Secured a rank of 467 all over India *2021*
- **National Level Science Talent Search Examination**,Secured a all India rank of 2170 *2021*