

VRUSHANK AHIRE

Curriculum Vitae

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Education

- 2022–Present **Bachelor of Technology, Computer Science & Engineering**, *Indian Institute of Technology Ropar*, Chandigarh, India.
Key Courses: Artificial Intelligence, Probability & Statistics, Linear Algebra, Data Structures & Algorithms, Artificial Neural Networks, Algorithm Design & Analysis

Fellowships & Awards

- 2025 **Hyundai Hope Scholarship Recipient'25**, startup innovation grant (INR 65,000)
2024 **Travel Grant Recipient**, IEEE HiPC 2024 TCPP–Murty Trust Travel Assistance (INR 15,000)
2024 **State Winner**, Google BitNBuild Hackathon 2024 – Designed a Deep Q-Learning based intelligent traffic management system for congestion reduction.
2024 **Winner**, ZenTej Hackathon – Computer vision for drone-based wildlife detection (Indo-Japan)
2024 **Semi-Finalist**, Kuku FM Hackathon, Built AI story generation app, competed with 100+ teams

Publications

Conference Proceedings

- [C4] 2025 **Vrushank Ahire**, Kunal Shah, Mudasir Khan, Nikhil Pakhale, Lownish Sookha, Mudasir A. Ganaie, and Abhinav Dhall. “**MAVEN: Multi-modal Attention for Valence-Arousal Emotion Network.**” *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, pp. 5789–5799, 2025.
- [C3] 2025 **Vrushank Ahire**, Yogesh Kumar, and M. A. Ganaie. “**Intuitionistic Fuzzy Graph Embedded Random Vector Functional Link with Multiview Learning.**” *2025 IEEE International Joint Conference on Neural Networks (IJCNN)*, pp. 1–8, 2025.
- [C2] 2025 **Vrushank Ahire**, Aniruddh Muley, Shivam Zample, Siddharth Verma, Pranav Menon, Surbhi Madan, and Abhinav Dhall. “**SFANet: Spatial-Frequency Attention Network for Deepfake Detection.**” *Signal Processing Cup, IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2025.
- [C1] 2024 **Vrushank Ahire**, Pranav Menon, Aniruddh Muley, and Abhinandan S. Prasad. “**Random Adaptive Cache Placement Policy.**” *2024 IEEE 31st International Conference on High Performance Computing, Data and Analytics Workshop (HiPCW)*, pp. 161–162, 2024.

Journal Articles

- [J3] 2026 Yogesh Kumar, **Vrushank Ahire**, and M. A. Ganaie. “**A Unified Framework for EEG Seizure Detection Using Universum-Integrated Generalized Eigenvalues Proximal Support Vector Machine.**” *Neural Networks* p. 108520 , 2026.
- [J2] 2025 M. A. Ganaie and **Vrushank Ahire**. “**Granular Ball Twin Support Vector Machine with Universum Data.**” *Neural Networks*, vol. 193, p. 107974, 2025.
- [J1] 2025 M. A. Ganaie, **Vrushank Ahire**, and Anouck Girard. “**Granular Ball K-Class Twin Support Vector Classifier.**” *Pattern Recognition*, vol. 166, p. 111636, 2025.

Research Experience

Nanyang Technological University - NTU Singapore

May 2025 – **Building Data Pipelines and Phoneme-Guided ASR for Low-Resource Languages.**

Dec 2025 Building and benchmarking scalable ASR pipelines (Whisper Large-v3, NVIDIA Parakeet, K2) on large-scale datasets (5k–50k+ hours), including LibriHeavy. Developing low-resource South Asian speech datasets, conducting cross-linguistic phonetic analysis, and designing phoneme-supervised architectures for improved Speech–LLM alignment, targeting Interspeech 2026.

Advisor : **Eng-Siong Chng**, Professor, College of Computing and Data Science, NTU([🔗](#))

Peking University

May 2025 – **Advanced Synthetic Data Generation and Token-Efficient Reasoning in Financial LLMs.**

Sept 2025 Developed a Generator–Evaluator LLM framework using autoregressive models with GRPO-based online learning to dynamically refine Chain-of-Thought reasoning. Benchmarked open-source LLMs (LLaMA, Mistral, DeepSeek) for mathematical reasoning and financial question answering, emphasizing token efficiency and real-world document analysis.

Advisor : **Hao Tang**, Assistant Professor, School of Computer Science, Peking University([🔗](#))

Monash University

Oct 2024 – **Developing Spatial-Frequency Attention Network (SFANet)for Deepfake Detection.**

Jan 2025 Developed SFANet that ensembles Swin Transformers, Vision Transformers, and frequency-domain CNNs via 2D FFT to capture subtle artifacts. Used face segmentation to focus on key regions and data augmentation for class imbalance. Achieved state-of-the-art performance on the DFWild-Cup dataset with 94.04% accuracy and 98.14% AUC, demonstrating strong generalization across eight deepfake collections.

Advisor : **Abhinav Dhall**, Associate Professor, Department of Data Science and AI, Monash University([🔗](#))

Indian Institute of Technology (IIT), Ropar

Jan 2025 – **Designed Multi-modal Architecture for Emotion Recognition in Videos.**

Mar 2025 Developed MAVEN, a multi-modal framework that integrates visual, audio, and textual cues using bi-directional cross-modal attention and modality-specific encoders for emotion recognition. Predicts valence and arousal in polar coordinates following Russell's circumplex model, effectively capturing transient emotions in real-world videos. Achieved 0.32 CCC on Aff-Wild2, 60% above the ResNet-50 baseline.

Dec 2025 – **Early Alzheimer's Detection with Speech and Neuroimaging: A Multimodal Approach.**

Present Developing multimodal models from speech, MRI, PET scans, and medical reports for early Alzheimer's prediction, prioritizing speech-based screening and reserving imaging for confirmation to minimize costs.

Advisor : **Mudasir Ganaie**, Assistant Professor, Department of Computer Science, IIT Ropar ([🔗](#))

Combustor Dynamics and Controls Lab, IIT Ropar

Jan 2025 – **Developing Computer Vision for High-Speed Fuel Droplet Analysis.**

Present Developing deep learning algorithms to predict fuel droplet size distributions from high-speed atomization images, enabling quantitative analysis before droplet breakup. Integrating spray diagnostics and computer vision to generate reliable statistics for optimal droplet distribution and efficient atomization.

Advisor : **Lipika Kabiraj**, Assistant Professor, Department of Mechanical Engineering, IIT Ropar ([🔗](#))

Selected Projects

Nov 2024 – **Autonomous RAG for Financial Analysis (AURA).**

Dec 2024 Designed a multi-agent financial Q&A framework, integrating a Supervisor, Financial Analyst Group, specialized agents (Market, Risk, Fundamental), and a Math Tool. Developed an Adaptive RAG Module with a Grader, Web Search Node, Code Executor, and Financial Report Generation Agent.

Jan 2025 – **Club Management System – Life on Campus.**

Mar 2025 Developed a web app to manage college clubs, events, and participation, with role-based access for users and admins. Features include posts, forums, calendars and resources.

Tech Stack: Next.js, React, TypeScript, Tailwind, Node.js, Express, MongoDB, Socket.IO and JWT.

Academic Service & Leadership

- 2025 **Reviewer**, Elsevier Knowledge-Based Systems (IF 7.6), Applied Soft Computing (IF 6.6), IJCNN '25
- 2025 **Mentor**, Iota Cluster (AI Club), IIT Ropar
- 2024 Represented **IIT Ropar at Inter IIT Tech Meet 13.0** – Built a financial chatbot for Pathway
- 2024 **Co-led Inter-School Conclave** – Engaged 1,400+ high school students in the annual tech fest

Technical Skills

- Programming Python, C++, C, Java, RISC-V
- ML & DL PyTorch, Keras, Hugging Face Transformers, LangChain, langraph
- Libraries OpenCV, NLTK, scikit-learn
- Databases SQL, MongoDB
- Other Tools Git, Linux, Docker, LaTeX

Referees

Prof. Mudasir Ganaie

Assistant Professor

Dept. of CSE

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Prof. Abhinav Dhall

Associate Professor

Data Science & AI

Monash University

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Prof. Lipika Kabiraj

Assistant Professor

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