Rahul Vigneswaran

Masters in Computer Science & Engineering (By Research)
Indian Institute of Technology Hyderabad
Reliance Foundation Fellow
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Education

Indian Institute of Technology, Hyderabad — India
Master of Technology in Computer Science & Engineering (By Research) - CGPA: (9.76/10) — *Jan'23 - Dec'25*

Publications

- **AAAI 2026** | Under Review |
  Rahul Vigneswaran, Divya, Digvijay, Chandana, Vineeth N Balasubramanian.
  Class Incremental Learning Free of Unrealistic Assumptions.

- **ICLR 2026** | Under Review |
  Rahul Vigneswaran, Chandana, Vineeth N Balasubramanian.
  Tackling Long-Tailed Class Incremental Learning.

- **EMNLP 2025** | Under Review |
  Anubhav, **Rahul Vigneswaran**, Stanley, Anish, Promod.
  Structure Thinking for enhanced reasoning in LLMs.

- **TMLR 2024/25** | Paper | Code |
  Rahul Vigneswaran*, Kancheti Sai Srinivas*, Bamdev Mishra, Vineeth N Balasubramanian.
  HARE: Human-in-the-Loop Algorithmic Recourse.

- **ICVGIP 2021** | Paper | Code | Video |
  Rahul Vigneswaran, Marc T Law, Vineeth N Balasubramanian, Makarand Tapaswi.
  Feature Generation for Long-tailed Classification.

- **AAAI 2021** | Paper |
  Adepu Ravi Shankar*, Yash Khasbage*, **Rahul Vigneswaran**, Vineeth N Balasubramanian.
  A Deeper Look at the Hessian Eigen Spectrum of Deep Neural Networks and its Applications to Regularization.

Research Experience

Applied Scientist Intern — Amazon, India
Managers: Promod Yenigalla, Anish Nediyanchath, Anubhav Shrimal — *Mar'25 - Aug'25*

- Developed a new capability for Amazon's internal Agentic assistant (SAPIEN), enabling insight exploration across databases and user files through automatic table identification ($\approx 89\%$ accuracy), context-aware clarification handling, and workflow initiation; demoed to leadership.
- Reduced manual testing effort of SAPIEN by building tools like *Golden Dataset Generator* and *Gamma Testing Framework*, ensuring scalable reliability across use cases.
- Secured a Top-3 finish (only intern to do so) at Amazon's internal Hackathon with Promptinator-3000, an automated prompt and dataset generation framework, earning recognition from leadership.

★ Work under review at **AMLC'25** (Amazon Internal) and **EMNLP'25**.

Research Assistant — IIT Hyderabad, India
Advisor: Dr Vineeth NB — *Jan'23 - Present*

- Proposed a new realistic setup in Continual Learning that is free of assumption and developed a novel method using adapters to tackle it.

- Developed a novel method to tackle Transitioning Head problem in Long-Tailed Class Incremental Learning via Early Knowledge Transfer, achieving state-of-the-art results.
- Created a human-in-the-loop recourse framework that integrates user feedback, generating personalized counterfactuals and enhancing user satisfaction and transparency.

★ Two works under review at **AAAI'25** and **ICLR'26**. One work published at **TMLR'24/25**.

Research Intern IIT Hyderabad, India
Advisors: Dr Vineeth NB (IIT-H) & Dr Makarand Tapaswi (IIIT-H) *July'19 - Jan'23*

- Developed TailCalibX, a feature generation technique for Long-Tailed classification that uses calibrated distributions to boost performance on imbalanced datasets, setting a new state-of-the-art.
- Created a Hessian-based regularization method that improves generalization by leveraging the similarity between layerwise and overall Hessians, enhancing regularizer efficiency.

★ Published in **AAAI'21** and **ICVGIP'21**.

Research Projects

Integration Testing for Stochastic AI systems *May'24 - Aug'25*
Advisor : Anubhav Shrimal (Amazon)

- Developed an **LLM-based, persona-driven multi-turn evaluation framework** for stochastic AI systems, simulating real user behaviors (waiting, task switching, file uploads) and enabled headless CI/CD integration to produce automated pass/fail signals, improving reliability of validation.

Adversarially Coupled Prompt & Dataset Generator *March'25 - May'25*
Advisor : Anish Nediyanchath (Amazon)

- Developed an **adversarial co-evolution framework** coupling a prompt generator and dataset generator with access to intermediate reasoning steps, achieving a **21× efficiency gain** by producing robust initial prompts and diverse reasoning-annotated datasets, reducing manual effort and accelerating UAT cycles; earned recognition from leadership.

AWARE: Adaptive Wear-levelling and Attack Re-mapping Engine *June'24 - Dec'24*
Advisor : Dr Shirshendu Das (IIT-H) | Report |

- Proposed a novel framework that enhances NVM durability and security in LLCs by combining adaptive wear-leveling and attack mitigation through intelligent remapping and workload-aware strategies.

Large Language Models related Hardware Optimizations *Jan'24 - April'24*
Advisors : Dr Rajesh Kedia & Dr Shirshendu Das (IIT-H) | Report |

- Analyzed hardware and software optimizations to improve Large Language Models, identifying gaps like fragmented benchmarking and advocating for unified solutions to boost efficiency.

Theoritical Analysis of Neural Collapse in Long-Tailed Continual Learning *Jan'24 - April'24*
Advisor: Dr Vineeth N Balasubramanian (IIT-H) | Report |

- Uncovered and addressed key limitations in existing theoretical frameworks for analyzing Neural Collapse in continual learning, extending their applicability to Long-Tailed Continual Learning.

TARM: Token Averaging Recurrent Memory Transformers *Jan'23 - April'23*
Advisor : Dr C Krishna Mohan (IIT-H) | Report | Code |

- Proposed TARM, a novel method using exponential moving average on memory tokens to boost memory capacity in Recurrent Memory Transformers, enhancing long-term dependency capture and training stability.

Achievements

Reliance Foundation Postgraduate Scholarship *'23 - '25*
Awarded to Top 100 Students Nationwide. Scholarship Value: 6 Lakhs

Amazon's Internal Hackathon *'25*
Top-3. Only Intern Finalist, competing against well-seasoned Applied Scientists & SDEs

TiDeL Hackathon *'24*
First Place | Report |

Amazon Machine Learning Summer School *'24*

Volunteering

Research

Reviewer: AAAI'26, ECCV'22

Sub-Reviewer: CVPR'23, ICLR'21, IJCAI'20, WACV'23, SDM'21

Student Volunteer: ACML'22, ICML'20

Academic TAships

Deep Learning for Computer Vision (NPTEL) ('24, '20)

AI and Emerging Technologies (TalentSprint + IIT Hyderabad) ('24, '23, '22)

Effective Teaching of Machine Learning (CSEDU IIIT Delhi) ('22, '21)

Reinforcement Learning (AI 3000 / CS 5500) (IIT Hyderabad) ('22)

Advanced Topics in Machine Learning (AI 2100 / CS 6360) (IIT Hyderabad) ('21)

References

- Dr. Vineeth N. Balasubramanian, Principal Researcher, Microsoft Research, India | Professor, IIT-H, India.
- Promod Yenigalla, Sr. Applied Science Manager, Amazon, USA.
- Anish Nediyanchath, Sr. Applied Scientist, Amazon, India.
- Anubhav Shrimal, Sr. Applied Scientist, Amazon, USA.