Aditya Raj

B.Tech, Electronics and Communication Engineering
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Expected Graduation: 2026

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Education

Degree/Certificate	Institute/Board	GPA/Percentage	Year
B.Tech, Electronics and Communication Engineering	NIT, Patna	8.1 / 10.0	2022–2026
Senior Secondary	CBSE	93.2%	2020–2022
Secondary	ICSE	90.2%	2010–2020

Achievements

Stanford AI Lab Interviewed at Prof. Jiajun Wu's Lab for research position in computer vision *2025*
NK Securities Research Ranked **67th/2095** in **IV Prediction**; **MSE = 1.3e-5** *2025*
M2L Summer School Selected from **1600+** global applicants (**BTech to Industry**); **Split, Croatia** *2025*
Amazon ML Challenge Ranked **184th/75,000+**; **F1 score = 0.4667** using fine-tuned **moondream** *2024*
IIT ISM AI of GOD **Winner**; **WER = 0.116** using **TrOCR + T5**; **post-processing algorithm** *2024*
RMO Top **0.4%** nationwide mathematical olympiad(classes 8–12) in **India**, out of 250k students *2019*

Findings

- **Knowledge is not localized circuits; it can be better understood as a network path of gated circuits**
  Application: ***MATS 9.0 (Neel Nanda)***

Research

- **Knowledge Graph-Informed Query Decomposition(KG-IQD): Hybrid KG-RAG Reasoning in Noisy Contexts**
  Authors: ***Aditya Raj, Dr. Kuldeep Kurte***[PI] */ Poster (ISWC 2025) - Rejected*

Experience

- **Founding AI Research Engineer** *India*
  QFI Research Capital *May 2025 – Present*
  – Lead a team of 2 engineers to build **data pipelines** and **forecasting models** predicting **product timelines** and assessing **market impact**, integrated with a **real-time sentiment engine** for long-term **alpha capture**.
  – **Resolved critical computation bugs**, built and deployed an **internal toolkit** to manage **workflow**.
- **Research Intern** *Hyderabad, India*
  IIIT-H / Dr. Kuldeep Kurte, Spatial Informatics Lab *Apr 2025 – July 2025*
  – Achieved **state-of-the-art results** on a **custom disaster QA benchmark**, **outperforming RQ-RAG by 14% and KG by 18%**, by developing a **neuro-symbolic framework** that **guides query decomposition using Knowledge Graphs** and **interrelates points with RAG on sub-queries** for **robust reasoning over structured and unstructured data**.

Projects

- **Optimizing and Quantizing FBNet Models for Edge Deployment** *docs / October 2025*
  Tools: Hugging Face, PyTorch, Edge Device
  – Converted **FBNet-A/B** from **PyTorch → TensorFlow → TFLite (FP32, FP16, INT8)** for **edge deployment**, achieving **MSE 1e-19**, **100% accuracy**, and up to **4× model size reduction**.
  – Rebuilt architectures in **Keras+TF**, used a **parser** for weight transfer, and verified using **MSE and accuracy metrics**.
  – Implemented **TFLite GPU batch resizing**, improving **conversion stability** and **edge-device performance**.
- **Investigating Conditional Knowledge Circuits in LLMs – TinyLlama 1.1B** *docs / Aug 2025 – Sept 2025*
  Tools: Hugging Face, PyTorch, DPO/RLHF, Red Teaming
  – Demonstrated that **LLMs retain competing facts**, retrievable via **trigger-activated gates** without erasing knowledge.
  – Showed that if one **circuit is removed**, others can **reactivate knowledge** through hidden triggers.
  – Hypothesized that **jailbreaking** will always succeed, and gave empirical examples for it(by jailbreaking Gemini 2.5 pro with 3-4 tokens).
- **Efficient LLMs via Switchable and Dynamic Quantization** *October 2025 - Current*
  Tools: PyTorch, Hugging Face, LoRA, QAT-LLM, SQuAD Dataset
  – Integrated **switchable and dynamic quantization** into **GPT-2**, enabling per-layer bit-width control (INT8–FP32) and adaptive **LoRA activation**.
  – Trained on **SQuAD** using **cyclic precision training** and joint bit-width optimization, achieving stable accuracy across dynamic precision configurations and demonstrating robust **quantized inference**.
  – (In-Progress)Evaluating the **robustness** under random precision switching, aligning insights with **CPT (ICLR'21)** and **Double-Win Quant (ICML'21)**.

Technical Skills

Languages Python, C++, SQL, BASH, TypeScript, MATLAB, Triton (basic)
ML/Stats PyTorch, Hugging Face (Transformers, PEFT), TensorFlow, JAX (basic), scikit-learn, NumPy
Time Series Gaussian processes, signal smoothing
AI Alignment RLHF, DPO, PPO, Instruction-Tuning, Constitutional AI, Supervised Fine-Tuning (SFT)
DevOps & Tooling Docker, Git, GitHub Actions, CI/CD, monitoring, Linux (WSL/Ubuntu), W & B
Model Interop Logit Lensing, TransformerLens, CircuitsVis, SAE, Activation Patching, etc.