

Hello Ghadia

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Education

Indian Institute of Technology, Kharagpur

July'17 – June'21

Bachelor of Technology in Electronics and Electrical Comms. Engg, CGPA: 9.35/10

Minor in Computer Science and Engineering

Selected Coursework:

- **Electrical and Electronics Engineering:** Analog/Digital Communication, Microcontroller and Embedded Systems, Digital VLSI Circuits
- **Computer Science:** Data Structures and Algorithms, Computer Architecture and Operating System, Computational Number Theory
- **Mathematics / Machine Learning:** Linear Algebra for AI/ML, Probability and Stochastic Processes, Natural Language Processing, Advanced Theory in Machine Learning

Work Experience

GPU Power Architect, NVIDIA, Bengaluru

July'21 - Present

Manager: Raghavendra Bhat

- Developed high-fidelity Graphics Energy Analysis / Debug system at an IP level to understand inefficiencies inside the GPU subsystem
- Built end-to-end power modeling frameworks for compute workloads: HPC, LLMs, and Recommender Systems
- Designed Perf/watt simulation environments for DGX-class systems to enable management/marketing with meaningful decisions on datacenter GPUs
- Collaborated with Software, Hardware, and Product teams to verify and debug delivered performance and power of key NVIDIA features like Deep Learning Super Sampling (DLSS)
- Improved the runtime/resource complexity of key algorithms like MaxQ and Bin-Optimization by $\sim 2000\times$

Research Assistant, H2Lab, University of Washington

Nov'22 – Present

Advisor: Prof. Prithviraj Ammanabrolu

- Goal: Using Natural Language Feedback to train Large Language Models via Reward Function learned on the gathered feedback
- Designed a reward distribution framework to localize reward for better correspondence between feedback and generated text
- Experimental runs show that localization helps achieve better factual alignment and overall reward compared to the baselines

Summer Internship, NVIDIA, Bengaluru

April'20 – July'20

Mentor: Sivakumar Anandan

- Conceptualized the use of Reinforcement Learning to solve the combinatorial optimization problem of deriving optimal configuration of a GPU
- Developed end-to-end proof-of-concept solution that showed significant runtime benefits as compared to the traditionally implemented solution
- Secured a Full-time job offer for exemplary performance throughout the internship

Publications and Preprints

MaxQ Optimization using Reinforcement Learning

Ravi Ghadia, Vamsi VVS Krishna Garaga, Karthik Prakash, Sivakumar Anandan, Raghavendra Bhat

Accepted to NTECH 2023 (NVIDIA-Internal Global Technology Conference)

- Implemented RL based solution achieving the MaxQ configuration of a GPU (optimal configuration with best Performance per Watt)
- Delivered $\sim 2000\times$ runtime and resource benefits as compared to the conventional brute force approach

CORAL: Contextual Response Retrieval Loss Function for Training Dialog Generation Models

Bishal Santra, Ravi Ghadia, Manish Gupta, Pawan Goyal

Bachelor's Thesis — Arxiv[preprint]

- Proposed retriever based loss function that considers context to assign loss for the generated output
- Achieved state-of-the-art on relevance metrics like MauDe/DeB against several strong pretrained baselines

Perf Activity Driven Instantaneous Power Projection

Ravi Ghadia, Sivakumar Anandan, Raghavendra Bhat

Accepted to NTECH India 2022 (NVIDIA Internal Technology Conference)

- Built a framework that allowed high precision energy analysis and helped isolate inefficient regions in the graphics pipeline

Skills

- **Programming Languages:** Python, C/C++, MATLAB, HTML, Javascript
- **Frameworks:** Pytorch, Tensorflow, Django, Streamlit
- **Libraries:** HuggingFace, OpenAI Gym, RL4LMs, stable-baselines
- **Profilers:** NVIDIA Nsight, Radeon Graphics Profiler
- **Utilities:** Perforce, Git, Bash, Linux

Selected Academic Projects / Competitions

Maverick 2.0 Hackathon — AB InBev

April'21 - May'21

National Finalists (top 8 out of 750+ teams Pan India)

- Developed an application to recommend customized discounts basis product data across various sectors & demographics
- Implemented robust pipelining to process requests in real-time — Applauded by the panelists for outstanding design

Secure Authentication via user-behaviour

Aug'20 - Nov'20

Advisor : Dr. Sudipta Mukhopadhyay

- Authenticated users based on their usage profile for mouse activity characterized by click time, pause time, velocity of the cursor etc.
- Used self-organizing maps to extract features from user-activities — Prevented unauthorised access with an 83% recall

Optimal Power Distribution

November'18

Advisor : Dr. Arijit De

- Determined the stability of a network topology from its transfer function with variation in inductive and capacitive components
- Developed Monte-Carlo simulation environment for optimal transfer function providing maximal power efficiency

Academic achievements and awards

- Secured **All India Rank 862** in **JEE Advanced 2017** among more than 150,000 students appearing for the examination
- **Runners Up** at Enigma — Competition organized during Impulse'19, annual tech-fest of Electrical Dept. IIT Kharagpur
- **All India Topper** in Chemistry for getting perfect score in the Class 12 examination conducted by the Central Board of Secondary Education (CBSE) in 2017
- **High School topper** in the science stream (PCMB) based on performance in the Senior Secondary School Examination (Class XII) conducted by the Central Board of Secondary Education (CBSE) in 2016 [link]
- Awarded **cash prize of 5000INR** for being amongst the **top 0.1%** in the nation based on performance in the secondary school examination conducted by the Central Board of Secondary Education (CBSE) in 2014

Extracurricular Activities

- Volunteer Work :
 - Served as **Laboratory Assistant** in Digital Signal Processing laboratory (50+ students) in senior year. Responsible for addressing doubts and assisting with assignments
 - Organized cleanliness drives along NITK beach shoreline.
- Executive Member of the **Association of Computing Machinery**, NITK Chapter. Organized events in the campus in the realms of circuits and electronics

- Partook in Life Skill workshops at high school (KV ASC). Quoted in the **Times of India** (most popular newspaper in India) [link]
- Actively contributed to organization of Alumni talks at high school. Quoted at **careerindia.com** [link]