Ravi Ghadia

ghadiaravi13@gmail.com • ghadiaravi13.github.io/ • ghadiaravi13

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 unit level to understand GPU inefficiencies
- Built end-to-end power modeling frameworks for compute workloads: HPC, LLMs, and Recommender Systems
- Designed Perf-per-Watt simulation environments for DGX-class systems to enable management/marketing with product road-map decisions on datacenter systems
- Collaborated with Software, Hardware, and Product teams to verify and debug 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 enabling rapid turn-around for data-requests

Research Assistant, H2Lab, University of Washington **Nov'22 – Present**
Advisor : Prof. Prithviraj Ammanabrolu

- Used natural language feedback to train large language models via reward function learned on human feedback
- Designed a vector-reward framework with localized rewards for incorporating multi-faceted feedback
- Experimental runs showed better alignment with the feedback: improved Alignscore for a Question-Answer setting

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 US 2023 (NVIDIA-Internal Global Conference, acceptance rate 18%)

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

CORAL: Contextual Response Retrievability 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 Conference, acceptance rate 22%)
- 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
- Implemented pipelining for real-time request processing — 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 — click-time, pause-time, cursor-velocity etc.
- Used self-organizing maps for feature-extraction — Prevented unauthorised access with an 83% recall

Optimal Power Distribution **November'18**
Advisor : Dr. Arijit De
- Determined network stability 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** with more than 150,000 students appearing for the examination across India
- **Runners Up** at Enigma — Electrical Acumen Competition organized during Impulse'19, annual tech-fest of Electrical Department, 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

Extracurricular Activities

- **Certified Instructor — NVIDIA Deep Learning Institute :**
  - Served as an instructor for courses on **Deep Learning** and **Transformer based NLP applications**
  - Conducted sessions during GTC and assisted other instructors as a TA during related courses
- **Volunteered as a Mentor** at Mentor Together, a Non-Profit Organization aiming to assist underprivileged young-minds in their student-to-professional transition
- Served as the Hall Alumni Committee head, orchestrating alumni funds to initiate annual donation drive for Ambassadors Children Home, an orphanage near the IIT Kharagpur campus
- Performed a lead role representing the Rajkot District team in **National Science Dramatics Competition 2014**