# Ravi Ghadia

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## Education

**Indian Institute of Technology, Kharagpur**  Jul'17 – Jun'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**  Jul'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 modelling frameworks for compute workloads: HPC, LLMs, Automotive 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)
- Contributed to key algorithms like MaxQ / Bin-Optimization reducing the runtime and resource intensity by a mammoth factor ∼**2000x**

**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**  Apr'20 – Jul'20
*Mentors: Sivakumar Anandan, Raghavendra Bhat*
- Conceptualized the use of Reinforcement Learning to solve the combinatorial optimization problem of deriving optimal configuration of a GPU
- Delivered proof-of-concept solution that showed the ability of RL to converge in the ballpark of traditionally optimal solution space
- Received a Full-time job offer for exemplary performance throughout the internship

## Publications and Preprints

**CORAL: Contextual Response Retrievability Loss Function for Training Dialog Generation Models**
*Bishal Santra, Ravi Ghadia, Manish Gupta, Pawan Goyal*
*Bachelor's Thesis — Submitted to NeurIPS 2023[preprint]*
- Proposed retriever based loss function that considers context while assigning 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 GPU graphics pipeline

**MaxQ Optimization using Reinforcement Learning**
*Ravi Ghadia, Vamsi VVS Krishna Garaga, Karthik Prakash, Sivakumar Anandan, Raghavendra Bhat*
*Accepted to NTECH India 2022 (NVIDIA Internal Technology Conference)*
- Implemented RL based solution for an NP-hard problem that had significant runtime overhead in the overall power estimation

## 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                    Apr'21 - May'21
*3-member team, 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 pipelining using sklearn modules to process requests in real-time — Received special mention 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                    Nov'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 using MATLAB 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 — Electrical Acumen 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

## 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**