Harsh Poonia

harpoonix.github.io | hpoonia@cs.cmu.edu | harshpoonia | harpoonix | (412) 360-4454

EDUCATION

Carnegie Mellon University — Pittsburgh, PA
Master of Science in Machine Learning — December 2026
- Courses: Deep Reinforcement Learning, Intermediate Statistics, Advanced Introduction to Machine Learning (PhD)

Indian Institute of Technology Bombay — Mumbai, India
B.Tech. (with **Honors**) in Computer Science and Engineering (Grade : **9.44/10**) — May 2025
- Courses: Graph + Advanced ML, NLP, Speech Recognition, Formal Methods in ML, Reinforcement Learning, Statistical ML in High Dimensions, Computer Vision, Linear Algebra, Optimization, Networks & OS, Algorithm Design, Databases

PUBLICATIONS

Exploring Neural Granger Causality with xLSTMs: Unveiling Temporal Dependencies in Complex Data [Paper]
Harsh Poonia, Felix Divo, Kristian Kersting, Devendra Singh Dhami
Submitted to NeurIPS 2025
- **Led** the adaptation of **xLSTM** to discover **sparse** Granger-causal relationships between noisy **multivariate** time series
- Created a stable, robust training paradigm by formulating a joint optimization algorithm with **proximal** gradient descent and dynamic **adaptive** group lasso penalty, consistently enabling the **self-selection** of the best features across domains

χSPN: Characteristic Interventional Sum-Product Networks for Causal Inference in Hybrid Domains [Paper]
Harsh Poonia, Moritz Willig, Zhongjie Yu, Matej Zečević, Kristian Kersting, Devendra Singh Dhami
Published at **UAI 2024**
- Developed a novel **characteristic interventional** sum-product network for causal inference in **hybrid domains** aimed at learning robust, generalizable causal representations; formulating likelihoods with a move to the **spectral** domain
- Employed probabilistic circuits to model **interventions** in data-generating process, maintaining **tractability** of inference

INTERNSHIPS

Optiver — Amsterdam, Netherlands
Software Development Intern — May 2024 - July 2024
- Automated the **T+1 postprocessing** of order logs, replacing **6-month** regulatory compliance cycles with **daily** updates
- Published **automated desk-level mandates** after reconciling various instrument data sources and processing an **entire day's** trade data in **<1 min** with minimal dependency risks, using the Atlassian API and **PostgreSQL** databases

Marsh McLennan — Mumbai, India
Research and Development Intern — December 2022 - January 2023
- Built APIs for security analysis tools to safeguard against **smart contract** vulnerabilities like reentrancy, denial of service, timestamp dependence (among others), and developed Marsh India's **first** smart contract **security audit** platform
- Handled the backend using **DynamoDB** and **AWS S3**, created API wrappers around these with **FastAPI** and **Nodejs**

SKILLS

Machine Learning	PyTorch, NumPy, Tensorflow, Keras, Pandas, SciPy, OpenCV, MATLAB
Programming	C/C++, Python, SQL, Javascript, Bash, Solidity, x86 Assembly

RESEARCH PROJECTS

Invariant Representations for Speech — IIT Bombay
Bachelor's Thesis Project | Prof. Preethi Jyothi — July 2024 - May 2025
- Developed an **invariant-by-design** network to learn unified representation for **accented** speech for zero-shot generalization
- Adopted **canonization** methods for invariance to compute canonical representations for perturbed, accented speech
- Ideated and implemented a **flow matching** based generative model for **non-autoregressive** speech synthesis

Improving Text-to-SQL using In-Context Learning — IIT Bombay
RnD Project | Prof. Sunita Sarawagi — January 2024 - May 2024
- Researched ideas on teaching sequences for **meta learning**, and bayesian perspective on choosing good demonstrations from viewing LLMs as **latent variable** models to build a better theoretical understanding of in-context learning
- Improved accuracy on "challenging" queries in BIRD bench by 5% with **question decomposition** and **fine-grained** sharing

SCHOLASTIC ACHIEVEMENTS

Academic Excellence	All India Rank **61**/150k (**Top 0.04%**) in JEE Advanced ('21), Class **Topper** in Computer Vision (1/70), IIT Bombay ('23), Qualified for Indian National Math Olympiad (INMO) ('19)
Scholarships	Narotam Sekhsaria Scholar (Top 20/5000+, **$42K** Zero Interest Loan, 2025); KVPY Fellow (India Rank **178**, 2020); NTSE Scholar (2019)