

# Kintan Saha

Third-year (Rising Junior) Undergraduate Student  
B.Tech. (Mathematics and Computing)  
Indian Institute of Science, Bengaluru, India

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## RESEARCH INTERESTS

My research interests lie in **Reinforcement Learning**, with a focus on **Stochastic Approximation** methods and establishing theoretical guarantees for learning algorithms, as well as in theoretical aspects of generative models, particularly of **Diffusion Models**. I am also interested in **3D Computer Vision**, especially in 3D Scene Reconstruction and Novel View Synthesis.

## PROFESSIONAL SUMMARY

- Strong foundation in reinforcement learning, 3D vision, and applied machine learning with hands-on experience using PyTorch, Git, and WandB.
- Published peer-reviewed work in AI/ML domains.
- Proficient in data preprocessing, statistical analysis, and extracting insights from real-world datasets. [1](#) [2](#)
- Experienced in stochastic policy optimization, adversarial training, and domain adaptation techniques.

## EDUCATION

**Indian Institute of Science, Bengaluru** Aug'23 – Present (Expected Graduation - July'27)  
B.Tech. in Mathematics and Computing. GPA: 9.3/10.0 (till 4th semester).  
**Schools - Maa Bharti Sr Sec School, Kota / Delhi Public School Ruby Park, Kolkata** Apr'09 – Jul'23  
Senior Secondary (97.8%), Secondary (95.8%)  
**Achievements:** [JEE Advanced](#) (AIR 338), [JEE Main](#) (AIR 87), [WBJEE](#) (AIR 7) , Top 1% in [NSEP](#), [NSEC](#), [NSEA](#)

## RESEARCH EXPERIENCE

[PROJECT DETAILS](#)

### REINFORCEMENT LEARNING

**Reliable Critics: Monotonic Improvement and Convergence Guarantees for Reinforcement Learning**

- Collaborating with [Prof. Aditya Gopalan\(IISc\)](#) and [Prof. Gagan Thoppe \(IISc\)](#) to enhance the [Reliable Policy Iteration\(RPI\)](#) framework.
- Integrated RPI with SOTA Deep RL algorithms (PPO, TD3, DDPG) and tested across **diverse environments** like Atari, MuJoCo, and MiniGrid.
- Establishing **new baselines** and demonstrating SOTA improvements using RPI-augmented algorithms. Also demonstrated resilience of RPI to various function approximation classes. Accepted for publication at [Indian Control Conference 2025 \(preprint\)](#).

**Towards Reliable, Uncertainty-aware Alignment** [\[arXiv\]](#)

- Collaborated with [Prof. Aditya Gopalan](#) to develop an uncertainty-aware policy optimization framework which provably reduces policy degradation.
- Extended the method to **LLM alignment** by modifying PPO to incorporate reward uncertainty in **RLHF pipelines**.

<i>Dataset Used</i>	<i>Tools / Libraries Applied</i>
Alpaca-Eval&mt-bench	HuggingFace Transformers, TRL and Datasets, Matplotlib, NumPy

### COMPUTER VISION

**Feed Forward Deblurring in 3DGS**

- Collaborating with [Prof. Venkatesh Babu \(Vision and AI Lab, IISc\)](#) to design a **scene-agnostic deblurring module** for 3D Gaussian Splatting (3DGS) to be used in feed-forward models.

<i>Dataset Used</i>	<i>Tools / Libraries Applied</i>
ACID, Re10k	PyTorch, Lightning, Hydra

### MACHINE LEARNING

**Unsupervised Domain Adaptation(UDA)** [\[Project Report\]](#) [\[Project Code\]](#)

- **Implemented** and **benchmarked** multiple SOTA UDA algorithms: DANN, CORAL/DeepCORAL, MMD, DSN, and Asymmetric Tri-Training as part of a course project under [Prof Chiranjib Bhattacharya](#).

- Evaluated cross-domain generalization on **diverse datasets**: MNIST, MNIST-M, SVHN, Office31, and Amazon Reviews.
- Applied **adversarial training** with Gradient Reversal Layer (GRL), domain-invariant representation learning, and theoretical metrics like H-divergence.
- Achieved **performance** within 5% of paper-reported results; analyzed key failure modes in domain classification due to activation function and network design choices.

<i>Dataset Used</i>	<i>Tools / Libraries Applied</i>	<i>Visualization Produced</i>
MNIST, MNIST-M, SVHN, Amazon Reviews	PyTorch, Matplotlib, NumPy	Domain classification plots, t-SNE

## QUANTITATIVE RESEARCH

- Selected from the **top 1%** nationwide for **Optiver FutureFocus - 2025 program**
- Spent a week learning quantitative trading workflows and applying data-driven modeling on in-house stock market datasets.
- Focused on preprocessing, visualization, and exploratory analysis for **alpha strategy design** using Pandas, NumPy and Matplotlib.

## COMPUTER SCIENCE EDUCATION

**HinglishEval: Evaluating Effectiveness of Code-generation Models on Hinglish Prompts** [\[Paper\]](#) [\[Code\]](#)

- Collaborated with [Prof. Viraj Kumar](#) to evaluate code-gen LLM performance on multilingual code-generation using a translated HumanEval dataset.
- Designed evaluation pipeline to analyse results under the **Item Response Theory (IRT)** framework.
- Accepted for publication at [ACM COMPUTE 2024](#); part of a broader effort to adapt LLMs for CS101 teaching in Indian classrooms.

<i>Dataset Used</i>	<i>Tools / Libraries Applied</i>
HumanEval	HuggingFace Transformers and Datasets, Matplotlib

## TECHNICAL SKILLS

<b>Programming, Frameworks</b>	Python, Shell scripting, Conda/Miniconda
<b>Deep Learning &amp; ML Engg.</b>	PyTorch, HuggingFace Transformers, TRL, Diffusers, W&B, Hydra, OpenCV, Scikit-learn, XGBoost
<b>Reinforcement Learning</b>	Stable-Baselines3, OpenAI Gym; <i>Envs: Atari, MuJoCo, MiniGrid</i>
<b>3D Vision &amp; Generative models</b>	NeRF, 3D Gaussian Splatting (3DGS), COLMAP, Diffusion Models, Flow-based Models
<b>Classical ML &amp; Stats</b>	Regression, Classification, Clustering, Hypothesis Testing
<b>Data Analysis &amp; Viz.</b>	Pandas, NumPy, Matplotlib, Seaborn, Plotly, Streamlit
<b>Query Languages</b>	SQL (joins, aggregations, subqueries)
<b>Tools &amp; Platforms</b>	Git, GitHub, Jupyter, VS Code, Docker (basic), MLFlow (basic), Kaggle, Google Colab, GCP

## KEY COURSES TAKEN AT IISC

[COMPLETE LIST](#)

Mathematics Courses	Computer Science Courses
<a href="#">Real Analysis (UMA 204)</a> <a href="#">Measure-Theoretic Probability (MA 361)</a> <a href="#">Concentration Inequalities (E2 207)</a>	<a href="#">Theory of Multi-Armed Bandits (E1 204)</a> <a href="#">Topics in Stochastic Approximation (E1 396)</a> <a href="#">Reinforcement Learning (E1 277)</a> <a href="#">Artificial Intelligence and Machine Learning (UMC 203)</a>

## SELECTED TALKS

[COMPLETE LIST](#)

1. [Presentation on Diffusion and Flow based models delivered at Vision & AI Lab \(VAL\)](#)
2. [Presentation on Unsupervised Domain Adaptation delivered as part of course project](#)
3. [Presentation at ACM COMPUTE 2024, of the published research paper](#)

## VOLUNTEERING

**Databased (IISc UG CS Club)** — Senior Core Committee Member  
 Organized sessions on CP, ML, Quantum Computing, Crypto, and more. Led [Algorithm Festival 2024](#).

**Rhythmica (IISc Music Club)** — Co-Convener  
 Organized concerts, open mics, and classes. Experienced guitarist with 10+ years of [musical journey](#).