# Rohit Raj

## Senior Undergraduate, Mathematics And Scientific Computing, IIT Kanpur
**Minors in Computer Systems and ML**

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## ACADEMIC QUALIFICATIONS

**Indian Institute of Technology Kanpur**

**B.S, MTH**            *CPI: 7.1/10*
📅 2021 - 2025          📍 Kanpur, India

**S.N.S. College, Gaya, Bihar**

**XII, BSEB**          *Percentage: 80.6%*
📅 2021          📍 Gaya, Bihar

**R.D. Public School, Gaya, Bihar**

**X, CBSE**          *Percentage: 94.4%*
📅 2019          📍 Gaya, Bihar

## SCHOLASTIC ACHIEVEMENTS

- Secured **All India Rank 2701** in **JEE (Advanced) 2021** among 1.5 Lakh shortlisted candidates
- Secured **All India Rank 1098** in **JEE (Mains) 2021** among 10 Lakh candidates.
- Reached **Gold Level** in world Quant Challenge and was offered Brain quantitative **research consultant** position.

## COURSES
*• ongoing*

Probability and Statistics | Data Structure and Algorithms

Programming For Performance* | Introduction to Machine Learning

Introduction to Reinforcement Learning | Set theory and Logic

Monte Carlo Markov Chain | Embedded & Cyber-Physical Systems

Introduction To Modern AI * | Generative AI*

## TECHNICAL SKILLS

**Programming**: C, C++, Python, Java, R , Solidity

**Tools & Framework**: Spring Boot, FastAPI, Django, Docker

**Libraries**: PyTorch, Numpy, Pandas, Matplotlib, Ethers.js

Seaborn, Scikit-learn, Pytorch, OpenCV

**Command-line**: Linux/Unix shell, Bash scripting

**Build & CI/CD**: Make, CMake, npm, GitHub Actions

## LEADERSHIP

### Organiser, Marketing

*Udghosh'23(Annual sports Fest), IIT Kanpur*    *Aug'23-Dec'23*

- Spearheading a 3-tier team of 20+ senior executives and 40+ junior executives in the festival.
- Led the marketing team of Udghosh for the Campus Ambassador program and successfully secured sponsors

### Secretary in Table Tennis

*Games & Sports Council, IIT Kanpur*    *Oct '22-Apr '23*

- Organized sports events, including intra-college and inter-college competitions, significantly increasing student participation and engagement.

## WORK EXPERIENCE

### Outer Orbit Technologies

*Software Engineering Intern*      *May '25-July '25*

- **Developed** a full-stack log viewer using Python and **React** to provide a live stream of application logs.
- Containerized application with **Docker** for deployment across environments.
- **Reduced** average bug discovery time by **over 90%** by creating features like live-search and custom alerts.

## PROJECTS

### MyGate: AI-Powered Community Management System | ⓞ

- Built full-stack visitor management platform with AI copilot using OpenAI function calling, real-time Firestore updates, and role-based access control deployed on Google Cloud Run
- Implemented secure RBAC with Firebase custom claims, server-side validation for AI operations, immutable audit logging, and FCM push notifications for instant community alerts
- Designed admin analytics dashboard with SLA tracking, society broadcast system, and responsive React frontend with real-time visitor status updates across multiple user roles

### Programming for Performance

*Prof. Swarnendu Biswas | ⓞ*      *Aug '25- Sep'25*

- **Vectorized matrix multiplication** using **Intel SSE4/AVX2 intrinsics** →**7.2x speedup**
- **Optimized 10D search** using **LICM**, **loop unroll** and **partial sums** →**2.3x speedup**
- Implemented **CUDA kernel** for **2D/3D convolution** →**1520x/3264x speedup**
- Developed **concurrent open-addressing hash table** & **concurrent lock-free stack**
- Worked extensively in **Unix** environment, using **command-line tools** for profiling, debugging, and **optimizing** performance-critical code.

### Uncovering the Mask of XORRO

*Prof. Purushottam Kar | ⓞ*      *Jan '25-Feb '25*

- **Mathematically** derived **simple XORRO PUF** vulnerability to **linear model attacks**
- Extended the linear model to crack **16-XORROs PUF** using mathematically derived **1040-dimensional feature vector** derived from **72-bit challenge vector**
- Achieved **99.82%** train & **99.2%** test accuracy using **LinearSVC model (L1 penalty)**

### Playing with the Melbot

*Prof. Purushottam Kar | ⓞ*      *Mar '25-Apr '25*

- Developed **decision tree** to **guess secret** from **5167 words** allowing $\leq$ **15 trials**
- Designed **greedy algorithm** to find **optimal query word** at each node of tree
- Achieved **100% accuracy**, 4 trials/word, **0.23s train time** & **1.5 MB model size**

### Decentralised Certification

*Kerala Blockchain Academy | ⓞ*      *Aug '24-Nov '24*

- Designed and deployed an **Ethereum-based decentralized application** (DApp) in **Solidity** for secure, tamper-proof certificate issuance.
- Implemented **NFT-based** credentials (ERC-721 tokens), providing students with portable, verifiable, and ownership-proof digital certificates.

### Reinforcement Learning Quest

*Prof. Subramanya Swamy Peruru | ⓞ*      *Aug '23-Nov '23*

- Implemented and compared SARSA and Q-learning algorithms to analyze their performance in a cliff walking grid world environment.
- Implemented policy gradient algorithm for balancing a cart pole, variants with and without a baseline, and evaluated their performance.