

Kanak Khandelwal

4th Year Undergraduate | Department of Mathematics and Statistics, IIT Kanpur

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Education

Indian Institute of Technology Kanpur

2023 – Present

B.S. in Mathematics and Scientific Computing | CPI: 8.0/10.0

St. Xavier's Senior Secondary School

2011 – 2023

Class XII (CBSE): 95.6% (2023) | Class X (CBSE): 93.6% (2021)

Work Experience

Oracle | Application Developer Intern | Fusion ERP

(05/2026–07/2026)

- Built and shipped **Billing Operations Workspace**, an **agentic AI application** using **Oracle AI Agent Studio**, delivering a single, prioritized view of billing exceptions, minimizing billing delays.
- Integrated **REST APIs** and backend data models for real-time retrieval and one-click corrective actions across **10,000+** invoices.
- Automated approval workflows using **policy-driven AI nodes**, enabling **zero-touch processing** and eliminating manual review.
- Designed the core workspace panel, unifying three financial workflows into one prioritized interface with **drill-down navigation**.
- Integrated **agentic applications** across AR and PPM, enabling cross-application navigation and a **unified billing experience**.
- Validated production readiness through an **Agent Quality Loop**, running automated **regression suites** and triaging issues as **PASS/REVIEW/BLOCKED** before release.

Research Experience

MADHAV Labs, IIT Kanpur | Undergraduate Research | Prof. Vipul Arora, IITK

(04/2025–06/2025)

- Built a dual-encoder cross-modal retrieval system for **DCASE Challenge 2025** using **PaSST** and **RoBERTa-large** encoders, projecting audio and text into a **shared embedding space**.
- Designed a **multi-positive contrastive loss** with weighted soft/hard positives and **hard negative mining** using progressive staged activation to prevent optimization interference.
- Engineered **PyTorch Lightning** pipeline with **mixed-precision training**, **FFmpeg** loader, and segment-based **mel-spectrograms**.
- Achieved **30.01% mAP@10** and **59.35% R@10** on the Clotho dataset for cross-modal audio-text retrieval.

Key Projects

Catastrophic Forgetting and Domain Adaptation | CS771 Course Project | Prof. Piyush Rai, IITK (10/2024–11/2024)

- Benchmarked 6 ImageNet extractors, selecting **BEiT-Large embeddings** for CIFAR-10 classifier with 98.72 % baseline accuracy.
- Developed a novel **Weighted Prototype Update** rule for Learning with Prototypes, balancing pseudo-labels with prior prototypes to sustain **97.8% accuracy** across **10 sequential datasets**.
- Engineered **Mean-Shift Prototype Update** for Unsupervised Domain Adaptation, boosting cross-domain accuracy by 5%.

Computer Networks | EE673 Course Project | Prof. Subrahmanya Peruru, IITK

(01/2026–04/2026)

- Developed **TCP/UDP** socket applications: **multithreaded chat** and **SMTP client** supporting CC/BCC and attachments.
- Implemented **Link-State** and **Distance-Vector** routing, exchanging asynchronous neighbor updates for minimum-cost paths.
- Simulated **TCP congestion control** in **NetSim** on lossy links, comparing congestion-window growth and utilization via **Wireshark**.
- Benchmarked **TCP/IP** via **Wireshark** and **iPerf3**, modeled **Head-of-Line blocking** as a **Markov chain** for throughput loss.

Technical Skills

- Competitive Programming:** Achieved max rating of **1724 (Expert)** at Codeforces. (Profile - KK23)
- Languages & Tools:** C | C++ | Python | MATLAB | Git
- Libraries & Frameworks:** PyTorch | LangChain | LangGraph | scikit-learn | pandas | NumPy | Matplotlib
- AI & Agentic AI:** LLMs | RAG | AI Agents | MCP | Tool Calling | Agentic Workflows | Oracle AI Agent Studio

Scholastic Achievements

- Secured **All India Rank 980** in **JEE Advanced** among 190,000 shortlisted candidates. (2023)
- Achieved **All India Rank 719** in **JEE Mains** among more than 1.6 million candidates. (2023)
- Secured **All India Rank 91** and **Global Rank 469** in **International Quant Championship (IQC) 2025 Stage 1**. (2025)
- Cleared NSEP (National top **301**) and qualified for the **Indian National Physics Olympiad (INPhO)**. (2023)
- Cleared NSEA (National top **256**) and qualified for the **Indian National Astronomy Olympiad (INAO)**. (2022)
- Secured **All India Rank 584** in Kishore Vaigyanik Protsahan Yojana (**KVPY**) **SA** organized by IISc, Bangalore. (2022)
- Awarded **NTSE Scholarship** by the Government of India, selected among top 2000 students from 1M+ plus candidates. (2021)

Relevant Courses

Data Structures & Algorithms	Probability and Statistics	Machine Learning	Linear Algebra
Computer Networks	Fundamentals of Computing	Ethics of AI	Econometrics
Nonlinear Regression	Game Theory	Numerical Analysis	Scientific Computing

Extra-Curricular Activities

- Won **Bronze Medal** in the **Inter IIT Aquatics Meet 2025** water polo championship.
- Represented **West Zone** in the **CBSE National Swimming Championship 2018-19**.