Vinayak Rana

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Artificial Intelligence
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ACADEMIC DETAILS

Degree	Specialization	Institute	Year	CPI/%
M.Tech.	*Artificial Intelligence*	IIT Gandhinagar	2024-Present	9.29
B.Tech.	*Computer Science & Engineering*	Punjab Technical University	2020-2024	8.80
Class XII	*Physics, Chemistry, Maths*	St. Xavier Sr. Sec. School	2019-2020	87.2
Class X		St. Xavier Sr. Sec. School	2017-2018	90.6

INTERNSHIPS

- **Machine Learning Intern, Black Fox Millennium Pvt. Ltd.** [March '24 - June '24]
  - Architected an NLP model for automated candidate ranking based on resume-to-job semantic similarity.
  - Engineered a data pipeline that parsed resumes, vectorized text with Sentence-BERT, and deployed the ranking model as a Dockerized FastAPI service.
  - Reduced manual screening time for recruiters by over 70%, enabling faster, more accurate candidate identification.

RESEARCH & PUBLICATIONS

- **Scalable Air-Quality Sensor Placement via Gradient-Based Mutual Information Maximization.** [May '25 - August '25]
  Vinayak Rana, Zeel B Patel*, Nipun Batra* *Submitted to AAAI-26 AI for Social Impact (core A*)*
  - Eliminated a critical performance bottleneck by developing an algorithm that bypasses the slow, exhaustive search required by traditional sensor placement methods.
  - Engineered a scalable framework that efficiently identifies optimal sensor locations through a continuous optimization process, ensuring its runtime is independent of the monitoring area's size.
  - Achieved an *orders-of-magnitude speedup* over gold-standard methods, while maintaining competitive accuracy.
- **Equitable Sensor Placement for Air-Quality Monitoring** [January '25 - May '25]
  (Advisor: Prof. Nipun Batra, IIT Gandhinagar)
  - Addressed placement bias in India's air-quality network by developing an equity-aware algorithm to prioritize high-poverty districts, along with a corresponding equity-focused metric for evaluation.
  - Validated the algorithm through extensive benchmarking, demonstrating that the equity-aware approach *consistently outperforms standard placement methods* when evaluated on the new equity-focused metric.

PROJECTS

- **Agentic AI Hotel Concierge** [August '25 - September '25]
  Project Link
  - Architected a stateful AI backend to streamline hotel operations and mitigate the repetitive workload of staff on guest inquiries, booking, and operational reporting.
  - Engineered a dynamic Role-Based Access Control (RBAC) system using LangGraph, creating distinct, stateful agents with tailored tool access for Guests, Staff, and Admins.
  - Deployed the system as a REST API on an Azure Virtual Machine, providing a unified conversational interface for 15+ operational tools, from real-time booking to natural language database queries.
  - *Tech Stack:* Python, FastAPI, LangChain (LangGraph), MongoDB, ChromaDB, Azure
- **ScholarBot (Conversational Research Assistant)** [June '25]
  Project Link | *Live Application*
  - Developed a conversational AI to query scientific papers and handle context-aware follow-up questions.
  - Engineered an end-to-end retrieval-augmented generation (RAG) pipeline using LangChain to extract context from uploaded PDFs and generate stateful, context-aware responses.
  - *Tech Stack:* Python, Streamlit, LangChain, Groq API, ChromaDB, Hugging Face Spaces

TECHNICAL SKILLS

- **Programming Languages:** Python, C++, SQL
- **Libraries & Frameworks:** PyTorch, Scikit-learn, LangChain, FastAPI, Pandas, NumPy, Selenium, BeautifulSoup
- **Tools & Platforms:** Azure, Docker, Git/GitHub, GitHub Actions (CI/CD), MongoDB, ChromaDB

POSITIONS OF RESPONSIBILITY

- **Teaching Assistant, IIT Gandhinagar** [August '24 - Present]
  - Mentored 900+ students in core subjects including Machine Learning, Data Visualization, and Python.
  - Co-authored course assignments and led weekly tutorials to reinforce complex theoretical and practical concepts.
- **Project Lead, Sustainability Lab, IIT Gandhinagar** [July '25 - Present]
  - Led a research team of two students, providing technical mentorship on the Equitable Sensor Placement project.
  - Guided the team through the full research lifecycle, from design and implementation to final analysis.
- **Organizing Team Member, ACM Summer School** [June '25]
  - Managed logistics for a national-level ACM event and was selected to deliver a technical tutorial on *Active Learning*.