Deepayan Basu

Roll No:B21MT016
B.Tech
Materials Engineering
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Summary

Aspiring Data Scientist and AI Engineer and a B.Tech graduate (2025) from IIT Jodhpur, with experience in developing and deploying end-to-end machine learning systems. Proficient in statistical modeling, causal inference, and LLM-based applications, with hands-on expertise in scalable backend design using FastAPI and Streamlit. Built full-stack AI products (e.g., AgriIntel, FinWhisper) leveraging LangChain, Retrieval-Augmented Generation (RAG) pipelines, and MLOps best practices. Adept at extracting insights from unstructured financial and scientific data across NLP and materials domains.

Education

Degree / Certificate	Institute / Board	CGPA / %	Year
B.Tech. (MT)	Indian Institute of Technology, Jodhpur	7.48 / 10	2025
Senior Secondary	South Point High School (CBSE)	94%	2021
Secondary	South Point High School (CBSE)	96%	2019

Technical Skills

Languages: · Python · MySQL · DSA
ML Libraries: scikit-learn · TensorFlow · Keras · PyCaret · statsmodels
Data Visualization: · Pandas · NumPy · Matplotlib · Plotly · Power BI · Looker Studio
Backend: Flask · Streamlit
LLM/NLP: LangChain · FAISS · Ollama · nomic-embed-text · FinBERT
Tools: Git · Hugging Face · Docker
Systems: Development experience in Linux/Unix environments using Pymatgen for materials modeling and ML integration
Networking: Basic understanding of TCP/IP protocols and distributed systems design.

Relevant Coursework

- Pattern Recognition and Machine Learning || ML for Economics || AI for Fintech || Financial Analytics

Experience

- **FinWhisper – Scientific Investing** *November 2024 – February 2025*
  LLM Intern Github
  – Developed a PDF-based financial QA system using **LangChain**, **PyMuPDF**, **FinBERT**, and **ChromaDB**, achieving a **40%+ improvement in answer relevance** across **5+ quarters** of earnings data using customized RAG with **nomic-embed-text**; deployed on an **MCP server** with 2x faster response time.
  – Integrated a knowledge graph pipeline with **Neo4j** to model relationships between **financial entities, sentiments, and timelines**, enabling **relational question answering** with **30% higher entity accuracy** and scalable insights over **1000+ financial nodes**.

- **DRDO, Defence Laboratory, Ministry of Defence, Govt. of India** *May 2024 – July 2024*
  Research and Development Intern Github
  – Led development of **Radar Absorbing Materials (RAM)**, achieving a **30%** reduction in radar cross-section (RCS) for stealth fighter applications.
  – Designed a dual-branch CNN (**J-CNN**) with Task-Driven Pruning for SAR target classification, achieving **94% accuracy** and **23% faster** inference on the MSTAR dataset as an added extended research and learning project.

Projects

- **Causal ML for Travel App Participation** *September 2024 – December 2024*
  Applied Economics, IIT Jodhpur / Under Dr. Dweepobotee Brahma Project Report
  – Applied Causal Trees and Causal Forests to estimate Conditional Average Treatment Effects (**CATE**) across **600+** users in a travel survey.
  – Identified high reward-responsiveness (+**3.36 CATE**) in the **14–20** age group, enabling targeted app engagement strategies.

- **Conference Call Sentiment Analysis Tool** *October 2024 – November 2024*
  AI for Fintech | Faculty: Saurabh Kumar, IIT Jodhpur GitHub | Dashboard
  – Built a sentiment analysis pipeline using **VADER** and **Afinn** on **10**+ earnings calls; found a **73%** match between sentiment shifts and post-call stock movements.
  – Processed **50**+ financial transcripts from PDF/Excel using **PyPDF2** and **Pandas**; tokenized text with **NLTK** and extracted normalized vectors for quarter-over-quarter sentiment comparison.

- **Lankford Coefficient Prediction** *January 2024 – March 2024*
  Metallurgy + Deep Learning GitHub
  – Implemented a **CNN** model to predict Lankford coefficients (**r0**, **r45**, **r90**) from Orientation Distribution Function (**ODF**) images of sheet metals.
  – Preprocessed **10k**+ ODF image segments; achieved $\mathbf{R^2}$ **scores** of 0.89, 0.92, and 0.94 respectively, reducing prediction time by **80%** over experimental methods.

- **Predictive Modeling of Material Band Gaps** *October 2024 – December 2024*
  B.Tech Project, IIT Jodhpur GitHub
  – Developed a predictive model for material band gap estimation using ML on data extracted from the Materials Project database (MPI-ID).
  – Used DFT simulations via **VASP**, visualized with **VESTA**, and applied **LAMMPS** for material simulations; handled model development using Python and Pydefects.

- **Stress Hotspot Prediction in FCC Materials** *August 2024 – October 2024*
  ML Research Project GitHub
  – Trained a **Random Forest** model with **74.03% AUC** to predict stress hotspot zones in FCC materials.
  – Engineered features like **Schmid factor**, misorientation, and geometric attributes to increase prediction accuracy.

Featured Project – Under Development

AgriIntel – AI Assistant for Indian Farmers *GitHub Link*
Full-Stack AI/ML Platform | MLOps | NLP | Independent Project May 2025 – Present

1. Designed and built an AI-driven web assistant to empower over **50M**+ **Indian farmers** with real-time crop guidance, mandi price forecasts (via Prophet), weather updates, and government scheme insights.
2. Developed a scalable **FastAPI backend** integrating LangChain agents and Ollama LLaMA3 for **multilingual RAG-based responses**, using FAISS and `nomic-embed-text` embeddings.
3. Engineered an interactive and mobile-friendly frontend (HTML + Tailwind CSS) with 3 core modules: chatbot, price visualizer, and analytics dashboards.
4. Ensured accessibility via **offline-first architecture** and support for **3 languages** (English, Hindi, Bengali) to accommodate rural and low-bandwidth regions.
5. Led complete deployment pipeline using **Docker, CI/CD automation**, and GitHub Actions, delivering a production-ready system optimized for low-resource devices.

Positions of Responsibility

- **Mentor & Core Team Member,** Sangam Music Society, IIT Jodhpur *July 2022 – April 2025*
  – Demonstrated proficiency in multi-instrument performance; led music production and coordinated 10+ cultural events and inter-college shows.
  – Managed internal logistics involving band members, sound engineers, and venue staff to ensure successful live and recorded performances.

- **Assistant Head & Coordinator,** UDBHAAS 2022 (JCKIF, IIT Jodhpur) *November 2022 - November 2022*
  – Organized and managed event logistics for a national-level exhibition, featuring artwork by local creators and attended by 500+ participants.
  – Oversaw the event inaugurated by Hon'ble Union Minister Shri Gajendra Singh Shekhawat; coordinated media, hospitality, and volunteer teams.

Achievements

- **1st Prize, National Institute of Fashion Technology Band Competition** – National Cultural Fest 2024
- **3rd Prize, IGNUS Band Competition** – IIT Jodhpur, 2025
- **Several prizes won in School Football**, **Track** , and other sports events

Languages

- **English:** Native/Fluent
- **Hindi:** Native/Fluent
- **Bengali:** Native/Fluent
- **Japanese:** JLPT N4 (mid level)