Arush Singhal

B.E in Computer Engineering
Thapar Institute of Engineering and Technology

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Summary

B.E. Computer Engineering student with strong foundations in software engineering, AI/ML, and quantitative systems. Skilled in Python, C++, and scalable deep learning (NLP, CV, Transformers). Experienced in building finance-focused analytics engines and agentic AI systems. Seeking SDE/AI/Quant internship roles in top software and financial firms.

Education

Thapar Institute of Engineering and Technology — *Patiala, Punjab, India*
Bachelor of Engineering in Computer Engineering — July 2023 – September 2027

Amity International School, Sector-46 — *Gurgaon, Haryana, India*
Nursery - Class 12 (PCM) — April 2009 – June 2023

Skills

- **Programming Languages:** C++, Python, C, R
- **Computer Science Fundamentals:** Data Structures and Algorithms, Operating System, Object Oriented Programming
- **AI/ML Frameworks:** TensorFlow, OpenCV, Scikit-Learn, Deep Learning, Transformer Architecture, Pytorch, CNN, Agentic AI (LangChain, LangGraph, OpenAI Agents SDK, CrewAI, AutoGen), Prompt Engineering(Zero-shot, Few-shot, COT)
- **Web Development:** Flask, Django, HTML, CSS, API Integration
- **DevOps:** Docker, Github Actions, CI/CD, Amazon Web Services
- **Tools and Platforms:** Git, GitHub, VSCode, Raspberry Pi, Linux, Raspbian
- **Databases:** Oracle, MySQL, PostgreSQL, Firebase
- **Current Learning Areas:** AI Model Optimization, LLMs, Vision Transformers, LLM Fine Tuning, MCP
- **Core Skills:** SDLC, Problem Solving, Communication, Teamwork, Project Management, Analytical Thinking

Projects

Quantitative Finance Suite - Specialised in Indian Market (in progress) *Python, Streamlit, FastAPI, GitHub Actions, GPT-4*
- StockSense: Engineered a quantitative analytics module leveraging yfinance for anomaly detection in price series, cross-sector similar-stock modeling via correlation/similarity metrics, and advanced market visualizations for global markets and stocks
- VaR Calculator: Designed multi-method Value-at-Risk framework (Historical, Parametric, Monte Carlo) for portfolio risk.
- Black-Scholes Engine: Implemented closed-form option pricing with Black-Scholes, extensible to Greeks and sensitivity analysis.

Real Estate Analytics and Portfolio Engine *React, Node.js, Oracle SQL, PL/SQL*
- Built a full-stack real estate analytics platform to assess multi-property risk and forecast cash flows using React, Node.js, and Oracle SQL/PLSQL. Integrated JWT-auth APIs and built real-time dashboards with risk flagging and data filtering.
- Engineered a normalized 3NF schema (6+ entities) with PL/SQL triggers and 15+ financial modules (ROI, IRR, lease risk) to automate investment analysis. Tested across 50+ real-world investment scenarios

AnalystGPT – Financial Analyst and Trading Agent *LangChain, GPT-4, ChromaDB, Streamlit, FAISS, Python*
- Built a domain-specific agentic AI pipeline that analyzes 5+ years of 200+ financial reports and earnings calls to generate analyst-style insights, comparisons, and risk scores and trading signals
- Designed a RAG pipeline using ChromaDB + FAISS for 200+ filings (10K, ESG, MDA), achieving 91% retrieval accuracy across semantic tag evaluations and a profit margin of 30% consistently over trading.
- Delivered sub-2s response latency across 15+ financial query types (revenue, risk, legal), with live QA demo and exports analyst-style PDF/CSV reports with live Buy/Sell/Hold outputs.

Autonomous Surveillance and Intrusion Detection Robot *Raspberry Pi, Linux, OpenCV, SMTP, IFTTT,C++,Arduino*
- Designed and deployed a Wi-Fi-controlled robot with location detection with android app made using Blynk, live camera streaming and OpenCV-based human detection using Raspberry Pi for surveillance tasks in non human accesible or high risk environments.
- Designed a Raspberry Pi and OpenCV + Supervised learning trained camera for live streaming over secure smtp server for live access and human detection alerts.

Research Work & Reimplementations

ShakespeareGPT *Transformer from Scratch — PyTorch, NLP, Gradio*
- Built a decoder-only Transformer model implementing multi-head attention, layer normalization, and positional encoding based on "Attention Is All You Need".
- Trained the model on the Tiny Shakespeare corpus; achieved 18.7 perplexity and 94% coherence (based on user feedback).

GPT-2 Architecture and Research Reimplementation *PyTorch, Tokenizer, 124M Parameters*
- Rebuilt GPT-2 (124M parameters) from scratch using PyTorch with custom tokenizer and domain-tuned dataset.
- Logged perplexity/loss metrics and designed a modular, extensible pipeline for reproducibility and fine-tuning.

Experience

Thapar ACM Student Chapter — *Patiala, Punjab, India*
Tech and Marketing Executive - Core Member — August 2024 – Present
- Led 15+ AI/DSA/Web Development bootcamps and collaborated with cross-domain teams, increasing student engagement by 40% (700+ attendees).
- Established 5+ partnerships with industry experts to deliver targeted guest lectures, boosting chapter visibility and student participation metrics.

Achievements

- JEE Advanced Qualifier—Top 5% in India
- NCSC National Level Winner
- Patent Pending on Eco Brick—Tested at IIT Delhi for environmental Innovation