Amna Muhammad

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Research Interests

Large Language Models (LLMs); Natural Language Processing; Explainable AI (XAI); Conversational & Voice AI Agents; Retrieval-Augmented Generation (RAG)

Education

NED University of Engineering & Technology, Karachi, Pakistan
B.E. in Software Engineering (Aug 2024 – Present)

- Relevant Modules: Software Construction & Development, Design and Analysis of Algorithms, Data Structure Algorithms & Applications, Object Oriented Concepts & Programming, Computer Architecture and Logic Design.

Experience

Undergraduate Research Assistant
Department of Software Engineering, NED University of Engineering & Technology — (July 2026 – Present)

- Working on a long-running scam detection and prevention system, developing machine learning and transformer-based models to detect cyberpsychological traits associated with online scams.
- Training and evaluating transformer architectures, including DistilBERT, RoBERTa, and DeBERTa-v3, for text classification and behavioral analysis.
- Performing dataset preparation, preprocessing, model fine-tuning, and comparative performance evaluation across architectures.
- Researching explainable AI (XAI) techniques to improve model interpretability for cyberpsychological classification outcomes.

AI Software Engineer Intern
Wortholic, Rawalpindi, Pakistan — (Feb 2026 – April 2026)

- Developed backend services and automated internal workflows using Python and Java.
- Designed and implemented RESTful APIs using FastAPI for internal tools and system operations.
- Integrated LLM-based features via the OpenAI API to power automation and intelligent response generation.
- Collaborated on testing, debugging, and performance optimization across backend components.

Projects

AI Software Engineering Agent

- Built a multi-agent software engineering assistant with autonomous task planning, long-term memory, and a RAG pipeline backed by PostgreSQL for structured context.
- Implemented streaming responses and containerized deployment with Docker; deployed and load-tested on Alibaba Cloud ECS.

AI Study Partner – Collaborative Learning Platform

- Built a multi-user AI-powered study platform for document-grounded Q&A, quiz generation, and flashcards, using a RAG pipeline with ChromaDB and local embeddings.
- Developed the backend with FastAPI and a React + Vite frontend, integrating Groq APIs for fast LLM inference and PostgreSQL for state management.

VoxAI – Voice-First Content Management System for Financial Marketing (In Progress)

- Building a voice-first CMS that lets financial marketing teams generate and refine content through real-time conversational speech instead of forms or design tools.
- Implementing a compliance layer for financial-marketing regulations and direct publishing integration with connected social media platforms, built with Node.js and Express, using the Gemini API for conversational and content-generation logic.

Zenith – Exoplanet Detection (Machine Learning)

- Built machine learning models for exoplanet detection using astronomical time-series datasets.
- Applied preprocessing, feature engineering, and model evaluation techniques using Python and Scikit-learn to improve classification accuracy.

TECHNICAL SKILLS

- **Programming Languages:** Python, C++, C#
- **AI / Machine Learning:** PyTorch, Transformers (Hugging Face), Scikit-learn, NumPy, Pandas, LLMs, RAG, Prompt Engineering, Agentic AI, NLP
- **LLM & Agent Tooling:** OpenAI API, Groq API, ChromaDB, Embeddings, Knowledge Graphs, OpenClaw, n8n
- **Backend Development:** FastAPI, Flask, Node.js, Express.js, REST API Design
- **Databases:** PostgreSQL, MySQL, MongoDB, Redis
- **Cloud & DevOps:** AWS EC2, Alibaba Cloud ECS, Docker, Linux, Git, GitHub Actions, Nginx, Self-Hosted AI Infrastructure
- **Frontend (Basic):** React.js, HTML, CSS, Tailwind CSS

AWARDS & ACHIEVEMENTS

- NASA Space Apps Challenge 2025 – Local Runner-Up & Global Nominee
- Project pitching experience at IBA Tech Tank
- Active participant in AI/ML hackathons and competitions