Eman Nabeel

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Summary

Driven Computer Science Junior with a strong passion for **networking**, **ethical AI** and **large language models (LLMs)**. Experienced in applying LLMs to real-world challenges like **content moderation** and **IP geolocation**, showcasing the ability to integrate AI with networking. Strong foundation in network protocols, cybersecurity, and distributed systems, with a keen interest in leveraging LLMs for network automation, security, and traffic analysis. Additionally, enthusiastic about Convolutional Neural Networks (CNNs) and their potential applications. Proficient in Python, networking tools, and LLM APIs, with a problem-solving mindset and a drive to innovate at the intersection of AI and networking.

Education

Lahore University of Management Sciences, BS in Computer Science — Sept 2022 - May 2026 (Expected)

- GPA: 3.94/4.0
- **Coursework:** Network Security, Advanced Programming, Topics in LLMs, Distributed Systems, Network Centric Computing, Introduction to Blockchain, Data Structures, Algorithms, Deep Learning, Internet of Things, Design Studio: Robotics, Operating Systems, Network Security

Experience

Undergraduate Research Assistant, University of Paris 8 – Paris, France — January 2025 - April 2025

- Conducted remote research on quantifying the economic impact of internet shutdowns in Pakistan, analyzing data trends and policy implications.
- Collaborated with researchers to study the intersection of network disruptions, digital economies, and governance.
- Attended a research workshop in Paris, working alongside **Frédérick Douzet**, contributing to discussions on cybersecurity, internet governance, and economic resilience.
- Assisted in data collection, visualization, and analysis, supporting the development of policy-driven insights on the consequences of network censorship.

Undergraduate Teaching Assistant, Lahore University of Management Sciences – Lahore, Pakistan — Jan 2025 - May 2025

- Assisted in Network-Centric Computing by conducting recitations, grading assignments, and mentoring students in key networking concepts.
- Guided students in developing client-server applications with a focus on socket programming, multi-threading, and congestion control.
- Provided hands-on support for implementing reliable transport mechanisms, including TCP flow control and error handling.
- Facilitated assignments on distance vector (DV) and link-state (LS) routing protocols, helping students understand dynamic routing algorithms.
- Reviewed and debugged student projects on network communication and distributed systems, ensuring practical implementation of theoretical concepts.

Undergraduate Research Assistant, Zong Lab, Lahore University of Management Sciences – Lahore, Pakistan — June 2024 - Present

- Working under the supervision of **Dr. Zafar Ayyub Qazi**, **Dr. Ihsan Ayyub Qazi**, and **Dr. Zartash Afzal Uzmi** on AI-driven networking research.
- Developing LLM-based content moderation techniques to detect and classify inappropriate and misleading online content.
- Implementing IP geolocation methodologies by analyzing traceroute records and network data to improve

accuracy in infrastructure mapping.

- Investigating the impact of internet shutdowns, quantifying their economic and social consequences using network measurement and policy analysis.
- Applying machine learning, NLP, and network analysis to address critical issues in internet governance, security, and digital rights.

Head Undergraduate Teaching Assistant and Course Designer, Lahore University of Management Sciences – Lahore, Pakistan June 2024 - Dec 2024

- Restructured the Introduction to Programming course to include C programming, enhancing students' foundational understanding of low-level programming.
- Designed and developed assignments on C, C++ OOP, and the Standard Template Library (STL) to strengthen students' problem-solving and coding skills.
- Led and managed a team of TAs to conduct lab sessions, ensuring effective hands-on learning and debugging support.
- Deployed a **chatbot** in the lab to provide real-time coding assistance, improving student engagement and reducing wait times for help.

Projects

Automated Content Moderation of YouTube videos and ads using LLMs 2025
Submitted to USENIX Security '25

- Developed a multimodal LLM-based system to improve content moderation on YouTube by detecting inappropriate ads and identifying misclassified child-directed content. Integrated video, audio, and text analysis with optimized processing techniques to enhance efficiency and scalability.
- **Tools Used:** Python, LLMs (GPT-4o, Gemini, Claude), OpenAI Whisper, NLP, Video Processing

IP Geolocation using LLMs 2024

- Developed an LLM-powered system to extract geolocation hints from RIPE traceroutes of infrastructure IPs, improving network infrastructure geolocation. Implemented hostname classification, regex generation, and hint mapping using LLMs to automate pattern recognition. Enhanced scalability by integrating regular expression matching for hostnames to identify geographic encodings more efficiently.
- **Tools Used:** Python, LLMs (GPT-4, Gemini, Claude), Regex Matching, RAG

Meta Smart Glasses Real-Time Video Anonymization Ongoing 2025

- Developing a real-time face detection and blurring system for smart glasses using edge-based processing on the Raspberry Pi 3 to enhance bystander privacy. Exploring lightweight deep learning models such as YOLO v5 Nano, MCUNet, and TensorFlow Lite MobileNet for optimized face detection. The project focuses on achieving efficient, on-device anonymization without relying on cloud processing, ensuring privacy protection in real-world scenarios.
- **Tools Used:** Raspberry Pi 3, YOLO v5 Nano, TensorFlow Lite, MCUNet, Computer Vision, Edge AI

Key Value Server Architecture using Raft Implementation from Scratch 2024

- Designed and implemented a fault-tolerant distributed key-value store using the Raft consensus algorithm to ensure strong consistency, leader election, and log replication across multiple nodes. Built the system from scratch with a focus on high availability and resilience to node failures. Developed the Raft protocol, handling leader election, log replication, and commit synchronization to maintain a consistent replicated state across the cluster.
- Implemented client-server communication using sockets and RPCs for efficient request handling. Optimized performance through efficient log storage and snapshotting techniques.
- **Tools Used:** GoLang, Distributed Systems, Sockets, RPC, Multi-threading, Raft Algorithm

Custom Shell and File System 2024

- Developed a custom UNIX-style shell and file system from scratch, incorporating key operating system functionalities such as command execution, process management, and file system operations. The shell supports built-in commands, executable programs, I/O redirection, command chaining, and piping, mimicking the behavior of standard UNIX shells like Bash.

- Implemented a virtual file system with functionalities for file creation, deletion, and navigation, along with an integrated text editor and calculator for user convenience. Designed a process scheduler to efficiently manage concurrent execution. Ensured modularity and system efficiency using C-based system programming, leveraging fork(), execvp(), dup2(), and pipe() for seamless command execution and inter-process communication.
- **Tools Used:** C, GNU Readline, System Calls (fork, execvp, pipe, dup2), Custom Memory Management

Technical Skills

Languages: C++, C, GoLang, RUST, Python, Solidity, JavaScript, Latex, MERN Stack

Academic and Professional Awards

Dean's Honour List and Top 10 Merit Scholarship Holder 2022 - 2023

Dean's Honour List and Top 15 Merit Scholarship Holder 2023 - 2024

LUMS Learning Institute Teaching and Learning Grant June 2024

NVIDIA Fundamentals of Deep Learning July 2024