

Syed Muhammad Aqdas Rizvi

Karachi, Pakistan

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Profile

A highly motivated Computer Science graduate with a foundation in systems programming, computer networks, and full-stack development. Demonstrated ability to lead independent research, from conceiving and proposing a transport-layer framework (CATS) to its implementation and evaluation in a formal simulation environment. Combines deep technical skills in C++, Python, and Rust with a proven track record in software engineering, open-source contribution, and technical writing. Eager to apply this diverse skill set to challenging problems in a graduate-level research or R&D capacity.

Interests

Computer Networks (**Transport Layer Protocols, Congestion Control, QoS**), Systems Programming, Software Engineering, Full-Stack Development (Web and Mobile), Programming Languages, Applied Machine Learning/Artificial Intelligence, Open Source, and Emerging Technology Trends.

Education

Lahore University of Management Sciences (LUMS)

BS Computer Science

Lahore, Pakistan

Aug 2021 – Jul 2025

Relevant Coursework: Data Structures/Algorithms, Software Engineering, Systems, Databases, AI & ML, NLP, Theoretical Computer Science.

Karachi Grammar School (KGS)

Cambridge A-Levels

Karachi, Pakistan

Aug 2019 – Jun 2021

Subjects: Physics, English Literature, Mathematics, Further Mathematics, Thinking Skills (AS Level)

Awards & Achievements

- Dean's Honour List, 2021–2022 and Fall 2023–2024
- Chandrasekhar Fellowship in Physics (Honorific Fellowship, 2022–2023)
- Graduation with Merit (equivalent to Cum Laude)
- Winner, Astronomy and Logic Modules - Omicron Science Olympiad, Habib University (Feb 2020)
- Winner, Robotics Module and Overall Third Place – STEM Makers Camp, Pakistan Innovation Foundation (Jul 2018)

Research Experience

Independent Researcher

Karachi, Pakistan

Computer Networks - CATS Project

May 2025 – Present

- Conceived, designed, and proposed **CATS (Conductor-driven Asymmetric Transport Scheme)**, a framework to modify TCP with semantic priority awareness. The project's research proposal and a Python proof-of-concept are available. [View Project](#).
- Authored a research paper on the CATS architecture and its performance, currently **under review** for conference publication.
- Implemented the CATS framework as a new TCP socket class in the **ns-3 network simulator**, inheriting from TcpSocketBase and designed for compatibility with modern congestion control algorithms like TCP BBR.
- Developed a detailed simulation experiment modeling a worst-case webpage download, producing verifiable PCAP traces with a custom TCP Option (Kind 253) and detailed performance logs.
- Analyzed simulation results to show CATS's effectiveness, proving it can achieve a **78.7% improvement in First Contentful Paint (FCP)** by correctly reordering packet transmission, with negligible overhead to total page load time.

Center for Speech and Language Technologies (CSaLT)

Student Researcher under Dr. Agha Ali Raza

Lahore, Pakistan

Jan 2024 – May 2024

- Conducted a survey of Keyword Spotting (KWS) technologies for low-resource languages, particularly Urdu. [View Paper](#).
- Identified key challenges and opportunities for improving KWS performance in Urdu.

PhysLab

Student Researcher under Dr. Muhammad Sabieh Anwar

Lahore, Pakistan; Karachi, Pakistan

Jul 2019 – Jul 2021

- **Faraday's Law of Electromagnetic Induction:** Analyzed the law, wrote an experiment manual, and created MATLAB scripts for data processing. [View Experiment](#).
- **Surface Plasmon Resonance:** Refined experimental setup for accuracy and precision.
- **Gravity-Driven Fluid Flow:** Conducted experiments to analyze flow dynamics and evaluated results.

Work Experience

AI in Healthcare Initiative (AIHI), LUMS

Final Year Project: *MigraineAid*

Lahore, Pakistan

Sep 2024 – May 2025

- Working on **MigraineAid**, a project using machine learning to help migraine sufferers predict attacks.
- Developing a dashboard to fetch and visualize data through secure API calls, aiding doctors, researchers, and machine learning scientists. Implementing the backend in Rust for its memory safety, performance, and reliability to fast and secure data processing for real-time analytics in a healthcare context.
- Integrating Firebase Realtime Database and Firestore to manage patient and research data efficiently, with a focus on scalability, data consistency, and long-term production readiness as the project matures.
- Contributing to the development of a patient-facing mobile app in Java, focusing on UI/UX improvements and how it interacts with the database.
- Providing input on ML framework and data collection for migraine prediction.

TeReSol

Software Engineering Intern

Karachi, Pakistan

Dec 2024 – Jan 2025

- Completed a 4-week internship from mid-Dec 2024 to mid-Jan 2025.
- Developed a collection of reusable frontend components of a bank teller interface for the core banking software of **Bank AL Habib Limited**, using Vue.js.
- Implemented a micro-frontend with a finite state machine (FSM) to manage user workflows and connect to the backend API gateway.
- Gained hands-on experience in frontend development, FSM concepts, and secure API calls, ensuring compliance with high-security banking standards.
- Learned about software architecture for secure banking applications, including containerization with Docker and Kubernetes, backend development using the Quarkus framework in Java, and authentication mechanisms with Keycloak.
- Improved soft skills by collaborating with cross-functional teams and understanding the software development lifecycle in an industrial setting.

Robrix - Open Source Matrix Chat Client

Contributor

Remote

Jul 2024 – Jun 2025

- Developing features for real-time chat and improved user interactions using Rust and the Makepad graphics toolkit, as a part of the Robrix framework.
- Contributing to discussions and exploration of solutions for issues, including issues [1](#), [2](#), and [3](#).

Freelance Work

Website Developer

Karachi, Pakistan

May 2020 – Sep 2020

- Built user-friendly websites for **Rawaha Fragrances** and **Mashriq Apparel**.

Under Syed Hussain Aqdas Rizvi

Translator and Editor (Urdu to English)

Karachi, Pakistan

Jan 2019 – Present

- Translating and editing the biography and memoirs of Syed Hasan Rizvi (Shakeb Jalali).

Sindh Institute of Urology and Transplantation (SIUT)

Intern

Karachi, Pakistan

Jul 2017

- Assisted in healthcare operations and patient care during a month-long internship.

Selected Projects

Bump Off!

JavaScript, Chrome Extensions, Manifest V3

Oct 2024

- Developed a Chrome extension, [Bump Off!](#), to efficiently hide spam comments on Facebook posts, improving user experience.
- Gained traction with over 50 students within the first 24 hours of release. [View Repository](#).

LLM-4-LLU: Large Language Models for Low Literacy Users

Python, Whisper-1, GPT-3.5/4, Puppeteer, WhatsApp API

Feb 2024 – May 2024

- Built a system to provide LLM access via WhatsApp, enabling voice-driven interfaces for low-literacy users.
- Ensured scalability to handle over 500 users within 48 hours, delivering form-filling and domain-specific answers.
- Compared AI models for Urdu, balancing quality and affordability. [View Repository](#).

Project Janus

Unity, C#, Adobe Photoshop, Git, Team Collaboration

Jun 2024 – July 2024

- Designed a 2D single-player shooter with dual-timeline mechanics inspired by games like *Chronos Twins*.
- Focused on challenging combat puzzles and seamless timeline-based interactions. [View Repository](#).

Functional Shell

C, Operating Systems, Process Management

Sep 2024

- Implemented core shell functionalities such as command parsing, process control, and execution.
- Developed the shell to support efficient command-line interactions. [View Repository](#).

Functional Trading App

MERN – TypeScript

Apr 2024

- Built a trading application with a scalable backend and reusable front-end interfaces.
- Ensured performance and scalability using the MERN stack. [View Repository](#).

Skills

Technical Skills:

- **Programming Languages:** C/C++, Python, Rust, TypeScript/JavaScript, C#
- **Computer Networking:** Transport Layer Protocols (TCP/IP), Congestion Control (BBR), Quality of Service (QoS), ns-3 Network Simulator, Packet Analysis (PCAP/tcpdump/Wireshark)
- **Frameworks & Libraries:** React, Vue.js, SolidJS, PyTorch, TensorFlow, Docker, Axum, SQLx, Flask, FastAPI
- **Databases & Cloud:** PostgreSQL, MongoDB, Firebase (Firestore, Realtime DB), AWS, Google Cloud
- **Developer Tools:** Git, Docker, Postman, CI/CD, CMake
- **Game Development:** Unity

Creative & Communication Skills:

- **Technical Writing:** Research Papers (L^AT_EX), Technical Proposals, System Documentation
- **Media Production:** Video Editing (Adobe Premiere, DaVinci Resolve), Raster Graphics (Adobe Photoshop, GIMP), Vector Graphics (Inkscape), 3D Modeling (Blender)
- **Interpersonal:** Team Collaboration, Public Speaking, Technical Presentations

Leadership & Community Involvement

Religious Community Service

Karachi, Pakistan; Lahore, Pakistan

Volunteer

2016 – Present

- Organized events, managed security, and distributed food and beverages during community events.
- Acted as the male representative of the community at LUMS, enhancing welfare and representation.

Karachi Grammar School Competitions

Karachi, Pakistan

Organizer

Oct 2019 – Feb 2021

- **KGSO Chairperson and Co-Event Head, Astronomy (Oct 2020 – Feb 2021):**
 - Organized and planned the astronomy module and coordinated the entire event for the Karachi Grammar Science Olympiad (KGSO).
- **KGSO Assistant Event Head, Astronomy (Jan 2020 – Feb 2020):**
 - Assisted in organizing the astronomy module for KGSO.
- **KGX Co-Event Head, Mathematics (Jan 2020):**
 - Organized and led the mathematics module for Karachi Grammar X (KGX).

Karachi Grammar School Societies

Karachi, Pakistan

Society Council Member

Aug 2020 – Jul 2021

- **President, Einstein Society (Oct 2020 – Jul 2021):**
 - Led the school's science society, organizing academic and extracurricular activities to promote scientific learning and engagement.
- **Vice President, Mathematics Society (Aug 2020 – Jun 2021):**
 - Coordinated events, such as workshops, to promote mathematical learning and engagement.

Karachi ScienceBowl (Pakistan Innovation Foundation)

Karachi, Pakistan

Coordinator

Nov 2019

- Assisted with organizing and conducting the Karachi ScienceBowl.
- Acted as a liaison between the Pakistan Innovation Foundation and Karachi Grammar School.

Karachi Literary Initiative

Karachi, Pakistan

Volunteer Teacher

Nov 2019

- Taught pre-primary English and Mathematics to underprivileged children.

Additional Information

Languages:

- **English:** Native/Bilingual
- **Urdu:** Native
- **Hindi:** Fluent