Muhammad Arsalan Khan

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Education

National University of Sciences & Technology, H12 — Islamabad, Islamabad Capital Territory
B.E., Software Engineering | CGPA: 3.48/4.0 — September 2022 - Ongoing

Industry Experience

Motive — Islamabad, Islamabad Capital Territory
Part-time Software Engineer — September 2025 - Ongoing

- Designed a system that precomputes possible vehicle paths via graph modeling and storing them on cloud databases, saving service database and compute costs by **85%**, while handling tens of millions of daily requests.
- Implemented parallel preprocessing pipelines in **C++** and **Python (Pandas, NumPy)** to process hundreds of millions of paths within 1 hour.
- Leveraged **geohashing** and map-matching techniques for efficient path indexing and retrieval, enabling migration from unmanaged memory databases to managed cloud storage while still reducing latency by **50%**.

Software Engineering Intern — June 2025 - September 2025

- Designed and tested a proof-of-concept for migrating large-scale geospatial data (∼1B records) to a cost-efficient database
- Sustained two-digit millisecond latency under thousands of simulated requests/sec, analyzing trade-offs in cost vs. performance for future adoption

Zhejiang University — Hangzhou, Zhejiang, China
Summer Intern — August 2025

- Worked under Dr. Wenliang Du on SEED Emulator, focusing on testing frameworks and Ethereum emulation
- Introduced and integrated interactive notebooks for SEED Labs improving the usability of the emulation tools

Research Experience

TUKL Research and Development Lab, NUST — Islamabad, Islamabad Capital Territory
Research Intern – Deep Learning for EEG Pathology Detection — May 2024 – Aug 2024

- Contributed to a new deep learning framework, NeuroGATE, which achieved 90.7% accuracy on the NMT dataset (approx. 10% above prior SOTA)
- Designed and implemented an end-to-end EEG preprocessing, training, and evaluation pipeline using MNE and PyTorch
- Reviewed and reproduced recent research papers on EEG pathology detection to establish strong experimental baselines
- Experimented with and optimized deep learning architectures (CNNs, LSTMs, attention) for EEG analysis

Additional Experience

Akhuwat STEM School — Remote
IOI Trainer — Jul 2025 - Ongoing

- Train students for Pakistan Olympiad in Informatics (POI)/IOI in C++, DSA, and contest strategy

School of Electrical Engineering and Computer Science, NUST — Islamabad, Islamabad Capital Territory
Teaching Assistant – Data Structures & Algorithms — Sep 2024 – Jan 2025

- Delivered lectures and tutorial/problem-solving sessions on core DSA topics
- Prepared course materials, managed course logistics, and guided students on coding assignments and projects

Achievements

ICPC Pakistan Nationals (3rd Place, Gold Medalist)

- 3rd place out of 100+ teams in ICPC Pakistan National Finals; represented NUST at Asia West Regionals

Competitive Programming

- Candidate Master on CodeForces (top 6% worldwide, peak 1950+) showing strong C++, DSA & problem-solving skills
- National contest placements: 1st place at SOFTEC 2025 (100+ teams), 2nd at NASCON 2025 (180+ teams), 4th at IgnitePK 2025 (1000+ teams)

Leadership & Activities

Google Developer Groups on Campus, NUST Islamabad, Islamabad Capital Territory
Campus Organizer, NUST November 2024 - August 2025

- Led a 40+ member developer community, fostering engagement through technical workshops and networking
- Organized & executed 4+ large-scale tech events, attracting 300+ participants

Skills & Interests

Skills

- **Languages:** Python, C++, GoLang
- **Libraries/Frameworks:** PyTorch, Pandas, NumPy, Django, MNE, Selenium, Matplotlib
- **Platforms & Tools:** AWS (DynamoDB, EKS, EC2, S3), Git, Jupyter Notebooks
- **Concepts:** Deep Learning, Data Structures & Algorithms (DSA), Signal Processing, GeoHashing

Interests: Competitive Coding | Systems Programming | Operating Systems