

# Mustafa Ashfaq

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## EDUCATION

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**Lahore University of Management Sciences (LUMS)**

Sept 2021 – June 2025

*BS Computer Science - SCGPA: 3.58/4.0*

**Key Courses:** Deep Learning, Machine Learning, Data Science, Software Engineering, Network Security, Operating Systems, Data Structures, Algorithms, Database, Linear Algebra, Cloud Development

## PUBLICATIONS (IN PREPARATION)

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- **ConfFuzz:** *Fuzzing Highly Configurable Cloud Systems with Unit Tests as Fuzz Drivers*. In preparation for submission to ATC/NSDI.
- **Ashfaq M., Shahid E., Qazi I.** *LLM Strategy Planner for International Cricket Matches*. In preparation for submission.

## RESEARCH EXPERIENCE

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**Internet, Data, and Society Lab (IDSL), LUMS - Research Assistant**

Sept 2024 – Present

*Advisor: Dr. Ihsan Ayyub Qazi*

- Scraped and aggregated ball-by-ball data and commentary for 3,324 ODI matches from ESPN Cricinfo and CricBuzz using Selenium.
- Created a data cleaning and collection pipeline to aggregate venue-wise and phase-wise statistics for 3,000 international players.
- Leveraged GPT-4 with persona, chain-of-thought, and k-shot examples to generate match-winning strategies for the Pakistan Cricket Team.
- Visualized player-level strengths and weaknesses using Python and Tableau, aiding coaches in tailoring strategic guidance.

**SysNet Group, UIUC - Research Intern**

July 2024 – Present

*Advisors: Dr. Tianyin Xu, Dr. Darko Marinov*

- Established and managed the CloudLab environment to facilitate large-scale, automated testing across multiple cloud software projects, including Apache Hadoop, Hive, and HBase.
- Developed custom BASH and Python scripts to streamline experimental workflows, ensuring efficient and repeatable fuzzing procedures.
- Evaluated the integration of configuration parameter coverage into fuzzer seed selection, resulting in a 5–20% increase in new seeds saved based on project quality.
- leveraged LLM-based triage to quantify and reduce false positives in configuration-induced bug detection.

**CITY at LUMS Group - Research Assistant [link](#)**

July 2023 – Nov 2023

*Advisor: Dr. Muhammad Tahir*

- Performed data cleaning and analysis of the careem traffic dataset consisting of around 4344 hours of data spatially spread around 30 regions.
- Created a hybrid CNN-Transformer (CMT) spatio-temporal regression architecture.
- Engineered CMT for forecasting a week's worth of traffic conditions by analyzing only the preceding four hours data.
- Achieved a rolling MAE of 8.2 on test data which is in line with current state of the art SOTA models.

## TEACHING

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**Teaching Assistant - CS 331**

Jan 2024 – May 2024

- Instructed CS 331 (Intro to AI) for 133 students.
- Designed assignments: BFS, DFS, A\*, Alpha-Beta pruning, regression, decision trees, KNN, SVMs, CNNs.

**Teaching Assistant - CS 202**

Jan 2025 – May 2025

- Instructed CS 202 (Data Structures) for 333 students.
- Developed assignments on fundamental data structures (arrays, linked lists, stacks, queues, trees, heaps, tries, hash tables) and algorithms (sorting, BFS, DFS, Dijkstra).

## PROJECTS

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### Moody Lyrics — AWS, Terraform, Flask, PostgreSQL [link](#) Oct 2024 – Dec 2024

- Designed and developed a mood-based song recommendation web app integrating AWS Cognito for user authentication and LLM chatbot for personalized recommendations.
- Implemented backend APIs using Flask, hosted on AWS EC2 instances, and utilized PostgreSQL (Amazon RDS) for scalable data storage.
- Automated infrastructure provisioning using Terraform, including EC2 Auto Scaling Groups, S3 for frontend hosting, and CloudFront for optimized delivery.
- Conducted load testing using JMeter, ensuring high availability and resilience of AWS services (ALB, Lambda, RDS).

### Project Flow — Flutter, Firebase [link](#) Jan 2024 – May 2024

- Developed a mobile application using Flutter, integrating GPT for enhanced note-taking and task management capabilities.
- Implemented real-time sync and offline functionality (Firebase backend).

### Varsity Cricket Team Data Analysis [link](#) Sept 2023 – Dec 2023

- Collected and processed 310 entries of score data from varsity cricket team scorebooks.
- Applied various ML techniques and concluded that Random Forest Regressor performed best for predicting future match scores and optimal team lineups with an RMSE of 7.08.
- Results summarized in a blog post: [link](#)

### Toxicity Classification in ML [link](#) Sept 2023 – Dec 2023

- Developed and trained machine learning models (Naïve Bayes, Logistic Regression, BERT) to classify six types of toxicity in Wikipedia comments, enhancing content moderation capabilities.
- Performed data preprocessing and cleaning using NLTK and regex, and implemented TF-IDF for feature extraction, resulting in improved model accuracy and efficiency.
- Addressed class imbalance with LeastSampleClassSampler, optimizing predictive performance and ensuring robust model reliability across diverse comment datasets.

### Single Image Dehazing Using Vision Transformer [link](#) Mar 2024 – May 2024

- Optimized “Dehazformer” model with CLAHE preprocessing and encoder/decoder block, expanding the model functionality from dehazing to dehazing-reconstruction.
- Optimized “Dehazformer” model (5x training speed) with stable PSNR (24.47).
- Applied model to segmentation tasks, outperforming baseline.

## TECHNICAL SKILLS

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**Programming Languages:** C, C++, Python, Flutter, JavaScript, Haskell, SQL, LaTeX, Visual Basic

**Software Tools:** VS Code, GitHub, Jupyter, Anaconda, Matlab, Microsoft Excel

**Technologies/Frameworks:** PyTorch, Keras, TensorFlow, Scikit-learn, OpenCV, Pandas, NumPy

**Developer Tools:** Git, Draw.io, Jupyter Notebook, Trello, Slack

## AWARDS/HONORS

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- Semester Deans Honors List
- 100% Merit Scholarship in A-Levels
- Varsity Cricket Team Captain

## COMMUNITY LEADERSHIP & EXTRA-CURRICULARS

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- Peer Ambassador at LUMS for Social Support (PALss)
- Founded NGO Chiraagh, organized charity events with 1000+ student volunteers.
- Led WWF Pakistan’s plantation drive, planting 500 saplings across Lahore.
- Played competitive cricket for 10 years, earning multiple awards under PCB.