

EDUCATION

Ph.D. Computer Science

2023

Lahore University of Management Sciences (LUMS), Lahore, Pakistan

- Ph.D. Thesis: “Data-Driven Approaches for Context-Aware Sports Performance Assessment and Web Energy Optimization”
- Major Courses: Big Data Analytics, Topics in Computer and Network, Network Security, Internet of Things, Multicore Computing, Human Computer Interaction Design

MS Computer Science

2015

Lahore University of Management Sciences (LUMS), Lahore, Pakistan

- MS Thesis: “Efficiently Finding Minimal Failing Input in Map-Reduce Programs”
- Major Courses: Machine Learning, Reliable Software, Distributed Systems, Topics in Internet Research, Service Oriented Computing, Computer Architecture

BS Information Technology

2012

National University of Science and Technology (NUST), Islamabad, Pakistan

- Final Year Project: “Design and Development of Java Parallel I/O Library”
- Major Courses: Web Technologies, Computing Algorithms, Operating System, Database Systems, Software Engineering, Computer Graphics, Data Warehousing & Data Mining, Enterprise Network Technologies (Linux)

TEACHING AND ADVISING EXPERIENCE

Course Instructor as *Senior Application Engineer* at LUMS, Lahore

2023-Present

CS 100: Computational Problem Solving

Spring 2024

- Teaching separate section as a lead instructor

CS 300: Advanced Programming

Spring 2024

- Teaching separate section as a lead instructor

CS 491A/B: Senior Year Projects Advising

Fall 2023, Spring 2024

- Co-advising seven senior year projects

CS 100: Computational Problem Solving

Fall 2023

- Lead instructor for two lab sections and delivering class lectures for continuity.

Visiting Faculty at FAST-NU, Lahore, Pakistan

CS 205: Operating Systems

Spring 2015

Graduate Teaching Assistant at LUMS, Lahore

CS 200: Introduction to Programming

Summer 2017

Teaching Assistant at LUMS, Lahore

CS 510: Design and Analysis of Algorithms

Spring 2015

CS 582: Distributed Systems

Fall 2014

CS 310: Algorithms

Spring 2014

Teaching Assistant at SEECS NUST, Islamabad

CS321: Enterprise Network Technologies/Linux	Spring 2012
CS 251: Design and Development of Algorithms	Spring 2012
ISE312: Computing Algorithms	Spring 2011
ISE205: Object Oriented Programming using C++	Summer 2011
ISE103: Computer Fundamentals and C Programming	Fall 2010
EE221: Digital Logical Design	Spring 2011, Spring 2012
EE241: Digital Logical Design	Spring 2010, Fall 2010, Spring 2011, Fall 2011

RESEARCH EXPERIENCE

PhD Research Associate

Jan 2021-Present

Data Analytics Lab, LUMS, Lahore

- Sports Data Analytics [7]
- Modeling Power Consumption of Websites [5]
- 3D Wireless Sensor Networks Localization [1]
- OCR of Ancient Arabic Documents [9]
- Nanobody-Antigen Interaction using Machine Learning [10]

PhD Research Fellow

Sep 2014-Dec 2020

Program Analysis Lab, LUMS, Lahore

- Verification of MPI Java Programs using Software Model Checking [6], [12], [13]
- Efficiently Finding Minimal Failing Input in MapReduce Programs [11]

Research Assistant

Jul 2010-Sep 2012

High-Performance Computing Lab, SEECS NUST, Islamabad

- Parallel I/O Library for MPJ Express [15]
- **Summer Research Internee 2011**
 - * Profiling of MPJ Express
- **Summer Research Internee 2010**
 - * Hands-on development using MPJ Express
 - * Proofreading and editing of a book on parallel computing in Java using \LaTeX

PROFESSIONAL EXPERIENCE

Software Development Engineer

Jan 2013-Aug 2013

xFlow Research Inc., Islamabad

- Software-Defined Networking Applications Development [14]

Software Engineer

Jul 2012-Jan 2013

Techlogix, Islamabad

- Provided software support for Oracle Flexcube Banking Solution across all Askari Bank branches nationwide

SELECTED ACADEMIC PROJECTS

- Context-Aware Location-Sensitive Crowdsourcing Platform Human Computer Interaction (Fall 2016)
- Partial Evaluation of Aggregates in OCCAM Topics in Computer and Network Security (Fall 2016)
- A Survey of Clouds for Social Computing Service Oriented Computing (Spring 2015)

- Towards Generalizing Data Center Traffic Characteristics
- Reliable Identification of Counterfeit Medicine [16]

Distributed Systems (Fall 2013)
Distributed Computing (Fall 2011)

SELECTED PUBLICATIONS

- [1] M. Islam, M. Ikram, M. Alhussein, **M. S. Ayub**, *et al.*, “A Component-Based Localization Algorithm for Sparse 3-D Wireless Sensor Networks”, *IEEE Access*, 2024.
- [2] F. Ullah, U. Azam, A. Faheem, **M. S. Ayub**, *et al.*, “Detecting Cybercrimes in Accordance with Pakistani Law: Dataset and Evaluation using PLMs”, in *Joint International Conference on Computational Linguistics, Language Resources and Evaluation (LREC-COLING)*, ELRA, 2024.
- [3] S. Alam, **M. S. Ayub**, S. Arora, and M. A. Khan, “An Investigation of The Imputation Techniques for Missing Values in Ordinal Data Enhancing Clustering and Classification Analysis Validity”, *Decision Analytics Journal*, vol. 9, p. 100 341, 2023.
- [4] S. Alam, X. Zhao, I. K. Niazi, **M. S. Ayub**, and M. A. Khan, “A Comparative Analysis of Global Optimization Algorithms for Surface Electromyographic Signal Onset Detection”, *Decision Analytics Journal*, vol. 8, p. 100 294, 2023.
- [5] **M. S. Ayub**, N. Mustafa, S. Ali, *et al.*, “Modeling Power Consumption of Web Apps using Static Design Features”, Under Review, 2023.
- [6] **M. S. Ayub** and W. U. Rehman, “Verifying Non-Deterministic Behavior of MPI Java Programs using Software Model Checking”, Under Review, 2023.
- [7] **M. S. Ayub**, N. Ullah, S. Ali, *et al.*, “CAMP: A Player Performance Metric for Data-Driven Man of the Match Prediction in Cricket”, *Journal of the Operational Research Society*, 2023.
- [8] S. Alam, R. Pande, **M. S. Ayub**, and M. A. Khan, “Towards Developing an Automated Chatbot for Predicting Legal Case Outcomes: A Deep Learning Approach”, in *Asian Conference on Intelligent Information and Database Systems (ACIIDS)*, Springer, 2023.
- [9] S. Faizullah, **M. S. Ayub**, S. Hussain, and M. A. Khan, “A Survey of OCR in Arabic Language: Applications, Techniques, and Challenges”, *Applied Sciences*, vol. 13, no. 7, p. 4584, 2023.
- [10] U. Sardar, S. Ali, M. S. Ayub, *et al.*, “Sequence-Based Nanobody-Antigen Binding Prediction”, in *International Symposium on Bioinformatics Research and Applications*, Springer, 2023, pp. 227–240.
- [11] **M. S. Ayub** and J. H. Siddiqui, “Efficiently Finding Minimal Failing Input in MapReduce Programs”, in *International Conference on Software Engineering: Companion (ICSE-Companion)*, IEEE, 2018, pp. 177–178.
- [12] **M. S. Ayub**, W. U. Rehman, and J. H. Siddiqui, “Experience Report: Verifying MPI Java Programs Using Software Model Checking”, in *International Symposium on Software Reliability Engineering (IS-SRE)*, IEEE, 2017, pp. 294–304.
- [13] W. U. Rehman, **M. S. Ayub**, and J. H. Siddiqui, “Verification of MPI Java Programs using Software Model Checking”, in *ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*, ACM, 2016, pp. 1–2.
- [14] Q. Maqbool, **M. S. Ayub**, J. Zulfiqar, and A. Shafi, “Virtual TCAM for data Center Switches”, in *Conference on Network Function Virtualization and Software Defined Network (NFV-SDN)*, IEEE, 2015, pp. 61–66.
- [15] A. A. Awan, **M. S. Ayub**, A. Shafi, and S. Lee, “Towards Efficient Support for Parallel I/O in Java HPC”, in *International Conference on Parallel and Distributed Computing, Applications and Technologies (PDCAT)*, IEEE, 2012, pp. 137–143.

- [16] S. U. Rehman, R. U. Rasool, **M. S. Ayub**, *et al.*, “Reliable Identification of Counterfeit Medicine Using Camera Equipped Mobile Phones”, in *High Capacity Optical Networks and Enabling Technologies (HONET)*, IEEE, 2011, pp. 273–279.

PROFESSIONAL AND COMMUNITY SERVICES:

- **Residence Fellow, LUMS, Lahore, Pakistan** Jun 2014-May 2017
 - Overseeing student housing and support services on a part-time basis during evenings and weekends
- **Journal Reviewer/Conference TPC Member**
 - **Journals:** IEEE Access, EduLearn, IJCDS, IJEECS
 - **Conferences:** CHI, INTRACT, IEEE-3ICT, ADICS-ESIT, AICTC, AECT, IEEE-GCCCE, IEEE-ICOMITEE, EECSI, SCS-NCC, IEEE-ICCAIS, ICCAT, ISSPIT, ICCISN, ICSNC, ICARCAD, ISCPDM
 - **Co-Reviewer:** ICST, ISSRE
- **Volunteer**
 - Open Day, LUMS, Lahore 1st Feb,2015
 - Graduate Orientation, LUMS, Lahore 29th Aug,2014
 - Funfair for Special People, F9 Park, Islamabad 7th Apr,2012

SCHOLARSHIPS AND AWARDS

- GPA Based Scholarship Spring 2010
- Fully Funded Scholarship for BS Degree 2008 - 2012
 - Prime Minister National ICT&RD Fund

RELEVANT SKILLS

- Python, Java, C/C++, MySQL, \LaTeX , HTML, CSS, JavaScript, PHP, Matlab, Haskell, Git