

# Ahmad Mohsin

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## PROFILE

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- Highly motivated Research & Development professional with a strong Computer Science background in Industry and academia.
- Excellent Teaching and Research experience in Computer Science and Software Engineering of more than 8 years at National and International Universities.
- Expertise in Supervision, monitoring, and execution of Bachelors and Master Degree Thesis in Computer Sciences
- Rich Experience in conducting software models verification and validation of complex systems using simulations
- Probabilistic Software modeling and predictive analytics of systems properties
- Special Skills in Big Data Analytics, Data Intelligence, and software security analysis.
- Expertise in AI systems design methodology, data preparation training, and models evaluation
- Hands-on knowledge and implementation skills of Blockchain Technologies for solving complex challenges

## EDUCATION

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### **Doctor of Philosophy (Information Technology) (2017- September 2021)**

Edith Cowan University, Australia

Dissertation: "A Framework to Support the Modeling, Verification and Simulations of System-of-Systems Architecture"

### **Master of Science (SPM) (2007- 2009)**

Master of Science Specialization in Software Project Management

FAST School of Computing, National University of Computer and Emerging Sciences, Pakistan

Major in: Advanced Software Engineering, Software Requirements Engineering, Software Quality Management

### **Bachelors- Computer Science (BCS-Hons) (2001- 2005)**

Department of Computer Sciences Bahauddin Zakriya University Multan) Final Thesis

Project: Designed and Developed Image Processing Application

## RESEARCH INTERESTS

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- Machine Learning, Explainable AI for Reliable Intelligent Systems
- Software Architecture Predictive Modeling and Simulation
- Real-Time AI based Monitoring and Prediction Systems
- Integration of Blockchain and Internet of Things for solving complex problems

## INDUSTRY AND ACADEMIC EXPERIENCE

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### **Doctoral Researcher-Software-Intensive Systems Modeling and simulation Experience (2017- 2021) Edith Cowan, University, WA, AU**

#### **Design of Domain Specific Modeling Language**

Proposed and designed a Domain Specific Language (DSL) by extending existing formalism to bring reasoning capabilities at architectural level with hybrid stochastic syntax and semantics . The proposed DSL overcomes the limitations of existing modeling languages for modeling the large scale software intensive systems such as smart emergency response systems and smart grid systems . The resulting models produced for the first time in the literature are qualitative (constrain and compose system structure and behavior) and quantitative models.

#### **Model-Checking and Simulation of Software Architecture**

Architecture analysis of designed models form DSL are performed through Statistical model-checking and stochastic simulation. Unique architecture analysis are enabled by formally transforming models for verification and validation. Software-Intensive systems are evaluated through steady-state and transient analysis using unique stochastic verification and validation algorithms. For the first time Markovian Discreet Systems Specification based simulations are done for a software architecture model to predict system functionalities and quality attributes.

### **Software Projects Auditor (July 2021-Present)**

#### **Department of Computer Science and Software Engineering, University of Western Australia**

Working with Software Engineering Faculty to manage innovative projects being done with industry clients by various teams of Practicums. Following are the core duties:

- Auditing of Software Projects to verify their conformance with Client Requirements, Design and Implementation
- Sprint Meetings, Sprint Planning, Epics prioritization with Teams, audit of time sheets, group meetings,
- Evaluation of projects artefacts through private GitHub repositories for each project
- Monitoring of Agile Devops activities and tasks for each team and track of projects milestones.

### **Researcher- Enhancing Systems Architecture (July 2019-Oct 2019)**

#### **Cinglevue International Pty Ltd, Perth Western Australia (A joint project of AMSI Australia, APRINTERN and Cinglevue)**

I was able to contribute towards Australian Software Industry, by providing cutting edge solution (POC) for enhancing system

architecture of jointly funded project by Australian Government and AMIS Australia. Following are the tasks that I performed in this project:

- Evaluation and trade-off analysis of existing Virtuoso System Architecture and Data Lake using ATAM Standard.
- Meetings with Business Analysts, Chief Systems Architect to evaluate Business and System Requirements.
- Identify, analyze, and document system and application requirements, interacting directly with research team.
- Proposal and design of a new Event-Driven Architecture encompassing existing Data lake, Data Processing, and visualizations.
- Based on the proposed Architecture Model, designed, and developed a POC for Real-Time Events Streams Processing for Big Data Pipelines encompassing various use-cases.
- Successful POC Implementation, Demo, Data Analysis and Visualizations Dashboards design to support Real- Time Events Stream Processing for Virtuoso Platform.

**Unit-Coordinator, Computer Science 2018 – Present**  
**School of Science, Computing and Security, Edith Cowan University, Australia**

Started working with ECU as Instructor/Tutor and later given a leadership role of Unit Coordinator. I had the responsibility for delivering a range of courses in department of Computing and Security (ECU) including:

- Object Oriented Analysis and Design, Software Architecture and Design
- Operating Systems, Fundamentals of Software Engineering

In this role, I performed following responsibilities while teaching these courses at ECU

- Unit Design, Course content generation, Lectures preparation, Assessments Planning
- Lessons Preparation with updated contents, Workshops Design, Labs Conducts
- Pre- Lab Demos of Problem Scenarios and Overview of Labs Tasks (AADL, Design Patterns)
- Semesters Projects design, assignments design and marking in Blackboard LMS.
- Marking and assessment of exams and term projects with feedback
- Conduct in-Lab Seminars, Recording of Lab sessions using PanoptoStudio for online students

**Lecturer | Assistant Professor, Computer Science (AUG 2011- Present)**  
**Department of Computer Science & Engineering Air University, Pakistan**

I joined Air University as Lecture in 2011 and later promoted to Assistant Professor, Computer Sciences with focus areas in Software Engineering. In this role, I had responsibility for delivering a range of courses in the Department of Computer Science & Engineering (AU), including:

- Computer Programming (C++), Object Oriented programming using C++ and Java
- Visual Programming, C#, ASP.NET, RESTful APIs (.Net Framework-2015-17)
- Software Requirements Engineering
- Software Engineering with Python Applications. (Capstone Projects for evaluations)

I prepared the course outline, delivered lectures, prepared and marked quizzes, assignments and exams and administrated student grades. I have co-supervised 3 Master of Science (MS) students and supervised 10 Bachelor in Computer Science (BCS) students in their Thesis and final year projects respectively. Besides teaching, as a member of the software design and development team, I worked on the following projects:

1. **RFID** based Inventory Management Systems (In Collaboration with Mobile Distribution Company)
2. Smart Parking System (In Collaboration with University **Projects Practicum- UNIT** and Parking Contractors)
3. Internet of Things (**IoT**s)- **based Health Monitoring System** using Wearable Sensors (In Collaboration Nishtar Hospital Multan)

**Research and Development Responsibilities using cutting edge technologies for Systems design**

- Team Lead for software Projects **practicum incubator** on Industry Standards for University Projects.
- Research, align and customize software engineering best practices into Software practicums deliverables
- Worked as Project Lead in University Automation for Online Presence-Web Portals, LMS and Implementation of Online Admission System **as a pilot project** for University ONLINE.
- Designed **IoT based research projects**, aligning web services and python-based development in advance courses

**Technology Entrepreneur (2009-2011) IWSol Pakistan**

- Applied software Engineering best practices, design skills, and creative thinking to build cutting-edge solutions.
- Interacting with clients for software requirements gathering, prioritization using UML, MS Visio.
- Detailed application level Modeling, architecture analysis and database design with Enterprise Architect.
- Projects schedule planning, execution and tracking using MS Project and team collaborating using ASANA
- Specification of use-cases and design of functional test cases for assigned modules in standard SRS templates
- Software project development over a range of applications mostly using PHP (Wordpress, Joomla frameworks), Apache, MySQL, JQuery, XML, CSS and other open source web technologies.

**Projects**

1. TicketChaos integration with <https://www.ticketnetwork.com/> (2009-2010) Roles: Integration of Ticketnetwork APIs into Ticketchaos project using PHP, custom Database design and architecture
2. Transformation of Online Rugs business into Ecommerce based systems with various features (2010) Roles: Evaluation of existing system, Requirements prioritization, payment gateway integration
3. Marriage Match for Muslim Couples in Denmark. <http://marriagmatch.dk> (2010-11) Roles: SRS, Database Design, Payment Gateway Integration, Testing and Deployment
4. Design of online Portal for Virtual University Knowledge Sharing Series VPN- Access only (2009)

**NATIONAL AND INTERNATIONAL RESEARCH PROJECTS MANAGEMENT SKILLS**

I had the opportunity for managing and contributing to national and international research projects some of the research management gained are:

- Working in diverse multicultural teams through collaboration in joint projects (Research Teams from Brazil, USA, and Europe)
- Working with a Supply-Chain Research Group in Melbourne University
- Communication and coordination with team members, from problem identification, research methodology to solution design.
- Planning and participating at Research labs meetings and detailed discussions
- Providing guidance to other research students at undergraduate and graduate level

## TECHNICAL SKILLS AND TOOLS

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- AI Tools: TensorFlow and Keras Machine learning frameworks.
- Data Modeling, Processing and visualizations: in Python 3.2, Python Notebooks using Anaconda with (Numpy, Pandas and Matplotlib).
- Statistical Models Verification: PRISM Model Checker (4.5)
- Stochastic Simulations of system functional and quality attributes: DEVS based MS4 Me(3.0)
- Software Design and Architecture development using UML, SysML andAADL
- Model Driven Engineering: Eclipse Modeling Framework (EMF 2.5) with JAVA, Xtext, Xtend and Xbase
- Data Interchange (JSON, XML), Documentation: Latex, MSoffice
- Cloud Computing: AWS EC2, AWS Lambda, GitHub, Docker Containers Orchestration in Linux

## SCIENTIFIC PUBLICATIONS

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### Peer Reviewed: International Conferences

- Mohsin. A et al. "Model Synthesis and Stochastic Automated Verification of Systems-of-Systems Dynamic Architectures" In 12thIEEE-ICACSI-2020 October 17-18, 2020, Indonesia  
<https://doi.org/10.1109/ICACSI51025.2020.9263119>
- Valdemar Vicente, Mohsin. A et al. "Abstract Software Architectures to Deal with Constituents Uncertainties in Systems-of-Systems". In 1st Uncertainty in Modeling Workshop 2020, Oct 18–23,2020
- G. Teixeira , Mohsin. A et al., "Constituent System Design: A Software Architecture Approach," 2020 IEEE International Conference on Software Architecture Companion (ICSA-C), Salvador, Brazil, 2020, pp. 218-225,<https://doi.org/10.1109/ICSA-C50368.2020.00045>
- Mohsin. A, N. K. Janjua, S. M. S. Islam and V. V. Graciano Neto, "Modeling Approaches for System- of- Systems Dynamic Architecture: Overview, Taxonomy and Future Prospects," 2019 14TH ANNUAL CONFERENCE SYSTEM OF SYSTEMS ENGINEERING (SOSE), Anchorage, AK, USA, 2019, pp. 49-56, <https://doi.org/10.1109/SYSOSE.2019.8753877>
- Mohsin. A, S. I. R. Naqvi, A. U. Khan, T. Naeem and M. A. AsadUllah, "A comprehensive framework to quantify fault tolerance metrics of web centric mobile applications," 2017 International Conference on Communication Technologies (ComTech), Rawalpindi, 2017, pp. 65-71, <https://doi.org/10.1109/COMTECH.2017.806575>
- Mohsin. A, S. Asghar and T. Naeem, "Intelligent security cycle: A rule based run time malicious code detection technique for SOAP messages," 2016 19th International Multi-Topic Conference (INMIC), Islamabad, 2016, pp. 1-10, doi: 10.1109/INMIC.2016.7840097.
- Nawaz F., Mohsin A ., Fatima S., Janjua N.K. (2015) Rule-Based Multi-criteria Framework for SaaS Application Architecture Selection. In: Dillon T. (eds) Artificial Intelligence in Theory and Practice IV. IFIP I 2015. IFIP Advances in Information and Communication Technology, vol 465. Springer, Cham. [https://doi.org/10.1007/978-3-319-25261-2\\_12](https://doi.org/10.1007/978-3-319-25261-2_12)
- Mohsin, A ., Raza, S. I., & Fatima, S. (2014). Thread models Semantics: Solaris and Linux M: N to 1:1 thread model. Paper presented at the First International Conference on Modern Communication & Computing Technologies (MCCT'14). DOI: 10.13140/RG.2.1.4608.9767
- Muhammad Summair Raza, Shafqat Hussain Majoka, and Ahmad Mohsin. 2010. An integrated approach for developing semantic-mismatch free commercial off the shelf (COTS) components. In Proceedings of the 8th International Conference on Frontiers of Information Technology (FIT '10). Association for Computing Machinery, New York, NY, USA.

### **Journal Publications**

- Mohsin A., N. K. Janjua, S. M. S. Islam and M. A. Babar, "SAM-SoS: A Stochastic Software Architecture Modeling and Verification Approach for Complex System-of-Systems," in IEEE Access, vol. 8, pp. 177580- 177602020, <https://doi.org/10.1109/ACCESS.2020.3025934>.
- Nawaz, F., Mohsin, A. & Janjua, N.K. Service description languages in cloud computing: state-of- the-art and research issues. SOCA 13, 109–125 (2019). <https://doi.org/10.1007/s11761-019- 00263-z>
- Mohsin, A., Janjua, N.K. A review and future directions of SOA-based software architecture Modeling approaches for System of Systems. SOCA 12, 183–200 (2018). <https://doi.org/10.1007/s11761-018-0245-1>
- Mohsin, A , M. I. R., Sumbul Aziz Khan, Quratulain Munir. (2013). "Scheduling in Multi-core Systems: Minimizing Average Waiting Time by merging (Round-Robin with Shortest-Job-First Technique)". International Journal of Information Technology and Electrical Engineering, 2(4), 37-43. ISSN: 2306708X.

### **Submitted Paper- International Collaboration**

- Valdemar Vicente, Mohsin. A et. al " Towards Foundations for Systems-of-Information Systems: Research Perspectives from SoS Inception to Modeling and Verification" 2021 16TH ANNUAL CONFERENCE SYSTEM OF SYSTEMS ENGINEERING (SOSE), Västerås, Sweden, June 14-182021

### **Work in Progress**

- Ahmad Mohsin, Naeem Janjua, et al. "Stochastic Simulation of System of Systems Missions and Quality Attributes using Markov DEVS: From Software Architecture Models to Simulations.
- Irfan Raza, Ahmad Mohsin, et al. "IOTA Tangle Lightweight Blockchain: Direct Acyclic Graph (DAG) base Architecture for IoT data Scalability and Access control in Building Automation Systems (BAS)"

### **HONOURS AND AWARDS**

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- Awarded Prize for "IEEE Perfect Pitch Graduate Research Competition" as Second Place, IEEE Western Australia 2021
- Awarded Outstanding Talent Scholarship (OTS) from PITB, Pakistan (2007)
- Won, Silver Medal in MS Degree for securing overall second position at FAST- NUCES Pakistan (2010)

### **GRANTS AND SCHOLARSHIPS**

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- Awarded Higher Degree by Research Scholarship (HDRS) for PhD Program at ECU, Total Scholarship Grant: (\$ AUD 98,000) Australia (2017- 2021)
- Secured, First Ever APR- Internship Grant for Doctoral Research for industrial collaboration APR- INTERN-AMSI and Government of Australia (Project Cost: \$ AUD 20,500) ( 2019)
- Awarded Research Grant under Strategic Research Fund (SRF) (\$ AUD 2400)
- Awarded Research Grant by ECU- HDRS for Research Equipment (\$ AUD: 4500)

### **PROFESSIONAL DEVELOPMENT**

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- ECU Faculty Development Trainings and Certifications: On-Campus Teaching & Learning (PDC111) and PDC (112) Unit Coordinator Training PDC (113) (2018- 2021)
- Research Integrity Training Course by Epigeum Oxford University Press 2021
- Training - Introduction to Public Speaking Workshop (ECU, Joondalup), by Rostrum Training Council, Perth Australia 2018
- Training- PCEPT by Higher Education Commission (HEC) Pakistan 2016
- 4 Days Long Data Science Workshop (Big Data and Machine Learning Real- life Projects Hackathons) 2017

### **COURSES- EMERGING TECHNOLOGIES**

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#### **Internet of Things**

- The Internet of Things (IoT) 4 Weeks Long course, Run by Professor Mischa Dohler and awarded by Kings College London UK
- Digital Technologies Case Studies: AI, IOT, Robotics, Blockchain, Project Management Institute USA.

#### **Blockchain Technologies**

- Blockchain Essentials by IBM Cognitive Class AIUSA
- Blockchain: Beyond the Basics by LinkedIn Learning USA

#### **Software Design with Emerging Architecture Patterns**

- Certificate 1 Mastering Microservices with JAVA –LinkedIn Learning USA
- Certificate 2 Software Architecture and Design –IEEE Continuing Education USA

## PROFESSIONAL BODIES MEMBERSHIPS

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- IEEE- Member Asia Pacific Region and WA Section
- IEEE WA Section and IEEE ECU Chapter 2020 Committee Member
- AISA – Australia Information Security Association, Member since