Research Student Profile

Title	Mr.
Name	Ahmad Mohsin
Level (e.g. PhD)	PhD
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Overview of thesis

Systems-of-Systems (SoS) result from the collaboration of independent Constituent Systems (CSs) to achieve particular missions. CSs are not totally known at design time, and may also leave or join SoS at runtime, which turns the SoS architecture to be inherently dynamic, forming new architectural Configurations and impacting the overall system quality attributes (i.e. performance, security and reliability). Recently these systems have emerged in the form of Internet of Things (IoTs) and Cyber-Physical Systems (CPS), in a range of domains like health, transportation, energy, defence and natural disaster management. As such, these systems play a critical role in the success of socioeconomic and business processes, leaving an impact on human lives. it is vital to model and evaluate the impact of these stochastic architectural changes on SoS properties at abstract level at the early stage in order to analyze and select appropriate architectural design. Architectural description languages (ADL) have been proposed and used to deal with SoS dynamic architectures. However, these techniques lack the expressive power of syntax and formal semantics to model and reason about dynamic architecture, resulting configurations and their impact on system quality attributes.

This research proposes a model-based framework to specify and reason about the dynamic archiecture of SoS. The existing formalism of process algebra shall be extended by incorporation of semantics to deal with stochastic dynamic architecture at runtime. Formal models shall be transformed into stochastic models to generate possible system configuration state transitions. The proposed thesis validates the approach with simulation of benchmark SoS case studies with possible configurations and the impact of these structural changes on system quality attributes and ultimately provides alternative architectures to system architects to make better design decisions.

Qualifications
- Master of Science (SPM), National University of Computer & Emerging Sciences, FAST-NUCES, Islamabad, Pakistan (2009).
- Bachelors of Science in Computer Sciences, Bahauddin Zakariya University, Multan Pakistan (2005)
- The Internet of Things, Kings College London (2017)

Skills
- C++, C# .NET, Python 2.7, Eclipse Modeling Framework (EMF)
- MS project, MS Visio
- Latex (Bakoma, Overleaf), JabRef, Endnote

Online profiles

ResearchGate profile	https://www.researchgate.net/profile/Ahmad_Mohsin
LinkedIn profile	https://www.linkedin.com/in/ahmadmohsin/

Awards and Recognition
- ECU- HDR (PhD) Scholarship (Dec- 2017)
- Awarded PITB-Outstanding Talent Scholarship (MS) (2008)
- Awarded Medal of Honour (MS)- (2010)

Research

Research Interests
- Software Architecture, Internet of Things, Cyber physical Systems

Past Teaching
- Software Testing, Software Architecture & Design, OOP, Visual Programming

Recent Publications (within the last five years)
Journal Articles
- Mohsin, A., & Janjua, N. K. (2018). A review and future directions of SOA-based software architecture modeling approaches for System of Systems. Serv. Oriented Comput. Appl., 12(3-4), 183-200. doi:10.1007/s11761-018-0245-1.
- Mohsin, A., Fatima, S., Khan, A., & Nawaz, F. (2016). An Automated Approach for Web Services Architectural Style Selection. J Inform Tech Softw Eng, 6(176), 2.

Book Chapter
- 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 AI 2015. IFIP Advances in Information and Communication Technology, vol 465. Springer, Cham

Conference Publications/ Presentations

- Mohsin, A., Naqvi, S. I. R., Khan, A. U., Naeem, T., & AsadUllah, M. A. (2017). A comprehensive framework to quantify fault tolerance metrics of web centric mobile applications. Paper presented at the 2017 International Conference on Communication Technologies (ComTech).
- Mohsin, A., Asghar, S., & Naeem, T. (2016). Intelligent security cycle: A rule based run time malicious code detection technique for SOAP messages. Paper presented at the 19th IEEE International Multi-Topic Conference (INMIC).
- Nawaz, F., Mohsin, A., Fatima, S., & Janjua, N. K. (2015). Rule-based multi-criteria framework for SaaS application architecture selection. Paper presented at the IFIP International Conference on Artificial Intelligence in Theory and Practice.

Supervisors
Dr. Naeem Khalid Janjua, Dr. Syed MS Islam, Dr. Martin Masek

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