

# Waqar Ahmad

## Education

- 2017 **Ph.D. Information Technology**, *National University of Sciences and Technology*, Pakistan, Formal Dependability Analysis using Higher-order-logic Theorem Proving. within SAvE lab under the supervision of Dr. Osman Hasan
- 2012 **M.Phil. Electronics**, *Quaid-i-Azam University*, Pakistan, *CGPA – 4.0/5.0*. Efficient Implementation of Computationally Complex Algorithm under the supervision of Dr. Hasan Mahmood
- 2008 **M.Sc. Electronics**, *Quaid-i-Azam University*, Pakistan, *First Class*.

## Academic Positions

- Research Assistant**, System Analysis and Verification (SAVe) Lab, NUST, Pakistan
- 2017–19 **ICT Fund**, UAE
  - Project Investigation of Effective Management of Energy Demand in Distribution Management Systems of Smart Grids using Formal Verification Methods
  - Investigators Dr. Falah Awwad (PI), Dr. Osman Hasan (Co-PI), Dr. Syed Rafay (Co-PI USA)
- 2014–15 **Der Deutsche Akademische Austauschdienst (DAAD)**, Germany
  - Project Formal Verification of Distributed Thermal and Resource Management Schemes for on-chip Many-core Systems
  - Investigators Osman Hasan (PI), Prof. Dr. Joerg Henkel
- 2012–15 **Qatar National Research Fund (QNRF)**, Qatar
  - Project Formalization of Information Theories and Application in Engineering Systems
  - Investigators Sofiene Tahar (PI), M. Salah Hamdi, Osman Hasan
- Teaching Assistant**, School of Electrical Engineering and Computer Science, NUST, Pakistan
- Spring 2017 Course: (SE320) Formal Methods
- Fall 2013-14 Course: (E423) Embedded System Design Lab
  - Duties Teaching a class of  $\approx 40$  undergrad students (tutorial)
  - Supervision of student lab experiments
  - Checking assignments and grading

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## Publications

### Book Chapters

- 1 W. Ahmad, O. Hasan, and S. Tahar, "Chapter 36: Formal Reliability Analysis of Railway Systems using Theorem Proving Technique", *Handbook of RAMS in Railway System: Theory and Practice*, Taylor & Francis Group, 2017
- 2 W. Ahmed, H. Mahmood, and U. Siddique, "Efficient Implementation of Computationally Complex Algorithms: Custom Instruction Approach", *Electrical Engineering and Intelligent Systems*, Springer, 2013.

### Refereed Journals

- 1 W. Ahmad, O. Hasan and S. Tahar, "Formal Reliability and Failure Analysis of Ethernet based Communication Networks in a Smart Substation", *Quality and Reliability Engineering International*, Wiley Online Library, 2017 (Under Review)
- 2 W. Ahmad, S. Khan and O. Hasan, "Formal Fault Tree Analysis using a Hybrid Model Checking and Theorem Proving based Approach", *Special Issue of Software Security*, IEEE, 2017 (Under Review)
- 3 W. Ahmad, O. Hasan, S. Tahar and M. S. Hamdi, "Formal Reliability Analysis of Oil and Gas Pipelines", *Proceedings of the Institution of Mechanical Engineers, Part O: Journal of Risk and Reliability*, SAGE Publishing, 2017, DOI: 10.1177/1748006X17694494 (IF: 1.084)
- 4 W. Ahmad, U. Pervez, J. Qadir and O. Hasan, "Reliability Modeling and Analysis of Communication Networks", *Journal of Network and Computer Applications*, Elsevier, volume 78, pp. 191-215, 2016 (IF: 3.5)
- 5 W. Ahmad, O. Hasan and S. Tahar, "Formalization of Reliability Block Diagrams in Higher-order Logic", *Journal of Applied Logic*, Elsevier, volume 18, pp. 19-41, 2016 (IF: 0.838)

### Peer Reviewed Conferences

- 1 W. Ahmad, and O. Hasan, "Formalization of Fault Trees in Higher-order Logic: A Deep Embedding Approach," *Symposium on Dependable Software Engineering Theories, Tools and Applications (SETTA-2016)*, Springer, LNCS 9984, Beijing, China, pp. 264-279.
- 2 W. Ahmad, and O. Hasan, "Formal Availability Analysis using Theorem Proving," *18th International Conference on Formal Engineering Methods (ICFEM-2016)*, Springer, LNCS 10009, Tokyo, Japan, pp. 226-242.
- 3 W. Ahmad, and O. Hasan, "Formal Dependability Modeling and Analysis: A Survey," *Conferences on Intelligent Computer Mathematics (CICM-2016)*, Springer, LNCS 9791, Bialystok, Poland, pp. 132-147.
- 4 W. Ahmad, O. Hasan and S. Tahar, "Towards Formal Reliability Analysis of Logistics Service Supply Chains using Theorem Proving," *Implementation of Logics (IWIL 2015)*, volume 40, EPiC Series in Computing, Suva, Fiji, pp. 1-14.
- 5 W. Ahmad, O. Hasan, and S. Tahar, "Formal Reliability Analysis of Wireless Sensor Network Data Transport Protocols using HOL," *Wireless and Mobile Computing, Networking and Communications (WiMob)*, IEEE, Abu Dhabi, UAE, pp. 217-224.

- 6 W. Ahmad, and O. Hasan, "Towards Formal Fault Tree Analysis using Theorem Proving," *Conferences on Intelligent Computer Mathematics (CICM-2015)*, Springer, LNCS 9150, Washington, USA, pp. 39-54.
- 7 O. Hasan, W. Ahmed, S. Tahar and M. S. Hamdi, "Reliability Block Diagrams based Analysis: A Survey," *International Conference of Numerical Analysis and Applied Maths (ICNAAM-14)*, American Institute of Physics (AIP), Rhodes, Greece, 2014
- 8 W. Ahmad, O. Hasan, S. Tahar and M. S. Hamdi, "Towards the Formal Reliability Analysis of Oil and Gas Pipelines", *Conferences on Intelligent Computer Mathematics (CICM-2014)*, Springer, LNAI 8543, Coimbra, Portugal, 2014, pp. 30-44.
- 9 W. Ahmed, H. Mahmood, and U. Siddique, "The Efficient Implementation of S8 AES Algorithm", In *Proceedings of world congress on engineering*, London, UK, 2011, pp. 1215-1219. (**Best Paper Award**)

#### Doctorate Thesis

- 1 Waqar Ahmad, Formal Dependability Analysis using Higher-order-logic Theorem Proving, NUST, Islamabad, Pakistan, July 2017.

#### Talks

- 2017 Thesis Defense Presentation at NUST-SEECS, Islamabad, Pakistan
- 2017 Oral Presentation at Formal Methods Research Lab, UT Austin, USA
- 2016 Oral Presentation at 1<sup>st</sup> WSAVe, NUST-SEECS, Islamabad, Pakistan
- 2015 Oral Presentation at CICM-15, Washington DC, USA

#### Academic Services

- PC Member of CICM 2017
- Selected Reviewer by International Journal of Business Intelligence and Data Mining (IJBIDM), InderScience Publisher
- External Reviewer of Journal of Information and Software Technology, Elsevier
- External Reviewer of Transactions on Sustainable Computing, IEEE
- External Reviewer of The Compute Journal, Oxford University Press
- External Reviewer of FTSCS-15
- External Reviewer of ICOSST-14

#### Academic Awards

- October 2016 Fully Funded HEC-IRSIP Scholarship to University of Texas at Austin, Tx, USA.
- March 2017 Overall Stipend of about 7500\$ USD.
  - 2015-16 Best Research Student Awards at SAVe lab
    - 2015 Conference paper presentation at CICM, Washington DC, USA. HEC Travel Grant of about 2600\$ USD.
  - 2012-16 Full Funded HEC PhD Indigenous Scholarship. Overall Stipend of about 15000\$ USD.
  - 2011 Best Conference Paper Award at WCE-2011, London, UK

## Experience

- 2008–09 **Dewan Salman Fibre**, Taxila, Pakistan.  
Instrument Engineer, Research & Development Division
- Problem identification & rectification of faults in field equipments
  - PLC control system programming and maintenance
  - Supervision of plant technicians

## Skills

LaTeX, MATLAB, Mathematica, PRISM, SPIN, UPAAL, HYTECH, Isabelle/HOL, HOL4 Proof Assistant, ACL2.

## Languages

Urdu **Mothertongue**  
English **Fluent**

*Speaking and Writing*

## Interests

- Table Tennis
- Cooking
- Cricket