

Dr. Junaid Haroon Siddiqui

Assistant Professor, Department of Computer Science
Lahore University of Management Sciences, Lahore, Pakistan
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EDUCATION

University of Texas at Austin, Austin, TX, USA

Ph.D. Electrical and Computer Engineering, GPA 3.95/4, Adviser: Dr. Sarfraz Khurshid 2012

National University of Computer and Emerging Sciences, Lahore, Pakistan

M.S. Computer Science, GPA 3.83/4, Adviser: Shafiq ur Rehman 2003

B.S. Computer Science, GPA 3.86/4, Magna Cum Laude 2001

RESEARCH INTERESTS

My research interests are automated software engineering using static and dynamic analysis of code for checking of code conformance; software testing; software verification; model checking; parallel and incremental algorithms for more efficient and effective analysis.

ACADEMIC EXPERIENCE

Lahore University of Management Sciences, Lahore, Pakistan

Assistant Professor, Department of Computer Science, Leading Program Analysis Group 08/2012 – now

RWTH Aachen University, Aachen, Germany

Visiting Researcher, ComSys research group, Host: Dr. Klaus Wehrle 07/2017 – 08/2017

University of Texas at Austin, Austin, TX, USA

Adjunct Assistant Professor, Department of Electrical and Computer Engineering 06/2013 – 08/2013

Virtual University, Lahore, Pakistan

Visiting Professor, recording of online course 8/2012 – 05/2013

National University of Computer and Emerging Sciences, Lahore, Pakistan

Instructor 01/2004 – 07/2004

Visiting Instructor 08/2002 – 01/2004

Research Officer 08/2001 – 08/2002

Research Assistant 06/2001 – 08/2001

INDUSTRY EXPERIENCE

Google Inc., Kirkland, WA, USA

Software Engineering Intern, cloud storage, Manager: Dr. Andrew Kadatch 06/2011 – 08/2011

Microsoft Corp., Redmond, WA, USA

Research Intern, incremental program analysis, Manager: Anna Gringauze 06/2010 – 08/2010

Vahzay Pvt. Ltd.

Software Architect, offshore development for Teneros Inc. 08/2006 – 06/2007

MetaApp Pvt. Ltd.

Manager Software Development, offshore development for Zenprise Inc. 08/2004 – 08/2006

Simitrix Pvt. Ltd.

Owner and Director, various offshore projects 07/2002 – 07/2003

Crestech Pvt. Ltd.

Technical Consultant for Microsoft Authentication Server 07/2001 – 08/2001

Veridicom Pvt. Ltd.

Software Engineer, offshore development for Veridicom Inc. 04/2000 – 05/2001

PROFESSIONAL MEMBERSHIPS

ACM (Professional member), IEEE (Professional member)

PUBLICATIONS

- [27] J. H. Siddiqui, A. Rauf and M. A. Ghafoor. 2018. “Advances in Software Model Checking.” *Advances in Computers Vol. 108*. Ed. A. M. Memon, Elsevier Inc., 59–89. **Invited.**
- [26] S. Ahmed, M. H. Alizai, J. H. Siddiqui, N. A. Bhatti and L. Mottola. 2018. “Towards smaller checkpoints for better intermittent computing: Poster abstract.” *Proceedings of the ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2018)*, Porto, Portugal, 132–133. (CORE rank: A*)
- [25] M. S. Ayub and J. H. Siddiqui. 2018. “Poster: Efficiently finding minimal failing input in MapReduce programs.” *Proceedings of the International Conference on Software Engineering: Companion Proceedings (ICSE 2018)*, Gothenburg, Sweden, 177–178. (CORE rank: A*)
- [24] A. Rauf, M. Nawaz and J. H. Siddiqui. 2018. “Poster: Efficient iterative deepening for bounded exhaustive generation of complex structures.” *Proceedings of the International Conference on Software Engineering: Companion Proceedings (ICSE 2018)*, Gothenburg, Sweden, 346–347. (CORE rank: A*)
- [23] M. Z. Malik, M. Nawaz, N. Mustafa, H. Saleem, F. Ibrar and J. H. Siddiqui. 2018. “Search based code generation for machine learning programs.” *International Conference on Software Engineering Research & Practice (SERP 2018)*, Las Vegas, NV, USA, to-appear.
- [22] M. S. Ayub, W. U. Rehman and J. H. Siddiqui. 2017. “Experience report: Verifying MPI Java programs using software model checking.” *Proceedings of the IEEE International Symposium on Software Reliability Engineering (ISSRE 2017)*, Toulouse, France, 294–304. (acceptance: 31% 34/108, CORE rank: A)
- [21] W. U. Rehman, M. S. Ayub and J. H. Siddiqui. 2016. “Verification of MPI Java programs using software model checking.” *ACM SIGPLAN Notices, 51(8): Proceedings of the ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP 2016)*, Barcelona, Spain, Article No. 55. (CORE rank: A)
- [20] M. S. Mahmood, Ghafoor M. A. and J. H. Siddiqui. 2016. “Symbolic execution of stored procedures in database management systems.” *Proceedings of the IEEE/ACM International Conference on Automated Software Engineering (ASE 2016)*, Singapore, 519–530. (acceptance: 20% 71/353, CORE rank: A)

- [19] M. A. Ghafoor, M. S. Mahmood and J. H. Siddiqui. 2016. “Effective partial order reduction in model checking database applications.” *Proceedings of the IEEE International Conference on Software Testing, Verification, and Validation (ICST 2016)*, Chicago, IL, USA, 146–156. (acceptance: 27% 35/130, CORE rank: A)
- [18] M. A. Ghafoor and J. H. Siddiqui. 2016. “Cross platform bug correlation using stack traces.” *Proceedings of the International Conference on Frontiers of Information Technology (FIT 2016)*, Islamabad, Pakistan, 199–204.
- [17] S. Ahmed, H. Khan, J. H. Siddiqui, J. A. Bitsch and M. H. Alizai. 2016. “Incremental checkpointing for interruptible computations: Poster abstract.” *Proceedings of the ACM Conference on Embedded Network Sensor Systems (SenSys 2016)*, Stanford, CA, USA, 350–351. (CORE rank: A*)
- [16] S. Makhdoom, M. A. Khan and J. H. Siddiqui. 2014. “Incremental symbolic execution for automated test suite maintenance.” *Proceedings of the IEEE/ACM International Conference on Automated Software Engineering (ASE 2014)*, Vasteras, Sweden, 271–276. (acceptance: 24% 82/337, CORE rank: A)
- [15] N. Rosner, J. H. Siddiqui, N. Aguirre, S. Khurshid and M. F. Frias. 2013. “Ranger: Parallel analysis of alloy models by range partitioning.” *Proceedings of the IEEE/ACM International Conference on Automated Software Engineering (ASE 2013)*, Palo Alto, CA, USA, 147–157. (acceptance: 23% 74/317, CORE rank: A)
- [14] J. H. Siddiqui and S. Khurshid. 2013. “Scaling symbolic execution using staged analysis.” *Innovations in Systems and Software Engineering*; 9(2): 119–131; extended version of [11]. **Invited.**
- [13] J. H. Siddiqui and S. Khurshid. 2012. “Scaling symbolic execution using ranged analysis.” *ACM SIGPLAN Notices*, 47(10): *Proceedings of the Object-Oriented Programming, Systems, Languages, and Applications (OOP-SLA) track of the ACM conference on Systems, Programming, Languages and Applications: Software for Humanity (SPLASH 2012)*, Tucson, AZ, USA, 523–536. (acceptance: 26% 59/228, CORE rank: A*) **Nominated for best paper award.**
- [12] Funes, D., J. H. Siddiqui, and S. Khurshid. 2012. “Ranged model checking.” *ACM SIGSOFT Software Engineering Notes*, 37(6): *Proceedings of the Java Pathfinder Workshop (JPF) held in conjunction with the International Symposium on the Foundations of Software Engineering (FSE 2012)*, Cary, NC, USA, 1–5.
- [11] J. H. Siddiqui and S. Khurshid. 2012. “Staged symbolic execution.” *Proceedings of the Software Verification and Testing track in the ACM Symposium on Applied Computing (SAC 2012)*, Trento, Italy, 1339–1346. (acceptance: 27% 12/43, CORE rank: B)
- [10] J. H. Siddiqui, D. Marinov and S. Khurshid. 2012. “Lightweight data-flow analysis for execution-driven constraint solving.” *Proceedings of the IEEE International Conference on Software Testing, Verification, and Validation (ICST 2012)*, Montreal, Canada, 91–100. (acceptance: 26%, 39/145, CORE rank: A)
- [9] J. H. Siddiqui. 2012. “Improving systematic constraint-driven analysis using incremental and parallel techniques.” *Ph.D. Dissertation, University of Texas at Austin*, Austin, TX, USA.
- [8] J. H. Siddiqui and S. Khurshid. 2011. “Symbolic execution of Alloy models.” *Lecture Notes in Computer Science Vol. 6991: Proceedings of the International Conference on Formal Engineering Methods (ICFEM 2011)*, Durham, UK, 340–355. (acceptance: 30% 31/103, CORE rank: A)
- [7] M. Z. Malik, J. H. Siddiqui and S. Khurshid. 2011. “Constraint-based program debugging using data structure repair.” *Proceedings of the IEEE International Conference on Software Testing, Verification, and Validation (ICST 2011)*, Berlin, Germany, 190–199. (acceptance: 21% 35/166, CORE rank: A)
- [6] J. H. Siddiqui and S. Khurshid. 2010. “ParSym: Parallel symbolic execution.” *Proceedings of the International Conference on Software Technology and Engineering (ICSTE 2010)*, San Juan, PR, USA, 405–409.
- [5] J. H. Siddiqui and S. Khurshid. 2009. “An empirical study of structural constraint solving techniques.” *Lecture Notes in Computer Science Vol. 5885: Proceedings of the International Conference on Formal Engineering Methods (ICFEM 2009)*, Rio de Janeiro, Brazil, 88–106. (acceptance: 29% 36/121, CORE rank: A)

- [4] J. H. Siddiqui and S. Khurshid. 2009. “PKorat: Parallel generation of structurally complex test inputs.” *Proceedings of the IEEE International Conference on Software Testing, Verification and Validation (ICST 2009)*, Denver, CO, USA, 250–259. (acceptance: 33% 47/140, CORE rank: A)
- [3] J. H. Siddiqui and S. Khurshid. 2009. “Optimizing a structural constraint solver for efficient software checking.” *Proceedings of the IEEE/ACM International Conference on Automated Software Engineering (ASE 2009)*, Auckland, New Zealand, 615–619. (acceptance: 31% 71/222, CORE rank: A)
- [2] J. H. Siddiqui, M. F. Iqbal and D. Chiou. 2009. “Parallel assertion processing using memory snapshots.” *Proceedings of the Workshop on Unique Chips and Systems (UCAS-5) held in conjunction with IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS 2009)*, Boston, MA, USA, 69–75.
- [1] J.H. Siddiqui. 2003. “Decentralized key management for large dynamic multicast groups using distributed balanced trees.” *M.S. Dissertation, National University of Computer and Emerging Sciences, Lahore, Pakistan.*

SERVICE

Journals

- Reviewer (2 times) for IEEE Transactions on Software Engineering and subreviewer 1 time.
- Reviewer (1 time) for IEEE Access Journal.
- Reviewer (5 times) for Software Quality Journal.
- Reviewer (1 time) for Software and Systems Modeling Journal.

Conferences

- Session Chair for “Test Generation” session and External Review Panel member (1 time) for *IEEE/ACM International Conference on Automated Software Engineering (ASE 2016)*. Also served as subreviewer for ASE 2009 and ASE 2012.
- Program Committee member (2 times) for *IEEE International Symposium on Software Reliability Engineering (ISSRE 2014 and ISSRE 2018)*.
- Program Committee member (3 times) for *IEEE International Conference on Software Testing, Verification and Validation (ICST 2015, ICST 2016, and ICST 2017)*. Also subreviewer for ICST 2011 and ICST 2012.
- Program Committee member (1 times) for *International Conference on Latest trends in Electrical Engineering & Computing Technologies (INTELLECT 2017)*.
- Program Committee member (1 times) for *IEEE International Multi-topic Conference (INMIC 2013)*.
- Subreviewer for FM 2011 and FM 2012 (*International Symposium on Formal Methods*), MFCS 2012 (*International Symposium on Mathematical Foundations of Computer Science*), FSE 2012 (*International Symposium on Foundations of Software Engineering*), ISSTA 2011 (*International Symposium on Software Testing and Analysis*), NFM 2011 (*NASA Formal Methods Symposium*), RV 2010 (*International Conference on Runtime Verification*), and OOPSLA 2009 (*International Conference on Object Oriented Programming, Systems, Languages, and Applications*).

University Service

- University-wide Undergraduate curriculum committee, 2014 – now.
- University-wide Teaching & learning committee, 2017 – now.
- Chair search committee of the Department of Computer Science, May 2017.
- Undergraduate curriculum committee of the Department of Computer Science, 2014 – now.

Other

- Representative LUMS for national Computer Science curriculum revision committee, *Higher Education Commission*, Islamabad, Pakistan, 2016 – now.
- Member revision committee for Computer Science secondary school curriculum, *Punjab Textbook Board*, Lahore, Pakistan, 2017 – now.
- Area expert in the interview panel for hiring Computer science faculty at *Information Technology University*, Lahore, Pakistan (3 times).
- Judge of Lahore regional competition (2 Times) for *ACM International Collegiate Programming Competition (ICPC 2014 and ICPC 2015)*.
- Judge (4 times) for *All Pakistan software and programming competition (SOFTEC 2006, 2007, 2013, and 2014)*.
- Judge/coach (3 times) for Startup weekend at *Lahore University of Management Sciences*, Lahore, Pakistan (2014, 2015, and 2016).
- Judge (1 time) for *Punjab University's Software exhibition (SoftExpo 2014)*.

TALKS AND PRESENTATIONS

Invited talks

- “Scaling symbolic execution using ranged analysis,” Communication and distributed systems group at the *RWTH Aachen University*, Aachen, Germany, August 2017.
- “Verification of robotic and automation platforms,” 7th *International Workshop on Field and Assistive Robotics (WFAR-7)*, Lahore, Pakistan, October 2014.
- “Scaling symbolic execution using ranged analysis.” Job talk at the *Lahore University of Management Sciences*, Lahore, Pakistan, July 2012.
- “Parallel symbolic execution,” Guest lecture in “Verification and Validation of Software” course at the *University of Texas at Austin*, Austin, TX, USA, April 2011.
- “Structural constraint solving techniques — comparison and optimizations.” Testing working group at Microsoft Research, *Microsoft Corp.*, Redmond, WA, USA, January 2010;

Conferences

- Presented [24] at the *International Conference on Software Engineering*, Gothenburg, Sweden, June 2018.
- Presented [25] at the *International Conference on Software Engineering*, Gothenburg, Sweden, June 2018.
- Presented [19] at the *IEEE International Conference on Software Testing, Verification, and Validation*, Chicago, IL, USA, July 2016.
- Presented [21] at the *ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, Barcelona, Spain, March 2016.
- Presented [13] at the *ACM conference on Systems, Programming, Languages and Applications: Software for Humanity*, Tucson, AZ, USA, October 2012.
- Presented [10] at the *IEEE International Conference on Software Testing, Verification, and Validation*, Montreal, Canada, April 2012.
- Presented “Dynamic shape analysis using topological and spectral graph properties” at the *IEEE International Conference on Software Testing, Verification, and Validation*, Montreal, Canada, April 2012.

- Presented [6] at the *International Conference on Software Technology and Engineering*, San Juan, PR, USA, October 2010.
- Presented [2] at the *Workshop on Unique Chips and Systems held in conjunction with IEEE International Symposium on Performance Analysis of Systems and Software*, Boston, MA, USA, April 2009.
- Presented [4] at the *IEEE International Conference on Software Testing, Verification and Validation*, Denver, CO, USA, April 2009.

TEACHING EXPERIENCE

Lahore University of Management Sciences, Lahore, Pakistan

- Primary instructor for “Programming Languages,” an introductory graduate course about the semantics and design trade-offs of modern programming languages. (Fall 2018)
- Primary instructor for “Advanced Programming,” an undergraduate Computer Science core course covering multiple programming paradigms: functional programming in Haskell, asynchronous programming in JavaScript, and parallel programming in Golang. (Spring 2015, Spring 2016, Summer 2016, Spring 2017, Spring 2018)
- Primary instructor for “Program Analysis,” an introductory graduate course about program analysis including static analysis techniques, dynamic analysis techniques, and formal methods. (Spring 2018)
- Primary instructor for “Foundations of Computer Systems,” an introductory undergraduate systems course that covers systems from the programmer’s perspective. (Fall 2016, Fall 2017)
- Primary instructor for “Advanced Operating Systems,” an introductory graduate course about operating system internals and recent developments in systems research. (Spring 2013, Spring 2014, Spring 2015, Spring 2016)
- Co-instructor for “Network Centric Computing,” a first undergraduate course about understanding computer networks and designing distributed software. (Spring 2016)
- Primary instructor for “Multicore Computing,” a graduate level introduction to multicore computing with a focus on multicore architectures, memory models, locking schemes, concurrent data structures, multicore programming, and model checking. (Fall 2015)
- Primary instructor for “Reliable Software,” a graduate course on advanced research topics in software verification, validation, and model checking. (Fall 2014)
- Primary instructor for “Algorithms,” an undergraduate core course about design and analysis of algorithms. (Spring 2014)
- Primary instructor for “Introduction to Programming,” a second intensive course in programming for undergraduate students. (Fall 2013)
- Primary instructor for “Software Testing,” a senior undergraduate elective course about software testing and validation techniques. (Spring 2013)
- Co-instructor for “Research Seminar,” a graduate course about research methodology. (Fall 2012)

University of Texas at Austin, Austin, TX, USA

- Primary instructor for “Algorithms,” an undergraduate core course about design and analysis of algorithms. (Summer 2013)

Virtual University of Pakistan

- Primary instructor for “Visual Programming,” an undergraduate programming course, with 42 hours of recorded lectures, that are used in online course offering. (Spring 2013)
- Teaching Assistant for “Assembly Language Programming.” Wrote a 200 page book on Assembly Language that is still used in Virtual University of Pakistan and in National University of Computer and Emerging Sciences, Lahore, Pakistan as prescribed textbook. (Spring 2004)

National University of Computer and Emerging Sciences, Lahore, Pakistan

- Primary instructor for “Advanced Programming.” (Spring 2006)
- Primary instructor for “Assembly Language Programming.” (Spring 2006, Fall 2003, Summer 2002, Fall 2001)
- Primary instructor for “Data Structures.” (Fall 2005, Fall 2002)
- Primary instructor for “Object Oriented Programming.” (Spring 2004, Summer 2003, Spring 2003)
- Primary instructor for “Operating Systems.” (Spring 2007, Fall 2005, Spring 2002)
- Teaching assistant for “Data Structures” (Fall 2001), “Operating Systems” (Spring 2001 and Summer 2001), “Computer Logic Design” (Fall 2000), and “Object Oriented Programming” (Spring 2000).
- Short courses on “Unix for Programmers” (Summer 2001), “Advanced C Programming” (Summer 2000), and “Visual C” (Summer 1999).

Kinnaird College for Women University, Lahore, Pakistan

- Primary instructor for “Operating Systems.” (Spring 2002)

Beaconhouse Informatics University, Lahore, Pakistan

- Primary instructor for “Systems Development.” (Summer 2001)

STUDENTS

Advising

- Affan Rauf, “Incremental techniques in automated test case generation,” Ph.D. 2014 – now.
- Maryam Abdul Ghafoor, “Automated testing of database driven applications,” Ph.D. 2015 – now.
- Sohaib Ayub, “Verifying MPI Java programs using software model checking,” Ph.D. 2015 – now.
- Aatira Anum Ahmed, co-advised, Ph.D. 2017 – now.
- Saad Ahmed, co-advised, Ph.D. 2016 – now.

Graduated

- Junaid Ahmed, “Efficient state retention for transiently powered computers,” (co-advised) MS 2018.
- Muhammad Nawaz, “Efficiently generating test inputs for structural data,” MS 2017. Joined *Information Technology University*, Lahore, Pakistan as Research Assistant.
- Ayesha Zaheer, “Incremental symbolic execution using KLEE,” MS 2016. Joined *University of Central Punjab*, Lahore, Pakistan as Lecturer.
- Natasha Arshad, “Symbolic execution of distributed software using KLEE,” MS 2016.

- Nabeel Hussain, “Automated test and database state generation using symbolic execution,” MS 2016.
- Ahmed Akhtar, “Automated retrieval of structured stack traces data from online unstructured bug reports,” MS 2016. Joined *Lahore University of Management Sciences*, Lahore, Pakistan as Ph.D. student.
- Suleman Mahmood, “Symbolic execution of database procedures,” May 2015. Joined *University of Illinois at Urbana-Champaign*, Urbana, IL, USA as Ph.D. student.
- Waqas ur Rehman, “Model checking MPI Java programs,” May 2015. Joined *McMaster University*, Hamilton, ON, Canada as Ph.D. student.
- Aatira Anum Ahmad, “Web application testing with event sequences guided by symbolic execution of JavaScript,” May 2015. Joined *Lahore University of Management Sciences*, Lahore, Pakistan as Ph.D. student.
- Maryam Abdul Ghafoor, “Effective POR in model checking database applications,” May 2015. Joined *Lahore University of Management Sciences*, Lahore, Pakistan as Ph.D. student.
- Sohaib Ayub, “Efficiently finding minimal failing input in MapReduce programs,” MS 2014. Joined *Lahore University of Management Sciences*, Lahore, Pakistan as Ph.D. student.
- Mohsin Naeem, “Benign data race detection for single variable,” MS 2015.
- Sarmad Makhdoom, “Incremental symbolic execution,” MS 2014.

Selected undergraduate projects & graduate placement

- Sultan Khan (University of Illinois at Urbana-Champaign), Noaman Ahmed (University of Illinois at Chicago), and Umair Shahzad, “Rollback in distributed systems,” BS 2018.
- Baber Khalid (Rutgers University), “MegaVM,” BS 2018, Co-advised.
- Ifrah Idrees (Duke University), Ali Nowraiz (University of California, Riverside), and Mujahid Khan (Texas State University), “Incremental checkpointing,” BS 2018.
- Ameer Hamza (Florida State University), Abdul Rauf, and Abdul Tayyab, “P2P distributed storage,” BS 2018.
- Hussain Abbas (ETH Zürich) and Shahryar Tariq (Cornell University), “Distributed execution,” BS 2017.
- Jeehan Malik (University of Iowa), Hiba Shakil, and Shiza Shafiq, “Classroom response management,” BS 2017.
- Momina Haider (Carnegie Mellon University), Usman Nadeem (Virginia State University), and Irtaza Safi (University of Central Florida), “Android application hardening,” BS 2017, Co-advised.
- Ramsha Rao (Penn State University) and Wardah Riaz, “Travel management system,” BS 2016.
- Shalan Naqvi (University of Illinois at Urbana-Champaign), Ubaid Hafeez (Stony Brook University), and Habiba Farrukh (Purdue University), “User-guided symbolic execution,” BS 2016.
- Aynoor Saleem (Stony Brook University), “Automated program repair and visualization,” BS 2016.

HONORS AND AWARDS

Research funding: \$156k

- “Software debloating using program analysis” as part of a research lab funded by *Planning Commission of Pakistan*, 2018, \$125k (total funding for lab: \$720k).
- “Making Data Science available to the masses” funded by the competitive research grants from the *Faculty initiative fund of the Lahore University of Management Sciences*, Lahore Pakistan, 2018, \$9k.
- “Making IT systems resilient using automated program analysis” funded by the competitive research grants from the *Faculty initiative fund of the Lahore University of Management Sciences*, Lahore Pakistan, 2017, \$9k.
- Startup Research Grant by *Lahore University of Management Sciences*, Lahore, Pakistan, 2012, \$13k.

Funding for research travel: \$35k

- Competitive grants for research travel (6 grants) by the *Lahore University of Management Sciences*, Lahore, Pakistan, 2013 – 2018, \$22k.
- Competitive grants for research travel (3 grants) by the *Higher Education Commission*, Islamabad, Pakistan, 2013 – 2017, \$8k.
- Visiting researcher travel by *German Academic Exchange Services (DAAD)*, Germany, 2017, \$3k.
- Grant for research travel by the *University of Texas at Austin*, Austin, TX, USA, 2012, \$2k.

Awards

- Azure Educator Grant Award, \$33k in Azure credits, *Microsoft Corp.*, March 2015.
- AWS in Education Grant Award, \$5k in AWS credits, *Amazon Inc.*, February 2015.
- Fulbright Foreign Student Program for Ph.D., 2007 – 2012, *United States Department of State*, August 2007.
- Agha Hasan Abedi Gold Medal in M.S. Computer Science, *National University of Computer and Emerging Sciences*, Lahore, Pakistan, March 2005.
- Silver Medal in B.S. Computer Science, *National University of Computer and Emerging Sciences*, Lahore, Pakistan, October 2003.
- Recognition of Service Award for services as Chair of ACM Student Chapter at National University of Computer and Emerging Sciences, *Association for Computing Machinery*, April 2002.

Extracurricular

- Scored in the 96th percentile in GRE Computer Science subject test, 2006.
- First Chair and founder of ACM student chapter, 2001.
- Winner SOFTEC dynamic programming competition, Lahore, Pakistan, 2000.
- Winner PROCOM programming competition, Karachi, Pakistan, 2000.
- 3rd in PakAims speed programming competition, Lahore, Pakistan, 2000.
- 2nd in All Pakistan computer science quiz competition, 2000.
- 9th in ACM International Collegiate Programming Competition, Singapore regional competition, 2000.
- 2nd in All Pakistan computer science quiz competition and individual highest scorer, 1999.
- Winner PROCOM programming competition, Karachi, Pakistan, 1999.
- Head software competition in SOFTEC, Lahore, Pakistan, 1999.
- Winner Jang programming competition, Lahore, Pakistan, 1995.