

# Dr. Sohail Iqbal



## **Objective**

To promote AI-based Innovative Technologies for Education.

## **Current Position**

**Director** -Center for Education Research and Practice (CERP)

**Associate Professor** of Computer Science at

NUST School of Electrical Engineering and Computer Science, Islamabad.

<https://seecs.nust.edu.pk/faculty/muhammad-sohail-iqbal/>

## **Education**

**Ph.D. (Computer Science)**

(2005-2010)

University of Paris-Est, France.

**M. Phil (Computational Mathematics)**

(2002-2004)

Quaid-e-Azam University, Pakistan

## **Professional Experience**

1. **Head of Department of Information Technology at NUST-SEECS** Feb 2019-Feb 2022.
2. Head of Department of Computer Science at NUST-SEECS June 2014-Feb 2016.
3. **Scientific coordinator** at CROUS under French Ministry of Higher Education and Research to help PhD students in all scientific fields. 2008-10.
4. **Member of NCEAC** for computer science program accreditation.
5. Volunteer for the organization of Robotics Competitions at IEEE International Conference on Robotics and Automation 2010, Anchorage, AL, USA.
6. Summer Internship of Robotic Surgery by *Da Vinci Surgical System* at Hospital Henri Mondor, France, 2007.

## **Selected Research Publications**

**International Journal Articles** (ISI-indexed with impact factor- 18)

- [1] Q. Ain, **S. Iqbal** and H. Mukhtar, "Improving Quality of Experience Using Fuzzy Controller for Smart Homes," in *IEEE Access*, vol. 10, pp. 11892-11908, 2022, doi: 10.1109/ACCESS.2021.3096208.
- [2] K. Shahzad, **S. Iqbal**, and H. Mukhtar, "Optimal Fuzzy Energy Trading System in a Fog-Enabled Smart Grid," *Energies*, vol. 14, no. 4, p. 881, Feb. 2021, doi: 10.3390/en14040881.
- [3] A. Bashir, A. W. Malik, A. U. Rahman, **S. Iqbal**, P. R. Cleary and A. Ikram, "MedCloud: Cloud-Based Disease Surveillance and Information Management System," in *IEEE Access*, vol. 8, pp. 81271-81282, 2020, doi: 10.1109/ACCESS.2020.2990967.
- [4] Kamran Munir, Alberto De Ramoin Fernaindez, **Sohail Iqbal** and Nadeem Javaid, "Neuroscience Patient Identification using Big Data and Fuzzy Logic - An Alzheimer's Disease Case Study", *Expert Systems with Applications*, 2019, ISSN: 0957-4174. doi: <https://doi.org/10.1016/j.eswa.2019.06.049>.
- [5] S. S. Shah, A. W. Malik, A. U. Rahman, **S. Iqbal**, and S. U. Khan, "Time Barrier-Based Emergency Message Dissemination in Vehicular Ad-hoc Networks," *IEEE Access*, vol. 7, pp. 16494-16503, 2019.
- [6] **S. Iqbal** , S. Farooq , K. Shahzad, AW Malik, MM Hamayun, O. Hasan . SecureSurgiNET: A framework for ensuring security in telesurgery. *International Journal of Distributed Sensor Networks*. 2019;15(9). doi:10.1177/1550147719873811.
- [7] M. Ali , AW Malik, AU Rahman , **S Iqbal** , MM Hamayun. Position-based emergency message dissemination for Internet of vehicles. *International Journal of Distributed Sensor Networks*. 2019;15(7).

- [8] Qurat-ul-Ain, **Sohail Iqbal**, Safdar Abbas Khan, Asad Waqar Malik, Iftikhar Ahmad, and Nadeem Javaid, "IoT Operating System Based Fuzzy Inference System for Home Energy Management System in Smart Buildings", *Sensors*, Vol. 8, No. 9, pp. 1-30, 2018.
- [9] T. Samad, **S. Iqbal**, A. W. Malik, O. Arif, P. Bloodsworth, "A multi-agent framework for cloud-based management of collaborative robots", *International Journal of Advanced Robotic Systems*, Vol. 15, No. 4, pp. 1-13, 2018.
- [10] Zunaira Nadeem, Nadeem Javaid, Asad W. Malik, **Sohail Iqbal**. "Scheduling Appliances with GA, TLBO, FA, OSR and Their Hybrids Using Chance Constrained Optimization for Smart Homes", *Energies*, Vol. 11, No. 4, 2018.
- [11] S. Javaid, N. Javaid, **S. Iqbal**, M. Guizani, A. Al-Mogren and A. Alamri, "Energy Management With a World-Wide Adaptive Thermostat Using Fuzzy Inference System," in *IEEE Access*, vol. 6, pp. 33489-33502, doi: 10.1109/ACCESS.2018.2828040, July 2018.
- [12] N. Javaid, A. Ahmed, **S. Iqbal**, M. Ashraf, "Day Ahead Real Time Pricing and Critical Peak Pricing Based Power Scheduling for Smart Homes with Different Duty Cycles", *Energies*, Vol. 11, No. 1464, pp. 1-28, 2018.
- [13] G. Hafeez, N. Javaid, **S. Iqbal**, F.A. Khan," Optimal Residential Load Scheduling Under Utility and Rooftop Photovoltaic Units. *Energies*, Vol. 11, No. 3, 2018.
- [14] N. Javaid, G. Hafeez, **S. Iqbal**, N. Alrajeh, M. Alabed, and M. Guizani, "Energy Efficient Integration of Renewable Energy Sources in the Smart Grid for Demand Side Management", *IEEE Access*, Aug. 2018. doi: 10.1109/ACCESS.2018.2866461
- [15] Hussain, H.M.; Javaid, N.; **S. Iqbal**, .; Hasan, Q.U.; Aurangzeb, K.; Alhussein, M. "An Efficient Demand Side Management System with a New Optimized Home Energy Management Controller in Smart Grid", *Energies*, Vol. 11, No. 1, 2018.
- [16] Osman Hasan and **Sohail Iqbal** "A framework for laparoscopic simulations", *Journal Of Pakistan Medical Association*, Vol 67, Issue 9, pp 1404-09, Sep 2017.

- [17] K. Shahzad, **S. Iqbal**, P. Bloodsworth, "Points based Safe Path Planning of Continuum Robots", in *International Journal of Advanced Robotic Systems*, Vol. 12, No. 107, pp. 1-12, 2015.
- [18] M. Yaqoob, S. Qaisrani, M. Tariq, Y. Ayaz, **S. Iqbal**, and Sajid Nisar, "Design and Control of a Haptic Enabled Robotic Manipulator" in *International Journal of Advanced Robotic Systems*, Vol. 12, No. 109, pp. 1-10, 2015.

#### **International Conference Articles:**

- [19] Q. Ain and **S. Iqbal**, "Enhancing Short-Term Load Forecasting using ES-dRNN with Context Vector," 2022 24th International Multitopic Conference (INMIC), Islamabad, Pakistan, 2022, pp. 1-6, doi: 10.1109/INMIC56986.2022.9972954.
- [20] F. Naqvi, S. Iqbal and Q. -U. Ain, "Energy Optimization in Smart Buildings using Intelligent Fuzzy Ventilation," ICECCE-2019, Swat, Pakistan, 2019, pp. 1-7, doi: 10.1109/ICECCE47252.2019.8940705.
- [21] S. A. Hassan and S. Iqbal, "Automatic Car Braking System using Fuzzy Logic Controller with Environmental Factors," 2019 22nd International Multitopic Conference (INMIC), Islamabad, Pakistan, 2019, pp. 1-8, doi: 10.1109/INMIC48123.2019.9022773.
- [22] S. S. Zehra and **S. Iqbal**, "Fuzzy Logic based Enhanced Healthcare System for Elderly People (EHSEP)," 2019 22nd International Multitopic Conference (INMIC), Islamabad, Pakistan, 2019, pp. 1-8, doi: 10.1109/INMIC48123.2019.9022789.
- [23] Sakeena Javaid, Nadeem Javaid, **Sohail Iqbal**, and Muhammad Junaid Mughal. "Controlling energy consumption with the world-wide adaptive thermostat using fuzzy inference system in smart grid." In *Information and Communication Technology Convergence (ICTC)*, 2017 International Conference on, pp. 66-71. IEEE, 2017.
- [24] A. Qazi, **S. Iqbal**, "Online Education Taxonomy and Analysis to Promote Pakistani Education", in 10th International Technology, Education and Development Conference (INTED-2016). Valencia, Spain, Proceedings: pp. 6679-6688.

- [25] A. Qazi, S. Latif, **S. Iqbal** "Impact of Laptop Schemes for Promoting Online Education in Pakistan", ELDEC 2016, Lahore, Pakistan.
- [26] A. Qurashi, **S. Iqbal**, M. Maqsood, M. Syed, "Effect of using Visualization on Mathematical Proficiency of High School Calculus", ICERI 2015 Proceedings, pp. 4038-4045. Seville, Spain.
- [27] Sarmad Abbasi, **Sohail Iqbal**, and Nahdia Majeed, "On the Geometry of Continuum Robots", in Proceedings of IMA Conference on Mathematics of Robotics, 9-11 Sept 2015, Oxford, UK.
- [28] A. Ahmed, A. Rashid, **S. Iqbal**, "Analysis of Weather Forecasting Model in PRISM", Proceedings of the 12th International Conference on Frontiers of Information Technology, 2014, Pakistan.
- [29] B. Sadia, Z. Khan, **S. Iqbal**, S.Mansoor, M. Malik., "Deriving mechanical properties from CT scan for surgical simulation," TENCON 2013 - 2013 IEEE Region 10 Conference (31194) , vol., no., pp.1,4, 22-25 Oct. 2013.
- [30] B. Farooq, O. Hasan, and **S. Iqbal**. "Formal Kinematic Analysis of the Two-Link Planar Manipulator." in Formal Methods and Software Engineering. Lecture Notes in Computer Science, Volume 8144, Springer Berlin Heidelberg, 2013. pp. 347-362.
- [31] M. Ikram , **S. Iqbal**, "Astronomical Spectrum Analysis Using Mathematical Modeling" in Int. Conf. on Future Trends in Computing and Communication Technologies, Dubai, United Arab Emirates; August 9-11, 2013. pp. 178-183.
- [32] M. Yaqoob, S. R. Qaisrani, M. Waqas, Y. Ayaz, and **S. Iqbal**, "Low Cost Tactile, Force and Size Feedback System for Surgical Robotics," presented at the International Conference on Innovative Engineering Systems (IEEE-RAS ICIES2012) Alexandria, Egypt, 2012. pp. 58-63.
- [33] K. Sattar and **S. Iqbal**, "Multiple Leaf Nodes based Parse Trees for News Fetching Systems," presented at the 15th International Multitopic Conference (INMIC 2012), Islamabad, Pakistan, 2012.
- [34] **S. Iqbal**, "Safe TeleBot: Robotic System Development for Tele Surgery with Guaranteed Safety" in Recent Advances in Mathematical Methods, Models & Applications, Lahore, Pakistan, 16-17 April, 2011.

- [35] **S. Iqbal**, S. Mohammed and Y. Amirat, "A Guaranteed Approach for Kinematic Analysis of Continuum Robot Based Catheter", in *IEEE Int. Conf. on Robotics and Biomimetics*, Guilin, China, December 18-22, 2009, pp. 1573-1578.
- [36] N. Boumella and K. Djouani and **S. Iqbal**, "A New Design of Fuzzy Logic Controller Based on Generalized Orthogonality Principle", in *IEEE Int. Conf. on Computational Intelligence in Robotics and Automation*, Daejeon, Korea, December 15-18, 2009, pp. 497-502.
- [37] L. Fryziel, G. Fried, K. Djouani, **S. Iqbal** and Y. Amirat, "Kinematic analysis for a hybrid continuum active catheter", in *Proc. Of MECATRONICS 2008 7th France-Japan congress 5th Europe-Asia congress*, Le Grand Bornand, France. May 21-23, 2008, pp. 349-353.
- [38] G. Fried, K. Djouani, D. Borojeni, and **S. Iqbal**, "Jacobian Factorization of a C5 Joint Parallel Robot. Analysis of Singular Configurations," in *Proceedings of the 6th WSEAS Int. Conf. on Robotics, Control and Manufacturing Technology*, Hangzhou, China, 2006, pp. 224-231.
- [39] [Workshop] **S. Iqbal**, S. Mohammed, Y. Amirat, and G. Fried, "Uncertainty Analysis in Continuum Robot Kinematics," in *IEEE ICRA 2010 Full Day Workshop, Snakes, Worms and Catheters: Continuum and Serpentine Robots for Minimally Invasive Surgery*, Anchorage, AL, USA, 2010, pp. 30-32.  
[https://www.bu.edu/biorobotics/icra10workshop/icra10workshop/Posters\\_Short\\_Papers.html](https://www.bu.edu/biorobotics/icra10workshop/icra10workshop/Posters_Short_Papers.html)
- [40] [Book] **S. Iqbal**, N. Boumella, J. Garcia, "Fuzzy Controllers- Recent Advances in Theory and Applications", InTech, ISBN 978-953-51-0759-0, Sep, 2012. Web:  
<http://www.intechopen.com/books/fuzzy-controllers-recent-advances-in-theory-and-applications>
- [41] [Chapter] N. Boumella, J. Gracia, **S. Iqbal**, "Enhancing Fuzzy Controllers Using Generalized Orthogonality Principle", In *Fuzzy Controllers- Recent Advances in Theory and Applications*, ISBN 978-953-51-0759-0.

### **Funded Projects**

- Avatar Bot: A tele-medicine robot for remote areas, FYP funded by Ignite. (being PI)
- A Heptic Feedback Manipulator for Surgery, FYP funded by Ignite. (being PI).
- One-Screen Project on Automatic Content Generation, working as team member with PI Dr. Aimal Rextin as PI. Worth 10M PKR. (In progress)
- *SmartSIM – A Minimal invasive Surgical Simulator*, worked as team member with Dr. Osman Hasan as PI worth 40M PKR funded by ICT R&D Fund. 2011-2014.

### **Courses Taught at University Level**

Design and Analysis of Algorithm	Compiler Construction
Theory of Automata and Formal Languages	Mathematical Methods for Computing
Graph Theory and Algorithms	Discrete Mathematics
Fuzzy Controllers	Formal Methods for Software Engineering

### **MS Students Supervised**

Sr.	Name	Thesis Topic
1	Taimur Hassan	An Optimized Design of Manipulator for Robotics Surgery
2	Mehreen Shakoor	Optimized Control of Blood Glucose Level using Fuzzy Logic
3	Khuram Shahzad	Safe Path Planning of Continuum Robot for Surgical Applications
4	Shehzad Farooq	Information Security in Tele-Surgical Systems
5	Aleena Qureshi	Visualization of Mathematical Concepts Using Innovative Technologies in Education
6	Ali Gohar	Online Education Taxonomy and Analysis to Promote Pakistani Education

7	Zafar Ullah	Improving Fuzzy Controller for Continuum Robots
8	Tooba Samad	A Multi-Agent Framework for Cloud Based Management of Collaborative Robots
9	Qurat-ul-Ain	User Comfort Enhancement in Home Energy Management Systems using Fuzzy Logic
10	Furqan Naqvi	Air-Flow Analysis in Smart Buildings using Fuzzy Logic
11	Saima Mehr	Exploring the Impact of DST on Student Learning & Engagement
12	Zoha Rehman	Learning Science through Comics and Augmented Reality
13	Adnan Bashir	A Cloud Based Disease Surveillance and Health Information System
14	Hasnain Amin	Energy Management in Smart Homes with Electric Vehicles using Fuzzy Logic
15	Uzair Kazim	Fuzzy time series for data analytics for optimal electricity consumption in residential area
16	Kamran Khan	Optimal Charging Provision to Electric Transport by smart homes
17	Syed Ali Hasan	Optimal Vehicle-to-Home Energy Management System in Smart Grid
18	Aneeza Khalid	Optimal Solution for Price and Load Forecasting in Smart Grids
19	Muneeb ur Rehman	Fuzzy Logic based Energy Management in Smart Charging Network for Electric Vehicles
20	Jarar Haider	Hybrid Bayesian Network Structure Learning Using Parallel Learning Technique
21	Moin-ud-Din	A Game Theoretical Approach for Effective Demand Side Management

### **PhD Students in Supervision**

Sr.	Name	Thesis Topic
1	Khuram Shahzad	An Energy Efficient Cloud based Framework for Smart Cities (Pre-defense conducted successfully)
2	Qurat-ul-Ain	Energy Optimization with Dynamic Task Scheduling exploiting Cloud-Fog Paradigm (PhD thesis completed and sent for foreign evaluation)
3	Saeed Ullah Safi	Data Analytics in Smart Grid using Machine Learning

### **Personal Information**

**Full Name:** Muhammad Sohail Iqbal  
**Father's Name:** Iqbal Javaid  
**Marital Status:** Married with two sons and one daughter  
**Date of Birth:** 28<sup>th</sup> January 1978  
**Passport No:** PE-133-7501  
**Address:** House NN-3, Isra Apartments, NUST, H-12, Islamabad



### **Awards received**

1. Gold Medal in Bachelor of Science in Mathematics Major (Securing record marks), 1999.
2. PhD Scholarship awarded by Higher Education Commission of Pakistan, 2004-08.
3. Certificate of Appreciation from Quaid-e-Azam University for voluntary teaching, 2001.
4. Certificate of Appreciation from NUST-SEECS for getting high student feedback, 2017.
5. *Best Researcher in Computer Science* Award from Dept. of Computing, NUST-SEECS, 2018.
6. *Star Research Award* from NUST-SEECS 2019.

### **References**

- |                              |   |
|------------------------------|---|
| 1. Professor Dr. Osman Hasan | Pro-Rector (Acad) NUST, Islamabad, Pakistan.          |
| 2. Professor Faisal Shafait  | Associate Dean, NUST-SEECS, Pakistan.                 |
| 3. Dr. Peter Bloodsworth     | Computer Science Dept., Oxford University, Oxford, UK |