

Humaira Afzal

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Educational Qualification

- **Ph.D** in Computer Science from University of Bradford, UK with a thesis entitled “Modelling and Analysis of Dynamic Spectrum Sharing in Cognitive Radio Based Wireless Regional Area Networks” (January 2011-December 2014)
- **M.Sc/M.Phil** in Computer Engineering from University of Engineering and Technology Taxila, Pakistan with Cumulative GPA: 3.75/4.00 (2007- 2010)
- **M.Sc in Computer Science** from Bahauddin Zakariya University Multan, Pakistan with distinction (1994-1996)
- **B.Sc** from Bahauddin Zakariya University Multan, Pakistan with distinction (1992-1994)

Awards

- Secured 1st position (Gold Medalist) in M.Sc Computer Science from Bahauddin Zakariya University Multan, Pakistan
- Secured 2nd position (Silver Medalist) in B.Sc Computer Science from Bahauddin Zakariya University Multan, Pakistan
- Secured 2nd position (Silver Medalist) in Intermediate from Multan Board, Pakistan
- Secured Syed Yousaf Raza Gilani Foreign Scholarship (SYRGFS) award 2010

Teaching Experience

- Working as a Professor in Department of Computer Science, Bahauddin Zakariya University Multan, Pakistan from March 27, 2023 to to-date
- Worked as an Associate Professor in Department of Computer Science, Bahauddin Zakariya University Multan, Pakistan from July 25, 2022 to March 26, 2023
- Worked as an Assistant Professor in Department of Computer Science, Bahauddin Zakariya University Multan, Pakistan from January 2015 to July 24, 2022

- Worked as a Lecturer in Department of Computer Science, Bahauddin Zakariya University Multan, Pakistan from August 1999-January 2015
- Worked as a Lecturer in Computer Science, Central College Multan, Pakistan from April 1997-July 1999

Course Taught

- Digital and Logic Design
- Computer Organization and Assembly Language
- Fundamentals of programing with C++
- Object Oriented Programing with JAVA
- System Programing
- Data Structures and Algorithms
- Design and Analysis of Algorithms
- Advanced Analysis of Algorithms
- Research Methodology
- Pervasive/Ubiquitous Computing
- Mobile and Wireless networks

Administrative Abilities

- Focal Person for Accreditation of BSCS Program
- PhD Program Coordinator
- DSA for Females
- Worked as Time Table Incharge for about 10 years

Thesis Supervision

- **Muhammad Aqeel**, MPhil Thesis Title: Efficient Management of Coverage Area and Coverage Quality in WSNs using Node Mobility, (2019-2021)

- **Saba kanwal**, MPhil Thesis Title: Reliability Measures of Clustering Algorithm of WSN without Compromising Energy Consumption and Network Life Time, (2019-2021)
- **Hira Sharif**, MPhil Thesis Title: A Mechanism to detect and Mitigate PUE attack by Integrating CRCN, (2019-2021)
- **Chaman Saeed**, MPhil Thesis Title: Performance Evaluation of Association Process of IoT-enabled CPEs in IEEE 802.22 WRAN, (2019-2021)
- **Aima Tayyab**, MPhil Thesis Title: Modeling of Spectrum Handoff with Efficient Energy Usage in IOT based Cognitive Radio Network using Discrete Time Markov Chain, (2018-2021)
- **Afiya Kirn**, MPhil Thesis Title: Multi Channel Sensing with energy harvesting in Cognitive Radio based IOT Network (2018-2020)
- **Aamna Aslam**, MPhil Thesis Title: Efficient Route Selection with better Energy Usage in Cognitive Radio based IOT Network, (2018-2020)
- **Wajid Ali**, MPhil Thesis Title: Compact Image Features of Fast Retina key points to Retrieve Images, (2016-2018)
- **Sumaira Aslam**, MPhil Thesis Title: Harris-based Image Descriptor for Image Classification (2012-2016)
- **Muhammad Awais Khan**, MPhil Thesis Title: Hacking Systems, Hacking Values: Interactive Theories for an Interactive world (2014-2019)
- **Sajid Ali**, MPhil Thesis Title: Methods for Secure Spectrum sensing in Cognitive Radio Systems (2014-2017)
- **Asif Raza**, MPhil Thesis Title: Simulation of Primary User Authentication Method in CRN (2014-17)

Research Publications

1. **Humaira Afzal**, Kainat Sajid, Muzaffar Hameed, Muhammad Rafiq Mufti, Humera Batool Gill, “An Effective Paradigm for Selecting Channels in 6G Wireless Networks with Improved QoS”, Proceedings of the Pakistan Academy of Sciences: A. Physical and Computational Sciences, vol. 61, no. 2, pp. 193-201, 2024 (HEC recognized, Y-Category).

2. Tauqeer Safdar Malik, Jawad Tanveer, Shahid Anwar, Muhammad Rafiq Mufti, **Humaira Afzal**, Ajung Kim, "An Efficient and Secure Fog Based Routing Mechanism in IoT Network," *Mathematics*, vol. 11, no. 17, p.3652, 2023, (I. F = 2.4).
3. Muhammad Faizan Khan, Lu Lu, **Humaira Afzal**, Jamal Abdul Nasir, "PredictionMiner: mining the latest individual behavioral rules for personalized contextual pattern predictions", *Soft Computing*, pp. 1-15, 2023, (I. F = 3.732).
4. **Humaira Afzal**, Saba Kanwal, Muhammad Zulfiqar, Humera Batool Gill, Muhammad Rafiq Mufti, "Performance Evaluation of Various Algorithms for Cluster Head Selection in WSNs," *The Nucleus*, vol. 60, no. 1, pp. 35-44, 2023, (HEC recognized, Y-Category).
5. Muhammad Rafiq Mufti, Aqeel Awan, **Humaira Afzal**, Tauqeer Safdar Malik, Humera Batool Gill, "An Efficient Algorithm to Enhance Nonoverlapping Coverage Area with Less Energy Consumption in WSN," *Wireless Communications and Mobile Computing*, vol. 2022, 2022, (I. F = 2.146).
6. Syed Muhammad Sajjad, Muhammad Rafiq Mufti, Muhammad Yousaf, Waqar Aslam, Reem Alshahrani, Nadhem Nemri, **Humaira Afzal**, Muhammad Asghar Khan, Chien-Ming Chen, "Detection and Blockchain-Based Collaborative Mitigation of Internet of Things Botnets," *Wireless Communications and Mobile Computing*, vol. 2022, (IF= 2.336).
7. Muhammad Khalid Sohail, Abdul Raheman, Javid Iqbal, Muzammal Ilyas Sindhu, Abdul Staar, Muhammad Mushafiq, **Humaira Afzal**, "Are Pair Trading Strategies Profitable During COVID-19 Period?," *Journal of Information and Knowledge Management*, vol. 21(Supp01), p.2240010, 2021, (IF= 1.143).
8. Haseeb Malik, **Humaira Afzal**, Muhammad Rafiq Mufti, Asghar Ali, Ali Hassan, Saddam Amin, "Challenges and Research Advancement in 5G Wireless Backhaul Networks," *Statistics, Computing and Interdisciplinary Research*, vol. 3, no.2, pp.73-84, 2021, (HEC recognized, Y-Category).
9. **Humaira Afzal**, Muhammad Rafiq Mufti, Khawaja Tehseen Ahmed, Mariam Rehman, Muhammad Yousaf, Dewan Muhammad Qaseem, "Performance Modeling and Analysis of Secure Registration Process of CPEs in IEEE 802.22 WRAN Cognitive Radio Network," *The Nucleus*, vol. 57, no. 4, pp. 141-149, 2021, (HEC recognized, Y-Category).
10. Khawaja Tehseen Ahmed, **Humaira Afzal**, Sajid Iqbal, Malik Ghulam Hussain, Muhammad Rafiq Mufti, Ahmad Karim, "Highly Efficient Multimedia Image Retrieval using Slim Descriptor," *The Nucleus*, vol. 57, no. 4, pp. 118-128, 2021, (HEC recognized, Y-Category).

11. Sami Ud Din, Muhammad Rafiq Mufti, **Humaira Afzal**, Majid Ali, Muhammad Abdul Moiz Zia, “Adaptive Integral-Based Robust Q-S Synchronization and Parameter Identification of Nonlinear Hyperchaotic Complex Systems,” *Complexity*, vol. 2021, pp. 1-17, 2021, (I.F = 2.462)
12. Khawaja Tehseen Ahmed, Sumaira Aslam, **Humaira Afzal**, Sajid Iqbal, Arif Mehmood, Gyu Sang Choi, “Symmetric image contents analysis and retrieval using decimation, pattern analysis, orientation, and features fusion ,” *IEEE Access*, vol. 9, pp. 57215 – 57242, 2021, (IF = 3.745).
13. Beenish Khan, Muhammad Rafiq Mufti, Asad Habib, **Humaira Afzal**, Mohammad Abdul Moiz Zia, Afshan Almas, Shahid Hussain, Bashir Ahmad, “Evolution of influential developer’s communities in OSS and its impact on quality,” *Intelligent Automation & Soft Computing*, vol. 28, no.2, pp. 337–352, 2021, (I.F = 1.276).
14. Huma, Muhammad Khalid Sohail, Nadeem Akhtar, Dost Muhammad, **Humaira Afzal**, Muhammad Rafiq Mufti, Shahid Hussain, Mansoor Ahmed, “Analyzing COVID-2019 Impact on Mental Health Through Social Media Forum,” *Computers, Materials & Continua*, vol. 67, no.3, pp. 3737–3748, 2021, (IF = 4.890).
15. Syeda Javeria Shoukat, **Humaira Afzal**, Muhammad Rafiq Mufti, Muhammad Khalid Sohail, Dost Muhammad Khan, Nadeem Akhtar, Shahid Hussain, Mansoor Ahmed, “Analyzing COVID-19 Impact on the Researchers Productivity through Their Perceptions,” *Computers, Materials & Continua*, vol. 67, no.2, pp. 1835–1847, 2021, (IF = 4.890).
16. Fazal ur Rehman, Nadir Mehmood, Sami ud Din, Muhammad Rafiq Mufti, **Humaira Afzal**, “Adaptive Sliding Mode Based Stabilization Control for the Class of Underactuated Mechanical Systems,” *IEEE Access*, vol. 9, pp. 26607-26615, 2021, (IF = 3.745).
17. Fazal ur Rehman, Muhammad Rafiq Mufti, Sami ud Din, **Humaira Afzal** , Muhammad Imran Qureshi , Dost Muhammad Khan, “Adaptive smooth super-twisting sliding mode control of nonlinear systems with unmatched uncertainty,” *IEEE Access*, vol. 8, pp: 177932-177940, 2020, (IF = 3.745).
18. **Humaira Afzal**, Muhammad Rafiq Mufti, Khawaja Tehseen Ahmed, Saadia Ajmal, Muhammad Yousaf, “Performance Analysis of Hybrid Spectrum Sharing in Cognitive Radio Based Wireless Regional Area Network,” *The Nucleus*, vol. 57, no. 1 pp. 27-32, 2020, (HEC recognized, Y-Category).
19. Syed Muhammad Sajjad, Muhammad Yousaf, **Humaira Afzal**, Muhammad Rafiq Mufti, “eMUD: Enhanced Manufacturer Usage Description for IoT Botnets Prevention on Home WiFi Routers,” *IEEE Access*, vol. 8, pp. 164200 – 164213, 2020, (IF = 3.745).

20. Shahid Hussain, **Humaira Afzal**, Muhammad Rafiq Mufti, Dost Muhammad Khan, "Automatic video annotation of human health care action via clustering," Journal of Medical Imaging and Health Informatics, vol. 10, no. 10, pp. 2512-2521, 2020, (IF = 0.659).
21. Shahid Hussain, **Humaira Afzal**, Muhammad Rafiq Mufti, Nadeem Akhtar, "A novel method of image denoising: New variant of BM3D," Journal of Medical Imaging and Health Informatics, vol. 10, no. 10, pp.2490-2500, 2020, (IF = 0.659).
22. **Humaira Afzal**, Muhammad Rafiq Mufti, Aamir Raza, Abbas Hassan, "Performance analysis of QoS in IoT based cognitive radio Ad Hoc network", Concurrency and Computation: Practice and Experience. 2020; e5853, <https://doi.org/10.1002/cpe.5853>, (IF = 1.447).
23. Khawaja Tehseen Ahmed, **Humaira Afzal**, Muhammad Rafiq Mufti, Arif Mehmood, Gyu Sang Choi, "Deep Image Sensing & Retrieval using Suppression, Scale Spacing & Division, Interpolation and Spatial Color Coordinates with Bag of Words for Large and Complex Datasets", IEEE Access, vol.8, pp. 90351-90379, 2020, (IF = 4.098).
24. Shazia Afzal, Muhammad Yousaf, **Humaira Afzal**, Nawaf Alharbe, Muhammad Rafiq Mufti, "Cryptographic strength evaluation of key schedule algorithms," Security and Communication Networks, vol. 2020, (IF= 1.288).
25. **Humaira Afzal** , Muhammad Rafiq Mufti , Sami Ud Din, Qarab Raza Butt , Muhammad Imran Qureshi, Dost Muhammad Khan, Waqar Aslam, "Modeling and Inverse Complex Generalized Synchronization and Parameter Identification of Non-Identical Nonlinear Complex Systems Using Adaptive Integral Sliding Mode Control," IEEE Access, vol. 8, no. 1, pp. 38950-38969, March, 2020, (IF = 4.098).
26. Muhammad Samiullah, Waqar Aslam, Hira Nazir, M. Ikramullah Lali, Basit Shahzad, Muhammad Rafiq Mufti, **Humaira Afzal**, "An Image Encryption Scheme based on DNA Computing and Multiple Chaotic Systems, " IEEE Access, vol. 8, no. 1, pp. 25650-25663, January 31, 2020, (IF = 4.098).
27. Muhammad Sharif, Javaria Amin, Mudassar Raza, Muhammad Almas Anjum, **Humaira Afzal**, Shafqat Ali Shad, "Brain tumor detection based on extreme learning", Neural Computing and Applications, pp. 1-13, 2020, (IF = 4.664).
28. Subhan Tariq, Nadeem Akhtar, **Humaira Afzal**, Shahzad Khalid, Muhammad Rafiq Mufti, Shahid Hussain, Asad Habib, Ghufraan Ahmad, "A novel co-training-based approach for the classification of mental illnesses using social media posts," IEEE Access, vol. 7, pp.166165-166172, 2019, (IF = 4.098).

29. Shahid Hussain, **Humaira Afzal**, Muhammad Rafiq Mufti, Muhammad Imran, Amjad Ali, Bashir Ahmad, "Mining version history to predict the class instability, " PLoS ONE, vol.14, no. 9, pp. 1-21, 2019, (IF = 2.776).
30. **Humaira Afzal**, Waqar Aslam, Muhammad Rafiq Mufti, "A Comprehensive Study on Cognitive Radio Based Internet of Things," The Nucleus, vol. 56, no. 2, pp. 49-54, 2019, (HEC recognized, Y-Category)
31. Shahid Hussain, Muhammad Rafiq Mufti, Muhammad Khalid Sohail, **Humaira Afzal**, Ghufuran Ahmad and Arif Ali Khan, "A Step towards the Improvement in the Performance of Text Classification," KSII Transactions on Internet and Information Systems, vol. 13, no. 4, pp. 2162-2179, 2019. DOI: 10.3837/tiis.2019.04.024, (IF =0.711)
32. Shahid Hussain, **Humaira Afzal**, Muhammad Rafiq Mufti, Asfandiyar Khan, Arif Ali Khan, Fazal-E- Amin, "A Methodology to Rank the Patients Prone to Chronic Diseases in Telehealth," Journal of Medical Imaging and Health Informatics, vol. 9, no. 3, pp.418-425, 2019, (IF = 0.659).
33. Muhammad Rafiq Mufti, **Humaira Afzal**, Fazal-ur-Rehman, Waqar Aslam, Muhammad Imran Qureshi, "Transmission projective synchronization of multiple non-identical coupled chaotic Systems using sliding mode control", IEEE Access, vol. 7, no. 1, pp. 17847-17861, 2019, (IF = 4.098).
34. **Humaira Afzal**, Muhammad Rafiq Mufti, Irfan Awan, Muhammad Yousaf, "Performance Analysis of Radio Spectrum for Cognitive Radio Wireless Networks using Discrete Time Markov Chain," Journal of Systems and Software, vol. 151, pp. 1-7, 2019, (IF =2.559).
35. Abdullah Maqsood, **Humaira Afzal**, Muhammad Rafiq Mufti, Waqar Aslam, "Bio-inspired Hybrid Locomotion in Mobile Robots: A Comprehensive Survey," Journal of Information Communication Technologies and Robotic Applications, vol. 9, no. 1, pp. 1-8, 2018. (X-Category)
36. Muhammad Rafiq Mufti, **Humaira Afzal**, Fazal ur Rehman, Nisar Ahmed, "Stabilization and synchronization of 5-D memristor oscillator using sliding mode control," Journal of the Chinese Institute of Engineers, vol. 41, no. 8, pp. 667-677, 2018, (IF = 0.667).
37. Muhammad Rafiq Mufti, **Humaira Afzal**, Fazal ur Rehman, Qarab Raza Butt, Muhammad Imran Qureshi, "Synchronization and antisynchronization between two non-identical Chua oscillators via sliding mode control," IEEE Access, vol. 6, no. 1, pp. 45270-45280, December 2018, (IF = 4.098).
38. Tayyaba Zeb, Muhammad Yousaf, **Humaira Afzal**, Muhammad Rafiq Mufti, "A quantitative security metric model for security controls: Secure virtual machine migration

- protocols as target of assessment,” IEEE China Communications, Vol. 15, No. 8, pp. 126-140, August 2018, (IF = 2.024).
39. Muhammad Rafiq Mufti, **Humaira Afzal**, Irfan Awan, Andrea Cullen, “A framework for dynamic selection of backoff stages during initial ranging process in wireless networks”, Journal of Systems and Software, 133, pp.17-27, 2017, (IF =2.559).
 40. **Humaira Afzal**, Muhammad Rafiq Mufti, Muhammad Yousaf, Waqar Aslam, “Modeling of Collision Probability for Maximum Backoff Stages during Association Process in Wireless Regional Area Networks”, Sindh University Research Journal (Science Series), vol. 49, no. 3, pp.659-664, 2017. (X-Category, ISI Indexed)
 41. **Humaira Afzal**, Irfan Awan, Muhammad Rafiq Mufti, R. E. Sheriff, “Performance analysis of contending customer equipment in wireless networks”, Journal of Systems and Software (Elsevier Journal), vol. 117, pp. 357-365, 2016, (IF =2.559).
 42. **Humaira Afzal**, Irfan Awan, Muhammad Rafiq Mufti, R. E. Sheriff, “Modeling of Initial Contention Window Size for Successful Initial Ranging Process in IEEE 802.22 WRAN Cell”, Simulation, Modelling, Practice and Theory (Elsevier Journal), vol. 51, pp. 135-148, February 2015. (IF =2.426).
 43. **Humaira Afzal**, Irfan Awan, Muhammad Rafiq Mufti, R. E. Sheriff, “Modelling and Analysis of Customer Premise Equipments Registration Process in IEEE 802.22 WRAN Cell”, Journal of Systems and Software (Elsevier Journal), Vol. 98, pp. 107-116, August, 2014, (IF =2.559).
 44. **Humaira Afzal**, Muhammad Rafiq Mufti, Masood Nadeem., Irfan Awan, Usman Shahid Khan, “The Role of Spectrum Manager in IEEE 802.22 Standard”, Journal of Basic and Applied Scientific Research, Vol. 4, No. 4, pp. 280-289, 2014.
 45. Muhammad Zubair Baloch, Shahid Hussain, **Humaira Afzal**, Muhammad Rafiq Mufti, Bashir Ahmad, “Software Developer Recommendation in Terms of Reducing Bug Tossing Length,” In International Conference on Security, Privacy and Anonymity in Computation, Communication and Storage, pp. 396-407). Springer, Cham, December 2020.
 46. Khudema Zahra, Shahid Hussain, **Humaira Afzal**, Muhammad Rafiq Mufti, Dost Muhammad Khan, and Muhammad Khalid Sohail. "A Methodology to Automate the Security Patterns Selection," In International Conference on Security, Privacy and Anonymity in Computation, Communication and Storage, pp. 408-419. Springer, Cham, 2020.
 47. S. Iqbal, Muhammad Rafiq Mufti, **Humaira Afzal**, S. Sarwar, “Semi analytical solutions for fractional order singular partial differential equations with variable coefficients, ”Proc.

- 16th International Conference on Numerical Analysis and Applied Mathematics (ICNAAM), AIP Conference, Vol. 2116, No. 1, p. 300007, 13–18 September 2018, Rhodes, Greece.
48. **Humaira Afzal**, Irfan Awan, Muhammad Rafiq Mufti, “Mathematical Modeling of Association Attempt with the Base Station for Maximum Number of Customer Premise Equipments in the IEEE 802.22 Network”, Proc. in 3rd IEEE International Conference on Future Internet of Things and Cloud, Rome, 24-26 Aug. 2015, pp. 289 – 292.
49. **Humaira Afzal**, Usman Shahid Khan, Irfan Awan, Muhammad Rafiq Mufti, “A Simple Greedy Algorithm for Cognitive Radio Networks”, Proc. in 29th Annual UK Performance Engineering Workshop (UKPEW), pp. 3-7, 2013.
50. **Humaira Afzal**, Muhammad Rafiq Mufti, Irfan Awan, “Bi-Greedy Cognitive Radio MAC Protocol for Supporting TCP/UDP Traffic”, Proc. in 7th International Working Conference on Performance & Security Modelling of Cooperative Heterogeneous Networks (HETNETs), 2013.