Shahid Mumtaz, Ph.D., FIET, SMIEEE, CEng.

Email: Tel:

Biography

I am an IET Fellow, IEEE ComSoc, VTS, IAS and ACM Distinguished speaker, recipient of IEEE ComSoC Young Researcher Award, founder and EiC of IET "Journal ofQuantum communication," EiC of Alexandria Engineering Journal - Elsevier, Vice-Chair: Europe/Africa Region- IEEE ComSoc: Green Communications & Computing society and Vice-chair for IEEE standard on P1932.1: Standard for Licensed/Unlicensed Spectrum Interoperability in Wireless Mobile Networks. His work resulted in technology transfer to companies and patented technology. His expertise lies in 5G/6G wireless technologies using AI/ML and Digital Twin(VR/XR) tools and innovation path towards industrial and academic. Moreover, he worked as Senior 5G Consultant at Huawei and InterDigital, contributing to RAN1/RAN2.

He has more than 15 years of wireless industry/academic experience. He has received his Master's and Ph.D. degrees in Electrical & Electronic Engineering from Blekinge Institute of Technology, Sweden, and University of Aveiro, Portugal, in 2006 and 2011, respectively. From 2002 to 2003, he worked for Pak Telecom as System Engineer and from 2005 to 2006 for Ericsson and Huawei at Research Labs in Sweden. He has been with Instituto de Telecomunicações since 2011, where he currently holds the position of Principal Researcher (Associate Professor) and adjunct positions with several universities across the Europe-Asian Region.

He is the author of 4 technical books, 12 book chapters, 300+ technical papers (200+ Journals and Transactions, 90+ Conferences, 4 patents, 2 contributions to Standards, and 2 IEEE best paper awards in mobile communications. In addition to his work on data science, he has also contributed to Wireless communication, citing more than 9000 times with an H index of 50. He has been supervising/co-supervising several Ph.D. and Master students. He uses mathematical and system-level tools to model and analyze emerging wireless communication architectures using AI/ML, leading to innovative Master's theoretically optimal new communication techniques. He is working closely with leading R&D groups in the industry to transition these ideas to practice. He has secured funding of around 2M Euro.

His research has influenced international wireless standard bodies (i.e., IEEE and 3GPP), and major manufacturers have also represented his work in LTE release 12 onwards, including 5G NR. In addition, he has organized 20 workshops as Chair in IEEE prestigious conference, 22 special Issues as Lead Guest Editor of IEEE Communication, Wireless Magazine, and JSAC and Transaction on Vehicular Technology. Dr. Mumtaz is also the Associate Editor of several IEEE Journals, Communication Magazine, Wireless Magazine, Transactions on Industrial Informatics, Transactions on Communication, and IoT Journals.

In 2013, he was Co-General Chair in the 8th International Wireless Internet Conference - Symposium on Wireless and Vehicular Communication organized in Lisbon by IEEE and EAI societies. Moreover, he will also be a General Chair for IEEE CAMAD 2021 in Porto, Portugal. Furthermore, he gave invited tutorials/talks in IEEE conferences and the mobile industry and invited lectures in different foreign universities. Moreover, he serves as Scientific Expert and Evaluator for Research Funding Agencies, such as EU, COST, and NSF China. He was awarded an "Alain Bensoussan fellowship "in 2012. In addition, he was the recipient of the NSFC Visiting Researcher Fund for Young Scientists in 2017 from China.

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1 SCIENTIFIC PRODUCTION

The following section outlines Dr. Shahid's contributions to the scientific community in terms of his publications, the impact of his scientific work, his ability to attract funding through his coordination and participation in scientific projects, and his active community involvement.

EDUCATION

- 2011, Ph.D. in Electrical & Electronic Engineering — University of Aveiro, Portugal
- 2006, Master in Electrical Engineering — Blekinge Institute of Technology, Sweden

RESEARCH EXPERIENCE

- 2022- Sept. Full Professor, Nottingham Trent University, UK
- Since 2020 Principal Researcher, Instituto de Telecomunicações, Aveiro, Portugal
- 2017- 2019 Auxiliary Researcher , Instituto de Telecomunicações, Aveiro, Portugal
- 2020- 2021 Senior 5G/6G (RAN1/RAN2) Expert Consultant, InterDigital, USA
- 2019-2020 Senior 5G/6G (RAN1/RAN2) Expert Consultant, Huawei, Sweden
- 2012-2016 PostDoc, Instituto de Telecomunicações, Aveiro, Portugal
- 2005-2006 Research Intern, Ericsson, Sweden

SUMMARY: RESEARCH PRODUCTIONS

Contribution	Number
No. of Refereed IEEE Transactions/ Journal /Magazine	> 200
IEEE Conference	> 90
Books	4
Book Chapters	12
Standardization Contribution (IEEE & 3GPP)	2
Patents	4
Organized Special Issue in IEEE Journals as Lead Guest Editor	>20
Invited Talks/ Tutorials	>30
Organized Workshops	>25

RESEARCH PRODUCTIONS IMPACT

Citations	> 10000
H-index	> 55
i10- index	> 165

(Source: Google scholar)

PUBLICATIONS

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Michael Gundlach "**Cognitive Radio Oriented Wireless Networks**" Springer, Feb 2018.

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- [**B2**] Shahid Mumtaz and Jonathan Rodriguez "**Smart Device to Smart Device** Communication" Springer, 2014.
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- [**BC12**] K. Huq, S.M. Mumtaz, J. Rodriguez, "**An Overview of 4G System-Level Energy-Efficiency Performance**" Chapter in, Energy Management in Wireless Cellular and Ad-hoc Networks, Springer International Publishing, Switzerland, 2016.
- [**BC11**] K. Huq, S.M. Mumtaz, J. Rodriguez, "**Communication Haul Design for 5G Radio: Challenges and Open Issues**", Chapter in, Opportunities in 5G Networks: A Research and Development Perspective, Fei Hu, CRC-Taylor & Francis Group, New York, 2016.
- [**BC10**] K. Huq, S.M. Mumtaz, J. Rodriguez, "**A C-RAN Approach for 5G Applications**", Chapter in, Backhauling/Fronthauling for Future Wireless Systems, John Wiley & Sons, Ltd, London, 2016.
- [**BC9**] Kazi M. S. Huq, Shahid Mumtaz, and Jonathan Rodriguez, "**Influences of backhaul/fronthaul for 5G wireless networks: Challenges and Open Issues**" 5G Networks A Research and Development Perspective, Taylor & Francis LLC, CRC Press, 2015.
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- [**BC7**] Kazi Saidul, Shahid Mumtaz and Jonathan Rodriguez and Rui L. Aguiar "**Overview of Spectral and Energy-Efficiency Trade-off in OFDMA Wireless System**," Green Communication for 4G Wireless Systems, River Publisher, Denmark, March 2013.
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- **[166]** Z. Zhou, H. Liao, X. Wang, S. Mumtaz, and J. Rodriguez, "**When Vehicular Fog Computing Meets Autonomous Driving: Computational Resource Management and Task Offloading**," IEEE Network Magazine, 2020
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- **[159]** Baofeng Ji, Ying Han, Shahid Mumtaz, Chunguo Li " **Research on Secure Transmission Performance of Electric Vehicles under Nakagami-m Channel** " IEEE Intelligent Transportation Systems Transactions, 2020
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- **[157]** Feiran Huang, Zhigao Zheng, and Shahid Mumtaz "**Recognizing Influential Nodes in Social Networks with Controllability and Observability** " IEEE IoT Journal, 2020
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- **[154]** Xinyue Pei, Miaowen Wen, Shahid Mumtaz, and Mohsen Guizani "**Capacity and Outage Studies for Cooperative NOMA Cellular Systems With a Half-Duplex/Full-Duplex Relay**," IEEE Transaction on Communication, 2020
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CONTRIBUTIONS TO STANDARD

- Vice-Chair: IEEE SA-P1932.1 (Standard for Licensed/Unlicensed Spectrum Interoperability in Wireless Mobile Networks) Till 2022
  - This standard defines a communication mechanism among entities operating in licensed and unlicensed spectrum. The mechanism includes interoperation among MAC/PHY protocols designed for unlicensed and licensed spectrum operations and a controller for coordination among communicating entities
- Contribution at 3GPP
  - Release 13, 15, 16, 17
  - D2D, C-V2X, Positioning, URLLC, Beamforming, Multi-connectivity

NATIONAL AND INTERNATIONAL IMPACT AND RECOGNITION OF SCIENTIFIC PRODUCTION

INTERNATIONAL IMPACT

Dr. Shahid's research impacted many areas of wireless communication and data sciences, as demonstrated by his citation count and H index in the following table:

Citations	9000
H-index	50
i10- index	160

(Source: google scholar)

Some of his most impacted work are as follows.

Area of Data Sciences:

- Shahid devised the creative idea and brought vital theories to the application of Data Sciences in Wireless Communication.

- (First impacted work) Z. Zhou, C. Gao, C. Xu, Y. Zhang, S. Mumtaz, and J. Rodriguez, "Social Big-Data-Based Content Dissemination on the Internet of Vehicles," in IEEE Transactions on Industrial Informatics, 2018 (160 Citations)
    - This is a groundbreaking contribution to IoV. For the first time, Shahid showed how to combine the physical and social layer information to realize rapid content dissemination in D2D-V2V-based IoV networks. Previously, it was considered one of the most challenging challenges in intelligent transportation. Real-world social big data was collected from the most significant Chinese microblogging service Sina Weibo and the largest Chinese video - sharing site Youku to test the solutions.
- (Second impacted work) Z. Zhou, P. Liu, J. Feng, Y. Zhang, S. Mumtaz, and J. Rodriguez, "Computation Resource Allocation and Task Assignment Optimization in Vehicular Fog Computing: A Contract-Matching Approach," in IEEE Transactions on Vehicular Technology, 2019 (152 Citations)
    - Shahid coined the term Vehicular fog computing (VFC) in this seminal work. He also received the best Journal award from IEEE TCGN and the best IEEE conference paper award from IEEE 15th International Wireless Communications & Mobile Computing Conference (IWCM). The main challenge was how to offload the computation tasks from the base station to vehicular fog nodes by leveraging the under-utilized computation resources of nearby vehicles. Shahid addressed this challenge and provided a solution to minimize the network delay from a contract-matching integration perspective.
    - (Third impacted work) Z. Zhou, H. Yu, C. Xu, Y. Zhang, S. Mumtaz, and J. Rodriguez, "Dependable Content Distribution in D2D-Based Cooperative Vehicular Networks: A Big Data-Integrated Coalition Game Approach," in IEEE Transactions on Intelligent Transportation Systems, 2018 (140 Citations)
    - This paper, the first of its kind, proposes a D2D framework for vehicular networks, and it is part of 3GPP Release 14 (36.746). Shahid investigated how to achieve dependable content distribution in device-to-device (D2D)-based cooperative vehicular networks by combining big data-based vehicle trajectory prediction with coalition formation game-based resource allocation. Shahid's proposed algorithm was tested based on a real-world map and realistic vehicular traffic using the Huawei Base station in China. This framework is a springboard for future research on cooperative Vehicular Networks as Huawei.

Other Impacted work on Data Sciences

- Z. Zhou, Shahid Mumtaz, Luis Oliveria et al., "Learning-Based URLLC-Aware Task Offloading for Internet of Health Things," in IEEE Journal on Selected Areas in Communications, vol. 39, no. 2, pp. 396-410, Feb. 2021
- S. Liao, J. Wu, S. Mumtaz, J. Li, R. Morello and M. Guizani, "Cognitive Balance for Fog Computing Resource in Internet of Things: An Edge Learning Approach," in *IEEE Transactions on Mobile Computing, August, 2020*
- S. Liao, Shahid Mumtaz *et al*., "Cognitive Popularity Based AI Service Sharing for Software-Defined Information-Centric Networks," in *IEEE Transactions on Network Science and Engineering*, vol. 7, no. 4, pp. 2126-2136, 1 Oct.-Dec. 2020
- H. Yang, J. Wen, X. Wu, L. He and S. Mumtaz, "An Efficient Edge Artificial Intelligence MultiPedestrian Tracking Method With Rank Constraint," in *IEEE Transactions on Industrial Informatics*, vol. 15, no. 7, pp. 4178-4188, July 2019

Area of on Energy Efficiency:

- Dr. Mumtaz is an internationally recognized researcher for his extraordinary contributions to Green communication in wireless networks. His research and services are considered an essential and fundamental reference, significantly impacting green communication in the academic sector and industry. As a result, IEEE has started a new track and society called "Green Communications & Computing society"

in the academic sector. Currently, around 2K are members of the IEEE green community, among operators and industry, and all IEEE conferences have a Green Communication track due to his work on this subject.

- Moreover, IEEE ComSoc also granted him a distinguished lecture for his impacted work on green communication. Out of his 80 transactions, Dr Mumtaz has published more than 15 transactions on this topic, organized workshops, and delivered tutorials in green communication at major IEEE conferences. In addition, in the industry sector, he contributed to the 3GPP release 12/13 on the sleep mode of the base station.
    - Dr. Mumtaz's contribution to Green communication is his thorough and rigorous approach in developing algorithms and protocols, which lead to today's energy-efficient wireless communication. He was one of the first researchers to propose the Green Communication concept. Before his work, most studies only considered the system's spectral efficiency to optimize system performance and completely ignored energy efficiency. His idea leads to one of European's pioneer projects in the field of Green Communication (https://cordis.europa.eu/ project/id/248577). Afterward, IEEE started a new society and track in major IEEE conferences on Green communication, i.e., ICC and Globecom on "IEEE ComSoc Green Communications & Computing society." Currently, he is leading the Green communication society as Vice-chair. Since 3G, increasing energy efficiency and decreasing energy per bit of the wireless system is one of the priority areas for mobile operators'. The primary source of wireless communication energy comes from the active element (baseband) and passive (RF) components of base stations/mobile devices. Thanks to Dr. Mumtaz's contribution, novel solutions and algorithms are currently helping commercially deployed base station/mobile devices to improve their system's energy efficiency and decrease energy per bit.
        - First Impacted Work: Shahid Mumtaz & Jonathan Rodriguez "Green Communication for 4G Wireless Systems", River Publisher, March 2013 (Download, 530 copies)-
        - Second Impacted Work: K. M. S. Huq, S. Mumtaz, J. Bachmatiuk, J. Rodriguez, X. Wang, and R. L. Aguiar, "Green HetNet CoMP: Energy Efficiency Analysis and Optimization," in IEEE Transactions on Vehicular Technology, vol. 64, no. 10, pp. 4670-4683, Oct. 2015, (320 citations)
        - Third Impacted Work: Z. Zhou, F. Xiong, C. Xu, Y. He, and S. Mumtaz, "Energy-Efficient Vehicular Heterogeneous Networks for Green Cities," in IEEE Transactions on Industrial Informatics, April 2018 (110 citations)
        - Fourth Impached Work: Z. Zhou, Shahid Mumtaz, Mohsen Guizani, et al., "When Mobile Crowd Sensing Meets UAV: Energy-Efficient Task Assignment and Route Planning," in IEEE Transactions on Communications, vol. 66, no. 11, pp. 5526-5538, Nov. 2018 (108 citations)

OTHER IMPACTS

International impacts		
Year of International Impacts	**Awards**	**Society of Awards**
2018	Editor in Chief of IET Journal of Quantum Communication	IET - Institution of Engineering and Technology
2021	Editor in Chief of Elsevier Alexandria Engineering Journal	Elsevier
2019	ComSoc Young Professional Award	IEEE
2021-2023	ComSoc Distinguished Lecturer	IEEE
2020	IET Fellow	IET
2020-2022	IEEE Industry Applications Society Distinguished Lecturer	IEEE
2017-2021	Distinguished Speaker	ACM
2018-2024	Vice-Chair: Europe/Africa Region- IEEE ComSoc: Green Communications & Computing society	IEEE
2017-2025	Vice-Chair: IEEE SA-P1932.1 (Standard for Licensed/Unlicensed Spectrum Interoperability Wireless Mobile Networks).	IEEE Standard Assoication

2018	Haijun Liao, Zhenyu Zhou, Xiongwen Zhao, Bo Ai, and Shahid Mumtaz "Task Offloading for VehicularFog Computing under Information Uncertainty: A Matching-Learning Approach " IEEE 15th InternationalWireless Communications & Mobile Computing Conference (IWCM),	IEEE
2018	Zhenyu Zhou, Junhao Feng, Bo Gu, Bo Ai, Shahid Mumtaz, Jonathan Rodriguez, Mohsen Guizani "When Mobile Crowd Sensing Meets UAV: Energy-Efficient Task Assignment and Route Planning," IEEE Transactions on Communication, 2018 (Best Paper Award: IEEE ComSoc Technical Committee on Communications Systems Integration and Modeling)	IEEE
2018	Visiting Research Fellow at National Science Foundation of China	NSFC- China
2013	*ERCIM Alain Bensoussan EU Fellowship* (VTT, Finland).	EU
National impact		
2020	Investigador principal," by FCT. Ranked 1st out of 15 researchers in the engineering panel. Only one to get this one.	FCT
2017	"Investigador Auxiliar," by FCT. Ranked 1st out of 30 researchers in the engineering panel.	FCT
2015	PostDoc. by FCT. Ranked 1st out of 50 researchers in the engineering panel.	FCT
2009	Ph.D. by FCT. Ranked 1st out of 100 researchers in the engineering panel.	FCT

FUTURE SCIENTIFIC PROSPECTS

Please see the attachment of the **Career Development plan.**

COORDINATION AND PARTICIPATION IN SCIENTIFIC PROJECTS

International Projects (Secure total funding of > 1.5 M Euro)			
Name of Project	**Funding Secure**	**Funding Body**	**Role**
5GENESIS (5th Generation End-to-end Network, Experimentation, System Integration, and Showcasing)	300K Euro	EU	Local Coordinator (2019-2021)
RECENT (Ultra-Dense Unsupervised Heterogeneous Wireless Cloud Coded Networks for 5G/B5G)	800K Euro	H2020-MSCA-RISE	Coordinator (2019-2022)
GreenT (Green Terminal for Future Wireless System)	200K Euro	EU-Celtic	Technical Manager (2014-2016)
CoDiv (Enhanced Wireless Communication Systems Employing Cooperative Diversity)	300K Euro	EU	Participant (2008-2010)
FUTON (Fibre-Optic Networks for Distributed Extendible Heterogeneous Radio Architectures and Service Provisioning)	300K Euro	EU	Participant (2007-2010)
C2Power (Cognitive Radio and Cooperative Strategies for Power saving in multi-standard wireless devices)	300K Euro	EU	Participant (20012-2015)
Greenet (Analysis, design, and Optimization of energy inefficient wireless communication systems and networks)	600K Euro	MSCA-ITN	Participant (20012-2014)

ORCALE (Opportunistic Radio Communications in Unlicensed Environments)	300K Euro	EU	Participant (2006-2008)
WHERE-2 (Wireless Hybrid Enhanced Mobile Radio Estimator-Phase2)	300K Euro	EU	Participant (20014-2016)
National Projects (Secure total funding of > 600K Euro)			
BATS (Intelligent and Sustainable Aerial-Terrestrial IoT Networks)	250K	FCT	Coordinator (2021-2023)
5G-BMW (5G-mmWave Broadband communication)	50K	FCT	Coordinator (2017-2020)
THz communication for Future Wireless System	80K	CMU-Portugal	Co-PI (2018-2020)
LOCUS - playfuL cOnneCted rUral territorieS: The Internet of Things in the intergenerational creative production of cultural georeferenced contents	250K	FCT	Coordinator (2018-2021)

ACTIVE PARTICIPATION IN THE COMMUNITY WITHIN AND OUTSIDE THE UNIVERSITY

PARTICIPATION IN ACTIVITIES INSIDE UNIVERSITY:

Following are Dr. Shahid's involvement in the activities within the University.

- **Basic Training**: Dr. Shahid provided Ph.D. courses, tutorials, seminars, workshops, and conferences. The offered material has to be closely linked to the primary research track of Dr. Shahid.
- **Research Activities**: Dr. Shahid also guides the student to pursue specific research projects. The topic of the research project has to be within the defined research areas of Dr. Shahid. Howeve r, Dr. Shahid also provides the guidelines to the students to follow up on dates research in the scientific community, which aligns with the student's research topics. Through this, the student will have the opportunity to be exposed to different research environments and perform alternative hands-on research activities.
- **Extra-curriculum Training**: Dr. Shahid also provided courses that give students valuable future fruitful careers. The complementary topics/skills can consist of, but not be limited to, presentation skills, writing scientific papers, patent filing, IPR issues, and proposal writing. Therefore, the whole training programme by Dr. Shahid is designed with the following multidimensional goals: i) provide the student with the essential and world-class cutting-edge research state-of-the-art knowledge on the topics covered by the Dr. Shahid research (through seminars, workshops, integration within organized research groups, etc.); ii) foster the skills and the practical knowledge of the student to raise the impact of their research work and increase their future employability (through extracurricular activities, etc.); and iii) establish the basis for each student to create their future professional Network (through plenary meetings, conferences, and workshops, secondment, etc.)

PARTICIPATION IN ACTIVITIES OUTSIDE UNIVERSITY:

JOURNAL/MAGAZINE EDITORSHIP

- Editor in Chief of IET Journal of Quantum Communication
- Editor in Chief of Elsevier Alexandria engineering journal
- Associate Editor for IEEE Network Magazine
- Associate Editor for IEEE Communication Magazine
- Associate Editor of Internet of Things Journal
- Associate Editor of Internet of Things Magazine
- Associate Editor of Trans. on Intelligent Transport system
- Associate Editor of Trans. Industrial informatics

JOURNAL/MAGAZINE GUEST EDITORSHIP

- Special Issue on 6G: The Paradigm for Future Wireless Communications, IEEE Wireless Magazine, Guest Editor: Shahid Mumtaz, 2022
- Special Issue on Green Internet of Things: Challenges and Future Opportunities, IEEE Transactions on Green Communications and Networking: Guest Editors: Shahid Mumtaz, 2021
- Special Issue on Enabling Massive IoT with 6G: Applications, Architectures, Challenges, and Research Directions, IEEE IoT Journal, Guest Editors: Guest Editors: Shahid Mumtaz, Anwer Al-Dulaimi, Varun G Menon, Muhammad Ikram Ashraf, Mohsen Guizani, 2020
- Special Issue on "Deep Learning-based Intelligent Systems: Theories, Algorithms, and Applications" Elsevier Computers & Electrical Engineering, Guest Editors: Feiran Huang, Shahid Mumtaz, 2020
- Special Issue on "Block Chain and Big Data-enabled Intelligent Vehicular Communication". IEEE Transactions on Vehicular Technology, Guest Editors: Shahid Mumtaz, Anwer Al-Dulaimi, Haris Gačanin, and Ai Bo. (Submission: January 30, 2020. Publication: December 2020
- Special Issue on "Computational Intelligence in the Internet of Everything", IEEE IoT Magazine (Deadline: February 1, 2020)
- Special Issue on "AI-Based Licensed/Unlicensed Spectrum Interoperability in Future Mobile Wireless System, "IEEE Transactions on Cognitive Communications and Networking (TCCN). (Deadline: November 1, 2019)
- Special Issue on "Trusted Computing and Advanced Security in Edge computing and Internet of Thing, "Transactions on Emerging Telecommunications Technologies (ETT). (Deadline: December 8, 2019)
- Special Issue on "Next Generation Wireless Medical Sensor Networks (WMSNs) for IoT-based eHealth Services, "EURASIP Journal on Wireless Communications and Networking. (Deadline: June 1, 2019)
- Special Issue on "5G Tactile Internet: An Application for Industrial Automation ", IEEE Transaction on Industrial information. (Deadline: September 1, 2018)
- Special Issue on "On Licensed and Unlicensed Spectrum for Future 5G/ B5G Wireless Systems", IEEE Network Magazine. (Deadline: November 1, 2018)
- Special Issue on "Evolution of Information and Communication Technology towards 5G: New Emerging Areas, Technologies, Protocols and Applications", Elsevier Journal of Digital Communications and Networks. (Deadline: March 30, 2018)
- Special Issue on "Visible Light Communication (VLC) Technologies: Issues, Challenges, and Applications," Transactions on Emerging Telecommunications Technologies. (Deadline: December 30, 2017)
- Special Issue on "Spectrum Extensions for 5G and Beyond 5G Networks", Transactions on Emerging Telecommunications Technologies. (Deadline: December 20, 2017)
- Special Issue on "Unlocking 5G Spectrum Potential for Intelligent IoT: Opportunities, Challenges, and Solutions", IEEE Communication Magazine. (Deadline: December 15, 2017)
- Special Issue on "5G and Beyond Mobile Technologies and Applications for Industrial IoT", IEEE Transactions on Industrial Informatics. (Deadline: August 30, 2017)
- Special Issue on "Spectrum Management in 5G Network", IEEE Wireless Magazine. (Deadline: March 1, 2017)
- Special Issue on "5G and Beyond Mobile Technologies and Applications for IoT ", IEEE Journal of IoT. (Deadline: March 31, 2017)
- Special Issue on " Millimeter Wave Communications for Future Mobile Networks," IEEE JSAC (Deadline: October 1, 2016)
- Special Issue on "THz communication for Vehicular Network," IEEE Transaction on Vehicular Communication. (Deadline: March 2016)
- IEEE Communications Magazine Special Issue on Smart Device-to-Smart Device Communication (Deadline: Jan 2014)

- IEEE Wireless Communications Magazine Special Issue on Cooperative and Cognitive paradigms for Green HetNets. (Deadline: Feb 2012).

RESEARCH PROPOSAL REVIEW COMMITTEE AND PANEL MEMBERSHIP

- H2020- European Union
- Canadian Science and Technology foundation
- EU COST Action
- The Science Fund of the Republic of Serbia
- Kazakhstan's Science Fund
- Pakistan Science and Technology

CONFERENCE/SYMPOSIUM/WORKSHOP CHAIR/CO-CHAIR

- TPC: BigDataSE 2021, The 15th International Conference on Big Data Sciences and Engineering, China
- IEEE CAMAD, 2021, Portugal (General Chair)
- IEEE 2021-UK:10th IEEE International Conference on Big Data and Cloud Computing (General Chair)
- IEEE-EAI, Portugal, 2017- 8th International Wireless Internet Conference (General Chair)
- IEEE WCNC 2019, Marrakech, Morocco, 2ND WORKSHOP ON ULTRA-HIGH SPEED, LOW LATENCY AND MASSIVE CONNECTIVITY COMMUNICATION FOR 5G/B5G
- IEEE PIMRC 2018, Bologna, Italy, Recent Developments in 5G New Radio (5G-NR) towards Ultra-Reliable Low-Latency Communication (URLLC)
- IEEE IECON 2016, Florence, Italy: Emerging Solutions, Protocols And Technologies For Future Wireless Communication System
- IEEE INDIN 2016, Poitiers, France: 5G and Beyond Mobile Technologies and Applications For IoT
- IEEE ICC 2016, Kuala Lumpur, Malaysia: Novel Medium Access and Resource Allocation for 5G Networks
- IEEE WCNC 2016, Doha, Qatar: Novel Waveform and MAC Design for 5G
- IEEE VTC Spring,2016, Nanjing, China: mmWave Massive MIMO
- IEEE VTC 2015, Glasgow: Emerging Device Centric Communications in 5G
- IEEE IWCMC 2015, London: Recent Advances at Physical Layer for 5G Wireless Networks
- IEEE ISCC 2015, Larnaca, Cyprus: A 5G Wireless Odyssey: 2020

TECHNICAL PROGRAM COMMITTEE

- Track chair for the Internet of Things in Global Information Infrastructure and Networking Symposium (GIIS 2018)
- Lead Track chair for Green Communication and networking in Globecom2018.
- Special Sessions Co-chair IEEE CAMAD, 2018 Barcelona.
- Publicity Co-chairs VTC2018-Spring, Porto.
- 12th EAI International Conference on Cognitive Radio Oriented Wireless Networks http://crowncom.org/2017/show/org-com SEPTEMBER 20-22, 2017 LISBON, PORTUGAL (Technical Program Chair)
- The 8th Symposium on Wireless and Vehicular Communication November 13-14, 20 Lisbon, Portugal (http://wicon.org/2014/show/home)
- 2020: GLOBECOM, VTC-F, ICC, PMIRC
- 2018: GLOBECOM, VTC-F, ICC, PMIRC
- 2017: GLOBECOM, VTC-F, ICC
- 2016: GLOBECOM, ICC
- 2015: GLOBECOM, VTC-S, ICC, PMIRC
- 2014: GLOBECOM, VTC-S, VTC-S, ICC, PMIRC

TUTORIAL PRESENTATIONS

- Keynote on 6G at "International Meet & Expo on Robot Intelligence Technology and Applications" Porto, Portugal September 13-15, 2021.
- Webinar on "Vision of 6G: 2030", at deliver Various Industrial and Academic Forum. 2020
- Workshop: "LTE to 5G: Vision, Requirement, Technical Challenges and Technologies for 6G", American University of Dubai (AUD), sponsored by AUD, UAE, 2018
- Workshop:4G-LTE - R.F. Engineering, Air Interface, and Core Network, COMSATS, Lahore, sponsored by Ministry of Education, Pakistan, 2018
- Workshop: "LTE to 5G: Vision, Requirement, Technical Challenges and Technologies for 6G", COMSATS, Lahore, sponsored by Ministry of Education, Pakistan, 2018
- Seminar: "5G Standardization, New Radio and Next-Generation Core (NGC)- 3GPP Release 15-16", COMSATS, Lahore, sponsored by Ministry of Education, Pakistan, 2018
- Seminar: "Ultra-Reliable and Low latency Communication (URLCC) for 5G, IoT, Time Sensitive networking and V2X communication", COMSATS, Lahore, sponsored by Ministry of Education, Pakistan, 2018
- Course: "Antenna design, Beamforming, Precoding, Massive MIMO, mmWave Communication, and System Level Modelling", COMSATS, Lahore, sponsored by Ministry of Education, Pakistan, 2018
- Course: "Network Sharing, Network Slicing, NVF, SDN, Edge computing, and Caching" COMSATS, Lahore, sponsored by Ministry of Education, Pakistan, 2018
- Course: "Dynamic Spectrum Management: spectrum sharing, LTE-U/LAA, WiFi-LTE aggregation, Multefire, Satellite, and terrestrial spectrum sharing," COMSATS, Lahore, sponsored by Ministry of Education, Pakistan, 2018
- Workshop: "Machine learning, BlockChain, Big Data" COMSATS, Lahore, sponsored by Ministry of Education, Pakistan, 2018
- Invited talk "MAC and RRM Design using Licensed/Unlicensed band for 5G New Radio (NR) ", at Nokia Bell-Lab, Antwerp, Belgium, sponsored by Bell Labs, May 2018
- Invited talk "5G: Standardization, New Radio (N.R.) and Architecture ", Visiting Scholar at the University of Essex, sponsored by University of Essex, May 2018
- Invited talk "5G: Vision, Requirements, Implications, and Standardization ", Academic tour as Visiting Scholar at various universities in Pakistan, sponsored by Ministry of Education, Pakistan, November, Oct 2017
- Invited talk "5G: Vision, Requirements, Standardization & Implications", HEC Foreign Visiting Professor Program, NUST, UET Taxila and COMSATS, Pakistan, 2017
- Invited talk "MAC Level Analysis of mm-wave/THz Communication for 5G and B5G System", WWRF (39th Meeting of the Wireless World Research Forum), Barcelona, Oct 2017.
- Invited talk "5G: Vision, Requirements, Standardization & Implications", Beijing University of Science & Technology, Tsinghua University and North Electric University of Beijing, Dec 2016.
- Invited talk "WiFi in Licensed Band", Euracon, Summer School on Aggregation and Sharing for 5G Networks, Nice, France, Oct 2016.
- Invited talk "5G: Vision, Requirements & Implications for smart Hong Kong", City University Hong Kong, Sept 2016

2 PEDAGOGICAL SKILLS

The following sections discuss teaching activities, student supervision, the creation of courses, and participation of Dr. Shahid in the community.

TEACHING ACTIVITIES

- Since 2021 Atlântica - Instituto Universitário, Lisbon
- Since 2019 Adjunct Senior Lecturer, University of Essex, UK
- 2018- 2019 Professor, School of Computer Sciences, Telecommunication & Transport Institute (TSI),

Riga, Latvia
- 2017- 2019 Adjunct Associate Professor, Electrical & Electronic Engineering Department, COMSATS Lahore, Pakistan

SHORT COURSES

- Feb 2021- April 2021 Xidian University, China (Application of Data Sciences to Wireless Communication)
- March 2021- June 2021 Beijing Jiaotong University (Application of Data Sciences to Wireless Communication)

SUPERVISION AND GUIDANCE ACTIVITIES

Ph.D. Supervision/Co-Supervision

- Mudassar Ali completed his Ph.D. in December 2017 (Supervised), Thesis title: "Resource Allocation in D2D Communication ", University of Engineering and Technology, Taxila, Pakistan
- Ali Haider completed his Ph.D. in August 2018 (Supervised), Thesis Title: Distributed Resource Allocation for Self-Organizing Small Cell Networks: A Game-Theoretic Approach, COMSATS, Pakistan
- Kazi Saidul Huq completed his Ph.D. in June 2013 (Co-Supervised); thesis title: "Optimization and performance analysis of CoMP, "University of Aveiro, Portugal
- Sherif Adeshina Busari completed his Ph.D. in November 2019 (Co-Supervised); thesis title: "mmWave Massive MIMO channel modeling, "University of Aveiro, Portugal
- Beenish Hassan, in progress- 2022 (Co- Supervised), Thesis title "FDD and TDD based performance analysis for CoMP" COMSATS, Lahore, Pakistan
- Muhammad Awais Khan, in progress-2022 (Co- Supervised), Thesis title "Robust, Resilient and Reliable Architecture for V2X Communications " University of Aveiro, Portugal
- António Jorge da Silva Morgado, in progress-2021 (Co- Supervised), Thesis title "Dynamic Spectrum Management for 5G system" COMSATS, University of South Wales
- Bismark Okyere, in progress-2021 (co-supervised), Thesis title "Physical layer network coding for mmWave Massive MIMO," University of Essex, UK

M.Sc. Student Supervision/Co-Supervision

- Oleg Borovik, Completed M.Sc. in July 2020, Thesis Title: Task Offloading in the Internet of Things via Deep Reinforcement Learning, Transport and Telecommunication Institute (TSI), Riga
- Md. Monjurul Islam Khan, Completed M.Sc. in April 2018, Thesis Title: Development of an ns-3 Based Simulator from Space Telemetry, COMSAT
- Md Shipon Ali, Completed M.Sc. in April 2017, Thesis Title: Non-Orthogonal Multiple Access (NOMA) for Cellular Wireless Communications, BPTU, China
- Adedayo Ogundipe, Completed M.Sc. in July 2016, Thesis Title: Adaptive Harvest-Then-Transmit for a Two-Tier Heterogeneous Wireless Network, North Electric University, China

Post-Doctoral Research Associated

- Sherif Adeshina Busari, PhD (Instituto de Telecomunicações) January 2022 - January 2024
- Fengji Bao, Ph.D. (Henan University of Science and Technology May 2019-June 2020
- Ahmed Farouk, Ph.D. (University of Manitoba, Canada), January 2016 - June 2016

PEDAGOGICAL MATERIALS

A variety of pedagogical materials are produced by Dr. Shahid, including lectures, readings, and books. These materials include learning objectives, assessments, and activities used in face-to-face and online classes. The following are the details of Dr. Shahid's pedagogical materials and their impact.

Lectures Methodology:

- He considers the appropriate scope and coverage of the content to convey; exclude irrelevant or unnecessary information.
- He breaks up, or groups content into smaller, logical segments, allowing students to experience it more efficiently.
- He controls his pace during lecture recordings.
- He invites guest speakers to add variety.
- He integrates interactivity and opportunity for engagement, whenever possible.
- He makes sure lectures are accessible by providing transcripts and captions for all video content.
- He avoids long video lectures, as most students don not finish watching them; mini-lectures from five to ten minutes are more engaging.
- He also involve student in cooperative Learning via short project.

Application of Lectures Methodology (quality and the quantity of pedagogical materials)

- He applied the above lecture methodology while delivering classes and short courses at the following Universities
    - The University of Essex, UK
        - Big Data, ML, and Blockchain application for 5G wireless network (2 Credit Hours)
    - Telecommunication & Transport Institute (TSI), Riga, Latvia
        - Networking and Internet of Things (3 Credit Hours)
    - COMSATS Lahore, Pakistan
        - Digital Communication, Signal Processing (3 Credit Hours)
        - Network and Signals (3 Credit Hours)
        - Networking and Internet of Things (2 Credit Hours)
    - Xidian University, China
        - Application of Data Sciences to Wireless Communication (2 Credit Hours)
        - Probability and stochastic processes (2 Credit Hours)
    - Beijing Jiaotong University
        - Wireless Communication (2 Credit Hours)
        - Advanced Digital Communication (2 Credit Hours)
- **Book1**: Shahid Mumtaz and Jonathan Rodriguez "mmWave-Massive MIMO: A Paradigm for 5G", Elsevier, London, UK, Oct 2016.
- **Book 2**: Shahid Mumtaz and Jonathan Rodriguez "Smart Device to Smart Device Communication" Springer, 2014.
- **Book3**: Shahid Mumtaz and Jonathan Rodriguez "Green Communication for 4G Wireless Systems", Aalborg, Denmark, March 2013.

Impact (pedagogical publications, awards)

- He is IEEE & ACM ComSoc Distinguished (2019-2023)
    - https://sites.google.com/site/shahidmumtaz2012/service?authuser=0
- He provides various invited lectures in the area of Data Sciences and Wireless to Universities and Industrial ecosystem holers
- His few videos related to 5G technologies is available on YouTube, where he used the above Digital Media Methodology: For example

- https://www.youtube.com/watch?v=oMgHJ2ype6Y&t=1238s
- https://www.youtube.com/watch?v=dTlc9StbGIE

PEDAGOGICAL PROJECTS

Dr Shahid also developed the following new course at Atlântica - Instituto Universitário, Lisbon and Nebrija University Madrid

1: University: Atlântica - Instituto Universitário, Lisbon

- **Course Name**: Fundamentals of Cryptography (Ciências de Computação e Engenharia)
- **Start Date**: Jan 2022
- **ECTS:** 6
- **Hours:** 45

Objective of Course

- The subject will explore foundational knowledge in cryptography and information security.
  - The overall aim is to understand fundamental cryptographic concepts like encryption and signatures and use them to build and analyze security in computers, communications, and networks.
  - It covers fundamental concepts in information security based on methods of modern cryptography, including encryption, signatures, and hash functions

OutComes

- On completion of this subject, students should have the following skills:
  - Ability to undertake problem identification, formulation, and solution;
  - Ability to utilize a systems approach to solving complex problems and to design for operational performance
  - Ability to manage information and documentation,
  - Capacity for creativity and innovation,
  - Ability to communicate effectively with the engineering team and with the community at large

2: University: Atlântica - Instituto Universitário, Lisbon

- **Course Name**: Fundamentals of Microprocessors (Ciências de Computação e Engenharia)
- **Start Date**: Jan 2022
- **ECTS:** 4
- **Hours:** 45

Objective of Course

- Comprehension of microprocessor structure: CPU, memory, and input/output peripherals.
- Know how to use sets of instructions and machine language.
- Capacity to analyze systems architecture based on microprocessors.
- Capacity to use hardware description languages.

OutComes

- On completion of this subject, students should have the following skills:
  - Get a solid foundation on the fundamentals of microprocessors and applications, interfacing the external devices to the processor according to the user requirements thus, enabling to create of novel products and solutions for real-time problems

3: University: Atlântica - Instituto Universitário, Lisbon

- **Course Name**: Master Course: Data Sciences (Ciências de Computação e Engenharia)
- **Start Date**: March 2022
- **ECTS:** 60

Objective of Course

- Master in Data Science aims to provide students with current and rigorous training, allowing them an excellent theoretical and practical mastery of the latest knowledge in the area, in an interdisciplinary and multidisciplinary perspective, essential to ensure a good insertion in the labor market.

OutComes

- Students enrolled in this program will learn fundamental and leading-edge advances in machine learning, artificial intelligence, Blockchain, operations research, and decision science. World-leading experts will also invite to teach the courses in their respective fields. In addition, elective modules allow the student to specialize in various areas such as 5G/6G, Industry 5.0, or logistics to understand specific industries.

4: University: Nebrija University Madrid

- **Course Name**: Master in Quantum Communication
- **Start Date**: Oct 2022 (Pending for approval)
- **ECTS:** 60

Objective of Course

- The purpose of this Master's is to train those professionals that companies are beginning to demand. Following objectives are proposed:
  - Provide a solvent basic training in the fundamentals of quantum computing and communication
  - That students know the challenges and current research lines of quantum technologies
  - Train professionals for companies that work with computing and quantum communication technologies

OutComes

- This course will take students to the cutting-edge of research in the emerging area of quantum technologies, giving them not only advanced training in the relevant physics but also the chance to acquire critical skills in the engineering and information science

ACTIVE PARTICIPATION IN THE COMMUNITY WITHIN AND OUTSIDE THE UNIVERSITY

See section Page 26 of ToC.

Ph.D. Thesis Examination Committee

- Shaocheng Huang's , Rate, Reliability and Secrecy Performance Analysis and Optimization for Millimeter-Wave Communications, Ph.D. thesis, Department of Electrical and Computer Engineering, KTH, Sweden 2020 (external examiner)
- José Victor Vasconcelos Sobral, Performance Assessment of Routing Protocols for IoT/6LoWPAN Networks, Ph.D. thesis, UBI, Portugal, 2018 (external examiner).
- Luís Miguel Oliveira, Optimal Cybersecurity Placement Schemes for Smart City Infrastructures, Ph.D. thesis, School of Electrical Engineering and Computer Science, UBI, 2017 (external examiner).
- Ge Bo, Opportunistic Scheduling for Wireless Networks with Distributed Architectures, Ph.D. thesis, Department of Electrical and Computer Engineering, KTH, 2016 (external examiner).
- Ali Mari, Quality of Experience and Mobility-Aware Green Inter-Radio Access Technology Offloading, Ph.D. thesis, Department of Electrical and Computer Engineering, KTH, 2016 (external examiner).

3 LANGUAGES SKILLS

- English (Fluent)
- Portuguese (Advanced)