Hussain Al-Rizzo, Professor of Electrical and Computer Engineering

EDUCATION

Email: hmalrizzo@ualr.edu

Ph.D., Electrical Engineering (Highest Honors), 1992
Department of Electrical and Computer Engineering and Department of Geodesy and Geomatics Engineering, University of New Brunswick, Fredericton, NB, Canada.
M.Sc., Electronics and Communications (Highest Honors), 1983
Department of Electrical Engineering, University of Mosul, Mosul, Iraq
Postgraduate Diploma, Electronics and Communications (Highest Honors), 1981
Department of Electrical Engineering, University of Mosul, Mosul, Iraq
B.Sc., Electronics and Communications (Highest Honors), 1979
Department of Electrical Engineering, University of Mosul, Mosul, Iraq.

RESEARCH EXPERIENCE IN ACADEMIA AND INDUSTRY

- Design of flexible artificial magnetic conductors and their applications to enhance the performance of low-profile UWB antennas, reduction of mutual coupling in antenna arrays for MIMO, GPS, cellular, and telemedicine applications.
- Design, fabrication, and testing of ultra-thin and compact inkjet-printed multiband antennas using flexible substrates for wearable wireless devices and evaluating their performance under bending and twisting.
- Applications of electromagnetic band gap, microwave photonic and metamaterials structures to passive RF devices, reduction of mutual coupling between radiating elements in MIMO and antenna array systems, EMI/EMC and Simultaneous Switching Noise (SSN) reduction.
- Mutual coupling reduction in planar (conformal) and 3D antennas (with vertical extent) using novel planar soft electromagnetic structures.
- RF/Microwave carbon nanotube-based antennas and sensors.
- A systems engineering approach to the design and implementation of implantable and wearable wireless devices.
- Design of novel GPS antennas for multipath reduction and horizon-to-horizon coverage.
- Dynamic channel allocation and load balancing in large-scale WLAN systems.
- Wireless Networks, Wireless Sensor Networks, Multimedia Sensor Networks, Internet of Things (IoTs), Software Defined Networks.
- Wireless networks, wireless sensor networks, real-time systems, computer network protocols, multicast and Quality of Service issues.
- Advanced engineering electromagnetics, Computer-Aided Design (CAD) of guided-wave components, antennas, RF components and filters.
- Electromagnetic wave propagation and scattering in complex media.
- Design of miniaturized antennas and wireless system modules for implantable (bio-compatible) and wearable devices.
- Low multipath GPS antennas using corrugated ground planes.
- Dynamic optimization of access points and channels to minimize congestion, adjacent and co-channel interferences for indoor WLAN.

- Use of modern electromagnetic computational techniques to simulate high-power microwave interaction and transient-temperature profiles induced within lossy dielectric and magnetic materials.
- Development of novel conformal Finite-Difference Time Domain algorithms in Cartesian and Cylindrical coordinate systems to analyze geometrically composite structures with applications to single and multimode industrial-scale microwave processing applicators with temperature dependent electromagnetic and thermal constitutive parameters.
- Design of full-scale, industrial high-power microwave heating systems for processing of minerals, agricultural products, waste disposal, and wood products.
- Design, modeling, and testing of high-power microwave heating systems for extraction of heavy oil and tar sands.
- Development of new mineral processing methods for metal-containing ores or concentrates in a resonant microwave cavity.
- Modeling and simulation of the effects of precipitation on dual-polarized microwave and millimeter wave terrestrial and satellite communications systems.
- Field operation of GPS receivers, data processing, and accuracy assessments.
- Theoretical and experimental evaluation of the effects of the ionosphere, troposphere, and multipath on the performance of precise GPS pseudo-range and carrier-beat phase observations.
- Measurements of the electromagnetic constitutive parameters at microwave frequencies.

PROFESSIONAL EXPERIENCE

ACADEMIC

August 2000-Present

Initial appointment at the rank of Associate Professor, promoted to Full Professor in Fiscal Year 2009

Systems Engineering Department, George W. Donaghey College of Engineering and Information Technology (EIT), University of Arkansas at Little Rock

International Student Advisor/Mentor

Founding Director of the UALR's Antennas and Wireless Systems Research Laboratory (AWSRL)

August 1998 - July 2000

Assistant Professor (Equivalent to Associate Professor in the North American System)

Electrical and Computer Engineering Department, Sultan Qaboos University, Muscat, Sultanate of Oman.

(Sabbatical leave from the University of New Brunswick and EMR Microwave Technology Corporation, Fredericton, NB, Canada.)

February 1992- July 1998

Research Associate, Radiating Systems Research Laboratory, Department of Electrical and Computer Engineering, University of New Brunswick, Fredericton, NB, Canada.

November 1987 - January 1992

Research and Teaching Assistant, Ph.D. Candidate, Radiating Systems Research Laboratory, Department of Electrical and Computer Engineering, University of New Brunswick, Fredericton, NB, Canada.

June 1983 - October 1987

Research Associate, Electromagnetic Wave Propagation Department, Space and Astronomy Research Center, Scientific Research Council, Baghdad, Iraq.

January 1980 - May 1983

Research and Teaching Assistant, M.Sc. Candidate, Department of Electrical Engineering, University of Mosul, Mosul, Iraq.

INTERNATIONAL RFEREEING/SERVICE TO THE PROFESSION

- Guest Editor, Special Issue "Internet of Things Based Multimedia Sensor Networks", A special issue of Sensors (ISSN 1424-8220). This special issue belongs to the section "Internet of Things" Sensors, March 2019.
- "5G wireless communication systems: prospects and challenges", Session No 113, Organized by: International Conference on Communication, Management and Information Technology, ICCMIT, Madrid, Spain, 2018.
- Member of the Editorial Board of the Iraqi Journal of Computer, Communication, Control, and Systems Engineering, January 2019.
- Session Chair, MO-UB.2P: Reconfigurable Arrays, 2018 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting, 8-13 July 2018, Boston, Massachusetts, USA.
- ICCMIT 2018, Universidad Politecnica de Madrid, Madrid, Spain, Conference Date: April 2-4, 2018.
- Reviewed the book, Green Engineering: Innovation, Entrepreneurship and Design, CRC Press, by Riadh Habash, October 2017.
- Member of the Advisory Board, Journal of University of Babylon, Iraq.
- Member of the Advisory Board, Al-Khwarizmi Engineering Journal, Iraq.
- eTELEMED 2016 Technical Program Committee, The Eighth International Conference on eHealth, Telemedicine, and Social Medicine, eTELEMED 2016, April 24 - 28, 2016 - Venice, Italy
- Member of International Program Committee, The 1st International Workshop on Link- and System Level Simulations, IWSLS² 2016, Vienna, Austria, July 1, 2016, Institute of Telecommunications (ITC) at the TU Wien.
- Member of the External Advisory Committee 1st-IJRTESS-2017 (*2017 IEEE First International Conference on Recent Trends of Engineering Science and Sustainability*) [1st-ijrtess-2017], May 2017.
- Member of the External Advisory Committee, NTICT 2017 (*Annual Conference on New Trends in Information & Communications Technology Applications 2017*) [ntict2017], Baghdad, Iraq.
- Editor-in-Chief of the International Journal of Computing and Network Technology, 2012.
- Associate Editor, Journal of online Engineering Education, January 2011.
- Associate Editor, Journal of Advances in Electronics and Communications Engineering (JAECE), 2016.
- Member of the Editorial Board, Journal of Modeling and Simulation of Antennas and Propagation, 2016.
- Expert Judge, 2013 European Satellite Navigation Competition, Arab Middle East & North Africa (MENA).

- Member of The Network of Iraqi Scientists Abroad, NISA
- Member of the International Society of Iraqi Scientists
- Technical Program Committee, The Seventh International Conference on eHealth, Telemedicine, and Social Medicine, eTELEMED 2015, February 22 - 27, 2015 - Lisbon, Portugal
- Member of the External Advisory Committee, NSF HBCU-UP Phase II External Advisory Committee, Philander Smith College, Little Rock, AR, January 2013.
- Expert and Judge, Arab MENA Regional challenge to ESNC2012, European Satellite Navigation Competition, 2012.
- Reviewed Microwave and RF Design: A Systems Approach 2nd Edition, Scitech Publishing; Engineering Electromagnetics, 6th Edition, Hayt and Buck, McGraw Hill; Principles of Electrical Engineering 5/E, Rizzoni, McGraw Hill; and *Introduction to Wireless Communications*, Berry, Black, DiPiazza, Ferguson, and Voltmer, Pearson
- External reviewer for the Killam Research Fellowships, Canada's most prestigious research honors awarded to established Canadian scholars who have demonstrated outstanding research ability and who have published the results of this research through substantial publications in their field, June 2012.
- Chair Section 5-9: Inkjet Design, Materials & Fabrication, 2nd Annual World Congress of Nano-S&T (Nano S&T-2012), October 26 to 28, 2012, Qingda.
- Session Chair, Electromagnetic Band Gap Devices, 2011 IEEE Intern. Symp. Antennas and Propagation and USNC/URSI Nat. Radio Science Meeting, Spokane, Washington, USA, 5-8 July, 2011.
- Member of the Technical Advisory Committee of the International Microwave Power Institute, three-year term starting on February, 2005.
- Chair of Track 2 (Algorithms, Methods, Simulation, and Software), *Wireless Telecommunications Symposium*, April 27 – 29, 2008, Cal Poly Pomona, elected for the same position for WTS 2009.
- Chair of Track 2 (Algorithms, Methods, Simulation, and Software), *Wireless Telecommunications Symposium*, April 27 – 29, 2007, Cal Poly Pomona.
- Chair of TPC 2007 IEEE International Conference on Signal Processing and Communications ICSPC, Dubai, UAE, 24-27 November 2007.
- Chair of TPC, ICC 2007 Communications QoS, Reliability and Performance Modeling Symposium.
- Chair of TPC International Conference on Mobile Computing and Wireless Communications M-WCMC 2007.
- Chair of Technical Program Committee, Communication Systems and Circuits International Conference (CSCIC 2007), Aqaba/Jordan, 28-31 January 2007.
- Delivered a seminar on Advanced Channel Assignment and Load Balancing Techniques for WLAN, Ajman University for Science and Technology, Ajman, UAE, December, 2007.
- Chair of TPC WEMIC 2006 (Wireless Euro-Mediterranean International Conference).
- Chair of TPC, MCWC 2006 Mobile Computing and Wireless Communications International Conference IASTED International Conference on Communication Systems and Networks (CSN 2006).
- Chair of Track 2 (Algorithms, Methods, Simulation, and Software), Wireless Telecommunications Symposium, April 27 – 29, 2006, Cal Poly Pomona.

- Delivered a seminar on The Design of Antennas for Ultra Low Power Wireless Body Area Networks, Etisalat College and Ajman University for Science and Technology, United Arab Emirates, March, 2006.
- Session Chair, Reviewer, and Member of the Technical Program Committee, Wireless Euro-Mediterranean International Conference, March 27 – 29, 2006, Amman, Jordan.
- Reviewed proposals to the 2005 Armenian-U.S. Bilateral Grants Program of the U.S. Civilian Research and Development Foundation (CRDF), August 2005.
- Reviewed proposals for NSF Course, Curriculum, and Laboratory Improvement (CCLI) program, July 25-26, 2005.
- Developed a Joint Cooperative Bachelor Program between UALR and Al Ghurair University, Dubai, United Arab Emirates in Systems Engineering and Information Science, October, 2005.
- Delivered a short course on Developing Undergraduate Wireless Communications Curriculum, Dubai University College, Dubai, United Arab Emirates, November 30, 2004.
- Selected by the United Nations among other *nine* experts to deliver Communications Engineering and Satellite Communications courses for the 2004 Summer Faculty Development Seminar in Iraq, Institute of International Education, UN, May 28, 2004.
- Organized Workshop on Incorporating Computational Science Tools and Techniques into Undergraduate Courses, National Computational Science Institute, The Shodor Education Foundation Inc., 22-28 June, 2003, University of Arkansas at Little Rock.
- Session Chair, 9th IASTED International Conference on Signal and Image Processing SIP 2003, August 13-15. 2003, Honolulu. Hawaii.
- Reviewed the book, Engineering Electromagnetics, 6th Edition, Hayt and Buck, McGraw Hill, 2000
- Member of the Editorial Board of the Fifth International Symposium on Signal Processing and its Applications, ISSPA 99, 23-25 August 1999, Brisbane, Australia.
- Member of the Editorial Board of the Fifth International Conference on Communication, Computer and Power, ICCCP'98, 7-10 December 1998, Sultan Qaboos University, Muscat, Sultanate of Oman.

SHORT COURSES OFFERED

- Development of GPS-Based Vehicle Tracking System in the Sultanate of Oman, Ministry of Higher Education, Muscat, Sultanate of Oman, January, 2015.
- Intelligent GPS-Based Security System for Iraq, Salahaddin University-Erbil, July 2007.
- Reduction of EMI, EMC and Simultaneous Switching Noise Using Defected Ground Structures and Metamaterials, one-month intensive course delivered to engineers and managers at Molex, Little Rock, AR, 2010.
- Channel Assignment and Load Balancing for WLAN, Ajman University for Science and Technology, Ajman, UAE, December, 2007.
- Design of Antennas for Ultra Low Power Wireless Body Area Networks, Etisalat College and Ajman University for Science and Technology, United Arab Emirates, March, 2006.
- Developing Undergraduate Wireless Communications Curriculum, College of Information Technology, Dubai University College, Dubai, United Arab Emirates, November 30, 2004.
- The Global Positioning System, Sultan Qaboos University, Muscat, Sultanate of Oman, May 2000.

- Industrial Applications of High Power Microwave Heating, Sultan Qaboos University, Muscat, Sultanate of Oman, May 1999.
- The Global Positioning System, International Wireless and Telecommunications Symposium, Shah Alam, Malaysia, 14-16 May 1997.

HONORS & AWARDS

- UALR Graduation & Retention Advocate Award, 2013, and 2015, in Recognition of Dedicated Service and Honoring Graduation & Retention Advocacy.
- EIT College Excellence Award in Research, April 2009.
- **University of Arkansas at Little Rock Faculty Excellence Award in Research, May 2009.**
- EIT College Excellence Award in Teaching, April 2007.
- **Ted and Virginia Bailey Foundation, University of Arkansas at Little Rock Faculty Excellence Award in Teaching, May 2007.**
- Systems Engineering Department Teaching Award, April 2007.
- Teaching Distinction Award, Systems Engineering Department, May 2005 and May 2006.
- Listed in the *Marquis Who's Who in Science and Engineering*, 2005-2006, October, 2004.
- One-month research award, German Academic Exchange Service (DAAD), May 2000.
- Nominated by the University of New Brunswick as candidate for the Natural Sciences and Engineering Research Council (NSERC) doctoral prices, 1992.

PUBLICATIONS

Four patents, one book: Modern Printed Circuit Antennas, June 2019, Editor, Sensors: Special Issue on Internet of Things Based Multimedia Sensor Networks, May 2019, Six book chapters, 90 journal papers, 109 conference publications.

JOURNAL PAPERS (2019)

1. Abbas Al-Wahhamy, **Hussain Al-Rizzo**, and Nicholas E. Buris, "Efficient Evaluation of Massive MIMO Channel Capacity," *IEEE Trans. Systems Journal*, March 2019, *IEEE Systems Journal*, pp. (99):1-7, doi: 10.1109/JSYST.2019.2900006.

2. Mohammed Zaki Hasan, Hussain Al-Rizzo, "Beamforming Optimization in Internet of Things Applications Using Robust Swarm Algorithm in Conjunction with Connectable and Collaborative Sensors," Sensors, *20*(7), 2048, 2020, doi:10.3390/s20072048.

3. Abbas Al-Wahhamy, Nicholas E. Buris **,** and **Hussain Al-Rizzo**, and Samer Yahya, "An Efficient Paradigm For Evaluating The Channel Capacity Of Closed-Loop Massive Mimo Systems," *Progress In Electromagnetics Research C*, Vol. 98, 1–16, 2020.

4. Haider M. AlSabbagh, Taha A. Elwi, Yahiea Al-Naiemy, **Hussain M. Al-Rizzo**," A Compact Triple-Band Metamaterial-Inspired Antenna for Wearable Applications," *Microwave and Optical Technology Letters*, Wiley, vol. 62: pp. 763–777, 2020.