Akbar M. Sayeed

Independent Researcher & Consultant
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LinkedIn: `https://linkedin.com/in/ams360`
Google Scholar: 17,650+ citations; h-index: 53
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Research Interests

Wireless communication and sensing, multipath wave propagation, wireless channel modeling, measurement and estimation, communication and information theory, statistical signal processing, machine learning, harmonic analysis, time-frequency representations, quantum information science and engineering, prototyping, testbeds, and technology development. A current focus is the development of basic theory, system architectures, and testbeds for emerging wireless technologies (5G, 6G, XG), including millimeter-wave and Terahertz wireless, high-dimensional multi-antenna multiple input multiple output (MIMO) systems, and communication and sensing in highly dynamic environments. Dr. Sayeed has a broad experience in these areas ranging from fundamental theoretical concepts and techniques to signal processing algorithm development to conception, design, and hardware prototyping of solutions. Dr. Sayeed relishes challenging technical and research problems, troubleshooting and finding innovative solutions that often require learning new concepts and tools and connecting-the-dots across different areas and fields.

Professional Background and Experience

Dr. Sayeed is an Independent Researcher and Technical Consultant, and a former Professor of Electrical and Computer Engineering at the University of Wisconsin-Madison, where he directed the *Wireless Communications and Sensing Laboratory* from 1997-2021. In particular, Dr. Sayeed pioneered the concept of beamspace MIMO (`https://amsayeed.wordpress.com/the-cap-mimo-project/millimeter-wave-mimo/`) and led a team at UW-Madison on developing the concept, including a state-of-the-art prototype at millimeter-wave frequencies, resulting in multiple compelling proof-of-concept demonstrations at 28 GHz; `https://amsayeed.wordpress.com/the-cap-mimo-project/the-cap-mimo-project-2/`, `https://amsayeed.wordpress.com/the-cap-mimo-project/gen-2-28ghz-cap-mimo-prototype/`, `https://amsayeed.wordpress.com/the-cap-mimo-project/695-2/`. He also led the creation of the *NSF Research Coordination Network on Millimeter-Wave Wireless Technology* in October 2016 (`https://mmwrcn.ece.wisc.edu/`). Dr. Sayeed served as a Program Director (2017-2019) at the *National Science Foundation (NSF)* in the Communications, Circuits, and Sensing Systems (CCSS) Program of the Electrical, Communications and Cyber Systems (ECCS) Division of the Engineering Directorate. At the NSF, Dr. Sayeed's program portfolio covered a broad range of topics spanning communications, sensing, signal processing, imaging, and integrated design of hardware and algorithms for information processing systems. He was an active member of the Electromagnetic Spectrum Management (ESM) working group, and the working groups of two of the 10 NSF Big Ideas: 1) The *Quantum Leap* Working Group which was an NSF-wide effort for developing new cross-disciplinary initiatives for advancing Quantum Information Science and Engineering, and 2) The *Harnessing the Data Revolution* Working Group which was an NSF-wide effort for developing new cross-disciplinary initiatives for advancing Data Science and Engineering. In particular, he co-led the team that developed the NSF solicitation for the *Quantum Leap Challenge Institutes* (released Feb 2019) in response to the *National Quantum Initiative (NQI)* Act signed by President Trump in December 2018. Dr. Sayeed also served on a 2019 panel, convened by the *National Academies of Sciences, Engineering and Medicine (NASEM)*, for reviewing the *Communications Technology Laboratory* of the *National Institute of Standards and Technology (NIST)*.

Education

1996	University of Illinois-Urbana	Ph.D. in Electrical and Computer Engineering
1993	University of Illinois-Urbana	M.S. in Electrical and Computer Engineering
1991	University of Wisconsin-Madison	B.S. in Electrical and Computer Engineering

Positions

2020-present	Self-Employed	Independent Researcher & Consultant
1/23-present	Jawbone Innovations, LLC (part-time)	Technical Expert
4/23-present	Beamlink, Inc. (part-time)	R &D Consultant & Advisor
3/22-10/22	Silvus Technologies (part-time)	Director of R & D Business Development
2/20-12/21	A High-Speed Trading Company (part-time)	Wireless R & D Consultant
2008-2021	University of Wisconsin-Madison	Professor
11/17-4/19	National Science Foundation	Program Director
2003-2008	University of Wisconsin-Madison	Associate Professor
1997-2003	University of Wisconsin–Madison	Assistant Professor
1996–1997	Rice University	Postdoctoral Research Fellow
1991–1996	University of Illinois–Urbana	Research Assistant

Awards and Honors

2021	Donald Fink Overview Paper Award, IEEE Signal Processing Society
2017-19	Program Director, National Science Foundation
2018	Best Paper Award, Signal Processing for Communications Symposium, IEEE ICC
2016-19	Principal Investigator, National Science Foundation Research Coordination Network on Millimeter-Wave Wireless Technology
2016	Invited Participant of a Kickoff Event for a new $400M, 7-year NSF-led Advanced Wireless Research Initiative
2015	Steering Committee Member: NSF Workshop on the *Enhancing Access to the Radio Spectrum (EARS) program*
2012	IEEE Fellow
2003	UW Grainger Electrical and Computer Engineering Junior Faculty Fellowship
2001	Office of Naval Research Young Investigator Award
1999	National Science Foundation Faculty Early CAREER Development Award
1996	Robert T. Chien Memorial Award for outstanding Ph.D. research (U. Illinois)
1992–1995	Schlumberger Fellowship (U. Illinois)

Patents and Invention Disclosures

[1] A. Sayeed and J. Brady, *Differential MIMO Transceiver*, US Patent No. 10,284,339, issued May 2019.

[2] A. Sayeed, *Radiator Localization*, US Patent No. 9,763,216, issued September 12, 2017.

[3] A. Sayeed and J. Brady, *Wideband Transceiver for Antenna Arrays*, US patent No. 9,444,532, issued September 13, 2016.

[4] A. Sayeed and N. Behdad, *Continuous Aperture Phased MIMO*, US patent No. 8,811,511 issued August 19, 2014.

[5] W. Bajwa, A. Sayeed, R. Nowak and J. Haupt, *Method for Probing and Learning Sparse Multipath Wireless Channels*, US Patent No. 8,320,489, issued on Nov. 27, 2012.

[6] A. Sayeed and V. Raghavan, *Method and Apparatus for Maximizing Capacity of Multi-Antenna Communication Systems with Reconfigurable Antenna Arrays*, US patent No. 8,000,732, issued on August 16, 2011.

[7] A. Sayeed and T. Sivanadyan, *Active Wireless Sensing: Method for Rapid Information Retrieval From an Ensemble of Wireless Sensors*, US patent No. 7,881,671 issued on Feb. 1, 2011.

[8] K. Liu and A. M. Sayeed, *Layered Space-Time Processing in a Multiple Antenna System*, US patent No. 7,218,906 issued on May 15, 2007.

[9] E. N. Onggosanusi, B. D. Van Veen and A. M. Sayeed, *Channel Aware Optimal Space-Time Signaling for Wireless Communication Over Wideband Multipath Channels*, US patent No. 7,110,378 issued on September 19, 2006.

[10] T. A. Kadous and A. M. Sayeed, *Method and System for Multi-Carrier Multiaccess Reception in the Presence of Imperfections*, US patent No. 6,654,408 issued on November 25, 2003.

Professional Activities

Member:	IEEE (Fellow), Eta Kappa Nu, Tau Beta Pi
Member:	*NIST Next-G Channel Modeling Alliance* (2016-present)
Associate Editor:	*IEEE Transactions on Signal Processing* (2013-2015)
Associate Editor:	*IEEE Signal Processing Letters* (1999-2002)
Guest Editor:	*IEEE Journal of Selected Areas in Communications (special issue on Advances in Quantum Communications, Computing, Cryptography and Sensing)*; S. Ng, A. Conti, J. Yuan, P. Mueller, G.-L. Long, and A. Sayeed (2019-20)
	IEEE Journal of Selected Topics in Signal Processing (special issue on signal processing for millimeter-wave wireless communication); R. Heath, N. Gonzalez-Prelcic, S. Rangan, W. Roh, and A. Sayeed (2015-16)
	IEEE Journal of Selected Topics in Signal Processing (special issue on Signal Processing and Networking for Dynamic Spectrum Access); A. Swami, R. Berry, A. Sayeed, V. Tarokh and Q. Zhao (2008)
	IEEE Journal on Selected Areas in Communications (special issue on Self-organizing Distributed Collaborative Sensor Networks); A. Sayeed, D. Estrin, G. Pottie, and K. Ramchandran (2005)
Technical Committees:	Signal Processing for Communications and Networking Technical Committee of the IEEE Signal Processing Society (2007-2012)
Technical Program Committees:	2021 **Symposium Co-Chair**, Quantum Communications and Computing, IEEE Global Communications Conference
	2020 **Technical Program Committee**, Quantum Communications, Sensing and Cryptography Track, IEEE International Conference on Quantum Computing and Engineering (IEEE Quantum Week)
	2019 **Workshop Facilitator**, Sixth Workshop of the NSF Research Coordination Network on Millimeter-Wave Wireless Technology
	2018 **Workshop Co-Chair**, IEEE VTC Workshop on Millimeter-Wave Channel Measurement, Modeling, and Systems

2018 **Workshop Facilitator**, Fourth Workshop of the NSF Research Coordination Network on Millimeter-Wave Wireless Technology

2018 **Workshop Facilitator**, Third Workshop of the NSF Research Coordination Network on Millimeter-Wave Wireless Technology

2017 **Workshop Co-Chair**, IEEE VTC Workshop on Millimeter-Wave Channel Measurement, Modeling, and Systems

2017 **Workshop Co-Chair**, Second Workshop of the NSF Research Coordination Network on Millimeter-Wave Wireless Technology

2016 **Workshop Co-Chair**, Kickoff Workshop of the NSF Research Coordination Network on Millimeter-Wave Wireless Technology

2016 **Workshop Co-Chair**, IEEE Globecom Workshop on 5G Wireless Channel Modeling

2016 **Workshop Co-Chair**, IEEE VTC Workshop on Millimeter-Wave Channel Modeling

2014 **Technical Program Co-Chair**, IEEE Workshop on Signal Processing Advances for Wireless Communications (SPAWC)

2007-2013, IEEE Workshop on Signal Processing Advances for Wireless Communications (SPAWC)

2007-2013, IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)

2011 IEEE International Symposium on Information Theory (ISIT), St. Petersburg, Russia

2010 International Conference on Cognitive Radio Oriented Wireless Networks and Communications (CrownCom), Cannes, France

2009 IEEE GLOBECOM, Hawaii

2008 **Technical Program Track Chair**, Asilomar Conference on Signals, Systems and Computers, Pacific Grove, CA

2008 IEEE GLOBECOM, New Orleans

2008 **Technical Program Co-chair**, IEEE Communication Theory Workshop, St. Croix, US Virgin Islands

2007 **Technical Program Co-chair**, IEEE Statistical Signal Processing Workshop, Madison, WI

2005 ACM Conference on Embedded Networked Sensing Systems (SenSys), San Diego

2005 IEEE Global Communications Conference (GLOBECOM), St. Louis

2005 IEEE Workshop on Signal Processing Advances for Wireless Communications (SPAWC), New York

2004 25-th IEEE International Real-Time Systems Symposium (RTSS), Portugal, Lisbon

2004 International Symposium on Information Processing in Sensor Networks (IPSN), April, Berkeley, CA

2003 IEEE International Conference on Communications (ICC), 2003, Alaska

Fall 2002 IEEE Vehicular Technology Conference (VTC), Vancouver, Canada

Session Organizer: Millimeter-Wave Wireless Systems, 2018 IEEE Workshop on Signal Processing Advanced for Wireless Communications (SPAWC)

	Millimeter-Wave MIMO Wireless Systems, 2017 Asilomar Conference
	5G Wireless Panel, 2014 IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC 2014)
	Cognitive Wireless Communication and Sensing in Networks, 2006 Military Communications Conference (MILCOM 2006); with B. Daneshrad (UCLA)
Reviewer:	Various journals and conferences in communications and signal processing, National Science Foundation, Army Research Office, Australian Research Council, Vienna Research Fund, Austrian Research Council, Canadian Research Council, and the United Arab Emirates University
Panelist:	NSF ERC Mock Site Visit Review Panel, Worcester Polytechnic Institute, Oct 2019
	National Academies of Sciences, Engineering and Medicine (NASEM) Panel for Reviewing the Communications Technology Laboratory of the National Institute of Standards and Technology (NIST), July 2019
	Millimeter-wave (mmWave) Measurement and Modeling, International Symposium on Advanced Radio Technologies: Spectrum Mining at mmWave - Digging for Capacity (2017)
	Huawei University Days (2016)
	5G Densification and Enabling Technology, TIA Annual Meeting (2016)
	IEEE WCNC Workshop on Millimeter-Wave Wireless (2016)
	NSF Workshop on Distributed Sensor Networks (2002)
	NSF/ONR Workshop on Signal Processing for Manufacturing and Machine Monitoring (1996)
Meetings Attended:	Fifth Workshop on Scalable Information Processing with Quantum Nano-Photonics (SIPQNP), Tuscon, AZ, Mar. 2019
	NAS Workshop on Enabling Technologies for Quantum Systems, Washington DC, Mar. 2019
	U. Chicago Quantum Summit, Nov. 8, 2018
	THz Technologies Workshop, Brown U, Oct., 2018
	Optical Society of America (OSA) Annual Meeting , Washington, DC, Sep. 2018
	DOE Workshop on Quantum Communication Networks, Aug. 2018
	NSF Quantum Information Workshop (Industry-Academic Collaboration), ICT USC, Los Angeles, Mar. 2018

Book Chapters

[1] A. M. Sayeed and J. Brady, "Millimeter-Wave Wireless Transceivers: Theory, Design, and Implementation," *Signal Processing for 5G: Algorithms and Implementations*, (F.-L Luo and J. Zhang, eds.), IEEE-Wiley, 2016.

[2] A. M. Sayeed and T. Sivanadyan, "Wireless Communication and Sensing in Multipath Environments Using Multi-antenna Transceivers," *Handbook on Sensor and Array Processing*, (S. Haykin and R. Liu, eds.), IEEE-Wiley, 2010.

[3] A. M. Sayeed, "Object Detection and Classification in Sensor Networks," in *Frontiers in Distributed Sensor Networks* (R. Brooks and S. Iyengar, eds.), CRC Press, 2004.

[4] A. M. Sayeed, "Communication over Linear Dispersive Channels: A Time-Frequency Perspective,"in *Time Frequency Signal Analysis and Processing* (B. Boashash ed.), pp. 549-557, Elsevier, Nov. 2003.

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