Assessment of the National Institute of Standards and Technology (NIST) Communications Technology Laboratory (CTL)

Committee

Bishal Thapa

Chair

BISHAL THAPA is a recognized research leader in the field of cognitive wireless communication networks and wireless security. Dr. Thapa joined Raytheon BBN in 2011. He got his PhD in wireless communication and security from Northeastern University, Boston MA. His PhD thesis work focused on jamming and anti-jamming of wireless communication. Since he has been in BBN, he has been a PI or a tech lead on many DARPA, IARPA, DoD Services tactical data networking projects, and IC wireless security projects. Currently he is a PI on a multi-domain tactical Internet project that connects seabed sensors with space networks in-situ. He is also the networks lead on ongoing 5G Network Enhancement and Radar/OpenRAN 5G Spectrum Sharing Project. He has won best paper award from ACM WiSec 2011, been nominated as one of the 50 DARPA Risers from across the US defense and academic institutions in 2015, won Raytheon Technical Excellence, Innovation awards and recently received the Presidential coin. He participated in DARPA Hackfest and DARPA Spectrum Challenge where his team won the first prize in the cooperative spectrum challenge. He also recently led a team to 2nd place win on Navy’s Project Overmatch AINETX Networking challenge. He is an open source GNURadio and Battle of Meshes enthusiast. He served on the NASEM NIST CTL Review Panel in 2022. He is an IEEE and ACM Senior Member.

Darmindra Arumugam

Member

DARMINDRA ARUMUGAM is a Senior Research Technologist at NASA’s Jet Propulsion Laboratory (JPL) and the Technical Supervisor of the Radar Concepts and Formulation Group. He is also the founding Chief Technologist of the Applied Physics Laboratory at JPL, which advances high-impact radio and radar remote sensing technologies for NASA and other U.S. agencies. Dr. Arumugam specializes in quantum sensors, electromagnetics, and remote sensing, with a present focus on Rydberg atom and optical-to-microwave sensors for remote sensing using signals of opportunity. His work in wireless signal detection, spectrum sensing, and precision metrology aligns with NIST CTL’s efforts in next-generation wireless, spectrum sharing, and electromagnetic measurement science. He has demonstrated how quantum-based sensors harness multiband signals for passive spectrum monitoring, resilient communication, and quantum-enhanced metrology. With 60+ peer-reviewed publications and 25+ patents, he has advanced sensing technologies to higher readiness levels, supporting NASA missions and commercial space applications. Dr. Arumugam is a NASA NIAC Fellow and a former technical advisor to the Department of Homeland Security (DHS) Science & Technology Directorate, bringing expertise in advanced sensing and navigation technologies. He has received prestigious honors, including the NASA Exceptional Technology Achievement Medal (2019), the NASA Lew Allen Award (2016), and the NASA Voyager Award (2015). His contributions to GPS-denied navigation technologies have also earned recognition beyond the scientific community, including the Popular Mechanics Breakthrough Award (2017). Dr. Arumugam earned his Ph.D. in Electrical and Computer Engineering, with a focus on Applied Physics, from Carnegie Mellon University in 2011. Since 2021, Dr. Arumugam has led annual nationwide planning and consensus studies on Rydberg atom sensing for space-based remote sensing, bringing together experts from academia and U.S. national labs, including NIST and US Army Research Laboratory. His efforts have shaped national discussions, fostered cross-disciplinary collaboration, and guided the integration of Rydberg sensors into next-generation space sensing technologies.

Nathan R. Brooks

Member

NATHAN BROOKS has over 20 years of experience in electromagnetics and numerical optimization. He conducted research at esteemed institutions such as the National High Magnetic Field Laboratory (NHMFL), the Center for Advanced Power Systems (CAPS), and CERN (European Organization for Nuclear Research). He began his industry career with Argon ST, a Boeing subsidiary, and is currently a Boeing Senior Technical Fellow focused on electromagnetic and antenna system architectures. Dr. Brooks provides technical expertise and leadership for Boeing's Signal Intelligence capabilities, as well as leading and consulting on Electronic Warfare antenna system development. He has played a key role in securing and executing advanced capability program contracts from military, government, and commercial customers, including DARPA and IARPA. Dr. Brooks has led various 3D system performance modeling and simulation efforts and has been involved in site survey, system design, and installation teams worldwide. He recently led a team of Executive Technical Fellows to address aviation interference issues from 5G and future telecommunication systems. Dr. Brooks holds a B.S. and Ph.D. in Electrical Engineering from Florida A&M University and has received multiple awards, including the 2019 NSBE Golden Torch Lifetime Achievement in Industry Award and the 2020 Boeing Defense Engineer of the Year. He actively contributes to improving the STEM workforce and has been a member of NASEM review panels and boards.

Dmitry Chizhik

Member

DMITRY CHIZHIK is a Distinguished Member of Technical Staff at Nokia Bell Labs, with expertise in wave propagation modeling and measurements applied to wireless communications, MIMO channels and radar sensing. Prior work was at the Naval Undersea Warfare Center, New London, CT, where he did research in acoustic scattering from ocean floor, geoacoustic modeling of porous media, and shallow water acoustic propagation. Dr. Chizhik is a Fellow of the IEEE and is a recipient of the Bell Labs President’s Award. Dr. Chizhik received his BS and MS in Electrical Engineering and a Ph. D. in Electrophysics in 1991 from Polytechnic University, Brooklyn, NY (now NYU). At present Dr. Chizhik is a contributor to the Next Generation Alliance developing channel models for sensing and in new bands.

Brenda Connor

Member

Dr. Brenda Connor has a dual appointment at Texas Tech University (TTU) as Professor of Practice in the Department of Electrical and Computer Engineering and as Senior Technical Managing Director for the TTU Critical Infrastructure Security Institute (CISI). Dr Connor joined TTU in Jan 2025 after a 30-year career with Ericsson as Chief Engineer, Mission Critical Systems. She is focused on applied research to accelerate the critical infrastructure operator’s business case to deploy a private cellular network. Her research areas include:

• Critical Infrastructure Security and Operational Efficiency via Private Cellular AI enabled Integrated Sensing and Communications (ISAC) and SCADA IO processing capability for national security with dual use relevance for DOD.

• NVIDIA based AI Model & Algorithms development and reuse.

Dr. Connor is a telecom security expert including Certified Information Systems Security Professional (CISSP) certification. She has worked with Smart City, Intelligent Transportation Systems, Public Safety, Utility, and Oil and Gas verticals. Dr. Connor leverages her PhD in Engineering Management with her MS Computer Engineering and BS Computer Engineering from Boston University to lead and contribute to innovations with impact for society.

Ismail Guvenc

Member

ISMAIL GUVENC (Fellow, IEEE) is a professor in the Department of Electrical and Computer Engineering at North Carolina State University, where he has been since 2016, after serving at Florida International University (2012–2016), DOCOMO Innovations (2006–2012), and Mitsubishi Electric Research Labs (2005). He became a full professor in 2020. His recent research interests include 5G wireless systems, communications and networking with drones, spectrum sharing, and wireless testbeds. He has published more than 350 conference and journal papers and book chapters, and several standardization contributions. Dr. Guvenc is an inventor/coinventor in some 30 U.S. patents and he is a senior member of the National Academy of Inventors. He is a recipient of the NC State Alcoa Distinguished Engineering Research Award (2023), University Faculty Scholar Award (2021), NC State ECE R. Ray Bennett Faculty Fellow Award (2019), FIU College of Engineering Faculty Research Award (2016), NSF CAREER Award (2015), Ralph E. Powe Junior Faculty Enhancement Award (2014), and USF Outstanding Dissertation Award (2006). Dr. Guvenc earned his Ph.D. in Electrical Engineering from the University of South Florida (2006), M.S. in Electrical and Computer Engineering from the University of New Mexico (2023), and B.S. in Electrical and Electronics Engineering from Bilkent University (2001). He previously served on the National Academies' committee on the review of the National Institute of Standards and Technology's Communications Technology Laboratory in 2019. Dr. Guvenc published various conference and journal papers in the past five years related to spectrum monitoring and sharing and submitted comments to the Department of Commerce in 2023 on the matter of the Implementation of the National Spectrum Strategy.

Kevin T. Kornegay

Member

KEVIN KORNEGAY is currently the Eugene DeLoatch Endowed Professor and Director of the Cybersecurity Assurance and Policy (CAP) Center at Morgan State University in Baltimore, MD. He has expertise in RF and mixed-signal integrated circuit design, system-on-chip (SoC) design, secure embedded systems, and reverse engineering. He has a B.S. degree in electrical engineering from Pratt Institute, Brooklyn, NY, in 1985, and an M.S. and Ph.D. in electrical engineering from the University of California at Berkeley in 1990 and 1992, respectively. He serves on the technical program committees of several international conferences, including the IEEE Symposium on VLSI Technology and Circuits and the ACM Great Lakes Symposium on VLSI (GLSVLSI). He has served on the NIST IoT Advisory Board and the NIST Industrial Advisory Council R&D Workforce Working Group. He currently serves on the State of Maryland Cybersecurity Council. He has received numerous awards, including the NSF CAREER Award, IBM Faculty Partnership Award, National Semiconductor Faculty Development Award, and the General Motors Faculty Fellowship Award. He was a participant in the 5th Annual Symposium on Frontiers of Engineering and organizer of the 5th German-American Symposium on Frontiers of Engineering, National Academy of Engineering. He is an AAAS Fellow, a Life Senior Member of the IEEE, and a member of the Eta Kappa Nu, Sigma Xi, and Tau Beta Pi engineering or scientific research honor societies.

Mehmet Kurum

Member

MEHMET KURUM received his B.S. degree in Electrical and Electronics Engineering from Bogazici University, Istanbul, Turkey, in 2003, followed by his M.S. and Ph.D. degrees in Electrical Engineering from George Washington University, Washington, DC, USA, in 2005 and 2009, respectively. He held Postdoctoral and Research Associate positions with the Hydrological Sciences Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD, USA. From 2016 to 2022, Dr. Kurum served as an Assistant Professor at Mississippi State University (MSU), and subsequently, he held the position of Associate Professor and the Paul B. Jacob endowed chair until 2023. Currently, he is an Associate Professor in Electrical and Computer Engineering at the University of Georgia. Dr. Kurum’s research involves microwave remote sensing from satellite scales to small aerial platforms in environmental sustainability, especially in agriculture. His current research focuses on changing the paradigm of remote sensing methods and developing next-generation technologies and ideas that are more spectrum efficient, more effective and meet the challenges of the present and future spectrum congestion. His portfolio encompasses development of retrieval algorithms and forward EM model simulations in support of the NASA’s SMAP, SNOOPI, NISAR, and CYGNSS satellite missions. He has previously served as the
principal investigator on a multitude of research grants funded by federal agencies such as DOD, NASA, NSF, and USDA.

David Love

Member

DAVID J. LOVE is the Nick Trbovich Professor of Electrical and Computer Engineering at Purdue University. He received the B.S. (with highest honors), M.S.E., and Ph.D. degrees in electrical engineering from the University of Texas at Austin in 2000, 2002, and 2004, respectively. His research interests are in the design and analysis of broadband wireless communication systems, 6G and beyond wireless systems, multiple-input multiple-output (MIMO) communications, integrated sensing and communications, non-terrestrial networks, millimeter wave and higher frequency wireless, software defined radios and wireless networks, coding theory, and MIMO array processing. He is one of the inventors of codebook-based precoding, which is found in all 4G and 5G wireless systems. His early work on millimeter wave beamforming and massive MIMO have found widespread use in 5G. He holds 32 issued US patents. He has been recognized as an IEEE Fellow, American Association for the Advancement of Science (AAAS) Fellow, National Academy of Inventors (NAI) Fellow, and Thomson Reuters Highly Cited Researcher (2014 and 2015). He has received awards from the IEEE Communications Society (2016 Stephen O. Rice Prize, 2020 Fred Ellersick Prize, and 2024 William R. Bennett Prize), IEEE Signal Processing Society (2015 IEEE Signal Processing Society Best Paper Award), and IEEE Vehicular Technology Society (2010 Jack Neubauer Memorial Award). He was an invited participant to the 2011 NAE Frontiers of Engineering Education Symposium and 2016 EU-US NAE Frontiers of Engineering Symposium.

David W. Matolak

Member

DAVID W. MATOLAK received the B.S. degree from The Pennsylvania State University, M.S. degree from The University of Massachusetts, and Ph.D. degree from The University of Virginia, all in electrical engineering. He has over 25 years’ experience in communication system research, development, and deployment, with industry, government institutions, and academia, including AT&T Bell Labs, L3 Communication Systems, MITRE, and Lockheed Martin. He has over 290 publications and eleven patents. He was a professor at Ohio University (1999-2012), and since 2012 has been a professor at the University of South Carolina. He has been Associate Editor for several IEEE journals, and has delivered several dozen invited presentations at a variety of international venues. His research interests are radio channel modeling and communication techniques for non-stationary fading channels, and secure communications. Prof. Matolak is a Fellow of the IEEE, a member of standards groups in RTCA and ITU, and a member of Eta Kappa Nu, Sigma Xi, Tau Beta Pi, URSI, ASEE, and AIAA.

Mark McHenry

Member

MARK A. MCHENRY is the CEO of Shared Spectrum Company. He has extensive experience in military and commercial communication systems design, including research on the next generation of advanced wireless networks. He founded two high-tech wireless research and development companies. In 2000, he founded Shared Spectrum Company (SSC), which is developing automated spectrum sharing technology. Shared Spectrum Company develops advanced technologies for government and industry customers with challenging radio frequency and networking needs. It specializes in dynamic spectrum management applications. McHenry was also a co-founder of San Diego Research Center, Incorporated (SDRC) that focused on DoD test and training systems. SDRC was acquired by Argon ST in 2006. McHenry was a Program Manager at DARPA, where he managed multiple tactical wireless related programs. McHenry received the Office of Secretary of Defense Award for Outstanding Achievement in 1997 and the Office of Secretary of Defense Award for Exceptional Public Service Award in 2000. McHenry was an engineer at SRI International, Northrop Advanced Systems, McDonnell Douglas Astronautics, Hughes Aircraft and Ford Aerospace. McHenry was named Engineer of the Year by the District of Columbia Council of Engineering and Architectural Societies in February, 2006. McHenry was appointed by Secretary of Commerce, Carlos Gutierrez, to serve as a member of the Commerce Spectrum Advisory Committee, in December 2006. McHenry received a B.S. in Engineering and Applied Science from the California Institute of Technology, a M.S. in Electrical Engineering from the University of Colorado, and a Ph.D. in Electrical Engineering from Stanford University.

Richard L. Reaser, Jr.

Member

RICHARD L. (RICK) REASER, JR. has been a self-employed, independent aerospace engineering consultant who provides consulting services on satellite navigation, general space technology, as well as technical and market due diligence on aerospace technology innovations to a variety of clients since 2019. Previously, he led Raytheon Space and Airborne Systems' Spectrum Management and Electromagnetic Environmental Effects (E3) Department for 13 years. Prior to that, he served 28 years in the U.S. Air Force, retiring as a Colonel where he served as Navstar Global Positioning System (GPS) Joint Program Office (JPO) deputy system program director and chief engineer. He has relevant expertise in spectrum management, communications-electronics laboratory management, operations and technology, wireless system testing and technology, and systems engineering. Mr. Reaser received his Bachelor of Science in Engineering Mechanics from the United States Air Force Academy in 1978, a Master of Science in Systems Technology (Command, Control, Comm) from the Naval Postgraduate School in 1989 and a Master of Science in National Resource Strategy from National Defense University in 1998. He is a DoD Level III Certified Acquisition Professional in Program Management, Engineering as well as Test. He was awarded the Department of Defense Legion of Merit in 2006, State Department Superior Honor Award in 2005, Air Force Systems Engineering Unit of the Year in 2004 and Defense Superior Service Medal in 2000. From 2021 to 2022, he was a member of the National Academies of Sciences, Engineering and Medicine (NASEM) committee that reviewed Federal Communications Commission order FCC 20-48, which authorized Ligado Networks to operate adjacent to the GPS frequency band. In 2015 he was selected by the National Research Council (NRC) to serve on a Congressionally-directed committee that provided scientific, technical and management recommendations regarding Commerce Department's telecom labs. He served on the Secretary of Commerce Spectrum Management Federal Advisory Committee (CSMAC) from 2009 to 2019. Since 2022, he has served on the National Science Foundation's SpectrumX External Advisory Board.