2019 IEEE Fellows Elevation and Recognition

©ISTOCKPHOTO.COM/SUSARO

Almudena Suarez Rodriguez and Robert H. Caverly

Elevation to Fellow of the IEEE is an honor reserved for a select group of engineers each year. The number of Fellows elevated in any year cannot exceed one-tenth of 1% of the total voting membership. This highest grade of membership in the IEEE is conferred by the IEEE Board of Directors in recognition of an individual's outstanding record of accomplishments in any IEEE field of interest.

This year, six honorees were awarded the status of Fellow of the IEEE with the IEEE Microwave Theory and Techniques Society (MTT-S) as the evaluating Society. Another ten new Fellows are members of the MTT-S but were awarded the level of Fellow by other Societies or Councils. In alphabetical order, those awarded the level of Fellow by the MTT-S are

- Pierre Blondy, for contributions to RF microelectromechanical systems
- Richard Campbell, for contributions to millimeter and terahertz wafer-probe technology
- Nitin Jain, for leadership in the development of physics-based models for millimeter-wave (mm-wave) system-on-chip (SoC) integrated circuits (ICs)
- Mona Jarrahi, for contributions to terahertz technology and microwave photonics
- Miroslav Micovic, for contributions to gallium nitride (GaN) electronics
- Yuanxun (Ethan) Wang, for contributions to time-varying and nonlinear electromagnetic devices and systems.

In honor of their contributions, short biographies of our Society's new IEEE Fellows are presented in the following pages. These new Fellows have worked very hard and made many sacrifices for this work. Please join us in congratulating each of them.

Almudena Suarez Rodriguez, (almudena.suarez@unican.es) is with the Universidad de Cantabria, Spain, and Robert H. Caverly (r.caverly@ieee.org) is with Villanova University, Pennsylvania, United States.

Digital Object Identifier 10.1109/MMM.2019.2898066
Date of publication: 5 April 2019

Pierre Blondy
XLIM Research Institute
University of Limoges
Limoges, France

For contributions to RF microelectromechanical systems

Pierre Blondy received his Ph.D. and Habilitation degrees from the University of Limoges, France, in 1998 and 2003, respectively. He joined the Centre National de la Recherche Scientifique (CNRS) as a research engineer in 1998 and, in 2006, joined the University of Limoges, where he is currently a professor.

From 2011 to 2015, he held an Institut Universitaire de France research chair, which is selectively awarded to fewer than 1% of faculty professors in France. He was a visiting researcher at the University of Michigan, Ann Arbor, in 1997 and the University of California, San Diego, in 2006 and 2008. He has supervised more than 25 Ph.D. theses.

In 2003, he founded a research group as part of the University of Limoges/CNRS XLIM Research Institute that focuses on innovative technologies for microwave and mm-wave applications. He has been involved in many research projects funded by national and European public agencies and companies and has worked extensively on tunable filters, RF microelectromechanical systems (MEMS) components, and reliability. His work includes the creation of a start-up company, AirMems, with Romain Stefanini, aimed at the commercialization of switches and varactors developed in his research. MEMS components fabricated within his research group are currently on board a geostationary satellite, making it the first practical demonstration of this technology for space applications.

His group is also studying the properties of phase-change transition materials and their applications to microwaves. Switches, power limiters, and tunable filters have been developed using innovative materials such as vanadium dioxide and germanium telluride.

Dr. Blondy was an associate editor of *IEEE Microwave and Wireless Components Letters* in 2006. Since 2003, he has been a member of the IEEE International Microwave Conference Technical Program Committee and serves on the technical program of the European Microwave Conference. He is past chair of MTT-S Technical Committee 21 on RF-MEMS.

Relevant Publications

- C. Palego et al., "A two-pole lumped-element programmable filter with MEMS pseudodigital capacitor banks," *IEEE Trans. Microw. Theory Techn.*, vol. 56, no. 3, pp. 729–735, 2008.
- P. Blondy and D. Peroulis, "Handling RF power: The latest advances in RF-MEMS tunable filters," *IEEE Microw. Mag.*, vol. 14, no. 1, pp. 24–38, 2013.
- A. Verger et al., "Sub-hundred nanosecond reconfiguration capabilities of nanogap RF MEMS switched capacitor," in *Proc. IEEE MTT-S, Microwave Symp. Dig.*, 2010.
- J. Givernaud et al., "Microwave power limiting devices based on the semiconductor–metal transition in vanadium–dioxide thin films," *IEEE Trans. Microw. Theory Techn.*, vol. 58, no. 9, pp. 2352–2361, 2010.
- B. Lacroix et al., "Sub-microsecond RF MEMS switched capacitors," *IEEE Trans. Microw. Theory Techn.*, vol. 55, no. 6, pp. 1314–1321, 2007.

Richard Campbell
Department of Electrical and Computer Engineering
Portland State University
Portland, Oregon, United States

For contributions to millimeter and terahertz wafer-probe technology

Richard Campbell is an internationally recognized designer of RF ICs, RF electronics, instruments and measurements, and remote-sensing systems. Dr. Campbell specializes in innovative approaches that enable new measurements and open new markets, with an extensive portfolio ranging from concept to first measurements and released products.

He built and operated a high-resolution, low-energy electron-energy-loss spectrometer system for basic research in surface physics at Bell Laboratories, New Jersey, in the 1970s. In the 1980s, he designed, built, and deployed a surface-vehicle synthetic aperture-coherent and scattered-wave measurement system for ultrahigh-frequency wave propagation studies in urban residential environments. This work was funded by NASA and became part of the scientific basis for direct satellite-to-mobile communication systems. He was the principal designer of the first commercially successful cell phone GaAs application-specific ICs, for TriQuint Semiconductor. Dr. Campbell was also the principal designer of wafer probes for the emerging terahertz market at Cascade Microtech. He invented key wireless telemetry intellectual property for IR Telemetrics, a company that performs advanced measurements in rotating machinery. IR Telemetrics won the Michigan Governor's Award in 2006 for best transfer of technology from academia to industry.

Dr. Campbell is an award-winning lecturer and technical author and winner of the inaugural David Wedge Award for Excellence in Teaching in the Maseeh College of Engineering at Portland State University as well as the 2006 Bill Orr Award for Technical Writing. He has an assortment of spin-off products for project-based RF engineering education, with many reprinted as reference designs in the Amateur Radio Relay League *Handbook for Radio Communications* and the Radio Society of Great Britain *Radio Communication Handbook*. Dr. Campbell is coauthor of the seminal project-based RF educational text *Experimental Methods in RF Design*, reintroduced as a classic edition in 2017.

Nitin Jain
Anokiwave
San Diego, California, United States

For leadership in the development of physics-based models for mm-wave SoC ICs

Nitin Jain received his B.Tech. degree in electronics from the Indian Institute of Technology Madras, Chennai, India, in 1986 and his M.S. and Ph.D. degrees in electrical engineering from Rensselaer Polytechnic Institute, Troy, New York, in 1989 and 1991, respectively. His Ph.D. work focused on control devices and received the MTT-S Graduate Student Fellowship Award.

Dr. Jain joined MACOM Corporate R&D in 1991, with a focus on electromagnetic modeling for microwave and mm-wave circuit design. Among other projects, Dr. Jain was the technical lead of a team that designed the 77-GHz automotive radar module for cruise control application. This was widely acclaimed as a great technical achievement and, to date, remains a spectacular example of module integration and innovation for industrialization using predictive physical-modeling work.

From 1998 to 2000, Dr. Jain was an assistant professor in the Electrical and Computer Engineering Department of the Indian Institute of Science, Bangalore, India. Following this, he founded Anokiwave in San Diego, California. Under his leadership, Anokiwave designed multiple mm-wave SoC products for the commercial and military markets, including a fully integrated frequency-modulated continuous-wave automotive radar, another mm-wave IC for commercial satellite Internet in a quad-flat no-leads package, multiple beam-forming ICs, and other highly integrated ICs.

Today, Anokiwave products serve a broad audience: aerospace and defense phased arrays, satellite communications, and 5G active antennas, many of which are high-volume parts. Company firsts include being the first to sell 5G antenna beamforming ICs commercially at 26, 28, and 39 GHz and teaming with an industry partner to be the first to offer commercial phased arrays at 24 and 28 GHz.

Currently, Dr. Jain is the chief technology officer and chair of the board of Anokiwave. He has contributed to over 37 publications in international conferences and journals and also has more than 35 granted and pending U.S. patents.

Relevant Publications

- N. Jain and R. J. Gutmann, "Modeling and design of GaAs MESFET control devices for broadband application," *IEEE Trans. Microw. Theory Techn.*, vol. 38, pp. 109–117, Feb. 1990.
- N. Jain, R. J. Gutmann, and D. Johnson, "Transient RF signals during the switching of MESFET control devices," *IEEE Trans. Microw. Theory Techn.*, vol. 39, pp. 109–117, Feb. 1991.
- I. Gresham et al., "A compact, manufacturable 77 GHz radar module for commercial ACC applications," *IEEE Trans. Microw. Theory Techn.*, vol. 39, pp 44–58, Jan. 2001.
- D. Saunders et al., "A single-chip 24 GHz SiGe BiCMOS transceiver for FMCW automotive radars," in *Proc. Radio Frequency Integrated Circuits (RFIC) Symp.*, 2009, pp. 459–462.
- N. Jain and P. Onno, "Methods of using commercial electromagnetic simulators for microwave and millimeter-wave circuit design and optimization," *IEEE Trans. Microw. Theory Techn.*, vol. 45, pp. 724–746, May 1997.

Mona Jarrahi
Director of the Terahertz Electronics Laboratory
University of California, Los Angeles
Los Angeles, California, United States

For contributions to terahertz technology and microwave photonics

Mona Jarrahi received her B.S. degree in electrical engineering from the Sharif University of Technology in Tehran, Iran, in 2000 and her M.S. and Ph.D. degrees in electrical engineering from Stanford University, California, in 2003 and 2007, respectively. She was a postdoctoral scholar at the University of California, Berkeley, from 2007 to 2008 and joined the University of California, Los Angeles, in 2013, where she is currently a professor of electrical engineering and director of the Terahertz Electronics Laboratory.

Prof. Jarrahi has made significant contributions to the development of ultrafast electronic and optoelectronic devices and integrated systems for terahertz, infrared, and mm-wave sensing, imaging, computing, and communication systems that utilize novel materials, nanostructures, and quantum-well structures as well as innovative plasmonic and optical concepts. The results of her research have appeared in more than 200 publications and as part of 160 keynote/plenary/invited talks, and her work has received significant attention from scientific news outlets including *Huffington Post*, *Popular Mechanics*, *EE Times*, *IEEE Spectrum*, and *Laser Focus World*.

Her scientific achievements have been recognized by several prestigious national and international awards, including the Presidential Early Career Award for Scientists and Engineers; the Moore Inventor Fellowship from the Gordon and Betty Moore Foundation; the Kavli Fellowship from the National Academy of Sciences; the Grainger Foundation Frontiers of Engineering Award from the National Academy of Engineering; the Breakthrough Award from *Popular Mechanics*; the Early Career Award in Nanotechnology from the IEEE Nanotechnology Council; the Outstanding Young Engineer Award from the MTT-S; the Booker Fellowship from the National Committee of the International Union of Radio Science; the Lot Shafai Mid-Career Distinguished Achievement Award from the IEEE Antennas and Propagation Society (AP-S); the Early Career Award from the National Science Foundation (NSF); Young Investigator Awards from the U.S. Office of Naval Research, the U.S. Army Research Office, and DARPA; and numerous best paper awards.

Prof. Jarrahi is actively involved in several professional societies and has been on the program committees of numerous conferences. She is a member of the MTT-S Terahertz Technology and Applications Committee, an editorial board member of *Journal of Infrared, Millimeter and Terahertz Waves*, an MTT-S Distinguished Microwave Lecturer, a traveling lecturer for the OSA, and a visiting lecturer for the SPIE. She is a Fellow of the IEEE, OSA, and SPIE.

Relevant Publications

- C. W. Berry, N. Wang, M. R. Hashemi, M. Unlu, and M. Jarrahi, "Significant performance enhancement in photoconductive terahertz optoelectronics by incorporating plasmonic contact electrodes," *Nature Commun.*, vol. 4, pp. 16–22, 2013.
- S.-H. Yang, M. R. Hashemi, C. W. Berry, and M. Jarrahi, "7.5% optical-to-terahertz conversion efficiency offered by photoconductive emitters with three-dimensional plasmonic contact electrodes," *IEEE Trans. THz Sci. Technol.*, vol. 4, pp. 575–581, 2014.
- N. T. Yardimci, S.-H. Yang, C. W. Berry, and M. Jarrahi, "High power terahertz generation using large area plasmonic photoconductive emitters," *IEEE Trans. THz Sci. Technol.*, vol. 5, pp. 223–229, 2015.
- C. W. Berry et al., "High power terahertz generation using 1550 nm plasmonic photomixers," *Appl. Phys. Lett.*, vol. 105, p. 011121, 2014.
- X. Lin et al., "All-optical machine learning using diffractive deep neural networks," *Science*, vol. 361, pp. 1004–1008, 2018.

Miroslav Micovic
HRL Laboratories, LLC
Malibu, California, United States

For contributions to GaN electronics

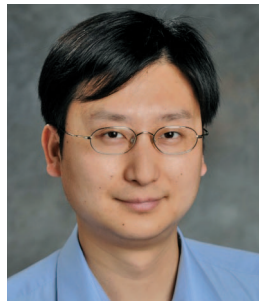
Miroslav Micovic received his B.S. degree in physics from the University of Ljubljana, Slovenia, and his Ph.D degree in electrical engineering from Pennsylvania State University, State College, in 1997. Dr. Micovic was an early developer of high-frequency transistors and circuits using GaN for a wide-bandgap semiconductor. He pioneered multiple advances in GaN transistor and circuit technology that have extended the operating frequency of GaN electronics into mm-wave (>27 GHz) and sub-terahertz (>0.1 THz) frequency bands.

GaN power amplifiers are currently the most powerful solid-state RF sources, operating in the 2–120-GHz frequency range and delivering more than 10 times higher RF power than those with silicon, gallium arsenide, or indium phosphide chips. In addition, mm-wave GaN electronics will be one of the enabling technologies for the next generation of 5G wireless networks and satellite links. The first W-band (75–110 GHz) GaN amplifier was demonstrated by Dr. Micovic and his research group at HRL Laboratories in 2006 and had a significant impact on the shaping of mm-wave GaN electronics.

Some of the key contributions pioneered by Dr. Micovic and his group in the development of mm-wave GaN electronics include the following:

- the first demonstration of a GaN high-electron mobility transistor (HEMT) with $f_t > 100$ GHz (reported in 2000)
- the first effective implementation of a heavily n+ doped GaN cap layer for improved ohmic contact fabrication in a GaN HEMT (reported in 2003); this process improvement was crucial for simultaneously obtaining the low contact resistance and smooth ohmic metal morphology necessary for fabricating high-frequency, short-gate-length GaN HEMTs
- a GaN double heterojunction field-effect transistor structure with a low-aluminum content back barrier for improved electron confinement at sub-0.1-μm gate lengths (reported in 2004); the back barrier was critical for sub-0.1-μm gate length scaling in GaN HEMTs
- the first effective implementation of a selective barrier etch back and an n^+ GaN ohmic regrowth process for GaN HEMT fabrication (reported in 2010); the low contact resistance of less than 0.1-Ω mm achieved by this process was one of the key technical breakthroughs that enabled the demonstration of highly scaled GaN transistors with $f_t > 300$ GHz and $f_{max} > 500$ GHz.

Dr. Micovic has authored or coauthored 126 peer-reviewed papers and has been awarded 58 patents.



Yuanxun (Ethan) Wang
Electrical and Computer Engineering Department
University of California, Los Angeles
Los Angeles, California, United States

For contributions to time-varying and nonlinear Electromagnetic devices and systems

Yuanxun (Ethan) Wang received his B.S. degree in electrical engineering from the University of Science and Technology of China, Hefei, in 1993 and his M.S. and Ph.D. degrees in electrical engineering from the University of Texas at Austin in 1996 and 1999, respectively. He became an assistant professor in the Electrical and Computer Engineering Department at the University of California, Los Angeles, in 2002 and is now a full professor there as well as director of the Digital Microwave Lab and the Center for High-Frequency Electronics. He is the lead principal investigator for multiple multimillion dollar research programs currently funded by the U.S. government including the NSF Emerging Frontiers in Research and Innovation program and the DARPA Signal Processing at RF (SPAR) program, Magnetic Miniaturized and Monolithically Integrated Circuits (M3IC) program, and A Mechanically Based Antenna (AMEBA) program.

Prof. Wang was a corecipient of the Best Student Paper Award at the 2017 International Microwave Symposium and also the recipient of the Best Student Paper Award at the 2017 Government Microcircuit Applications and Critical Technology Conference. He has served as associate editor for *IEEE Transactions on Antennas and Propagation* and published more than 100 journal and conference papers. His research interest is in the general area of microwave systems, with expertise ranging from systems to devices. Prof. Wang's work blends digital technologies and concepts into RF design, which often leads to novel devices that perform beyond conventional boundaries.

Relevant Publications

- Y. E. Wang, "On time-modulation-enabled nonreciprocity," *IEEE Antennas Wireless Propag. Lett.*, vol. 17, no. 11, pp. 1973–1977, 2018.
- M. Bedika, R. Zhu, Q. M. Xu, and Y. E. Wang, "Ultra-wide band nonreciprocity through sequentially-switched delay lines (SSDL)," *Sci. Rep.*, vol. 7, article no. 40014, Jan. 6, doi: 10.1038/srep40014.
- Y. Song, R. Zhu, and Y. E. Wang, "Active noise filtering for X-band GaN transmitters with bitstream modulations," *IEEE Trans. Microw. Theory Techn.*, vol. 65, no. 4, pp. 1372–1380, 2017.
- Y. Song, R. Zhu, and Y. E. Wang, "An X-band pulsed load modulation (PLM) transmitter with multi-level envelope delta-sigma modulations (EDSM)," *IEEE Trans. Microw. Theory Techn.*, vol. 64, no. 11, pp. 3643–3653, 2016.
- U. Azad and Y. E. Wang, "Direct antenna modulation (DAM) for enhanced capacity performance of near-field communication (NFC) link," *IEEE Trans. Circuits Syst. I, Reg. Papers*, vol. 61, no. 3, pp. 902–910, 2014.

MTT-S Members Elevated to Fellow of the IEEE Evaluated by Other Societies

We also recognize our members who have been elevated to IEEE Fellow by other Societies or Councils. Currently, there are 39 Societies and seven Technical Councils in the IEEE. Members elevated to the level of Fellow by other Societies who are also members of the MTT-S are listed here in alphabetical order according to the evaluating Society or Council:

- *Qing-Xin Chu,* by the AP-S, for contributions to compact wideband antennas
- *Dejan Filipovic,* by the AP-S, for contributions to frequency-independent and wideband antennas
- *Christophe Fumeaux,* by the AP-S, for contributions to resonant dielectric-loaded antennas
- *Fan Yang,* by the AP-S, for contributions to surface electromagnetics for antennas
- *Romit Roy Choudhury,* by the IEEE Communications Society, for contributions to wireless network protocols and indoor localization
- *Hiroshi Ito,* by the IEEE Electron Devices Society, for contributions to high-speed photodiodes for mm- and terahertz-wave generation
- *Lijun Jiang,* by the IEEE Electromagnetic Compatibility Society, for contributions to broadband computational EM methods
- *Friedhelm Casper,* by the IEEE Instrumentation and Measurement Society, for contributions to charged particle accelerators
- *Chee Wei Wong,* by the IEEE Photonics Society, for contributions to silicon nanophotonics
- *Hossein Hashemi,* by the IEEE Solid-State Circuits Society, for the development of RF and optical phased-array ICs.