

GERARD JAMES HAYES

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EDUCATION

Ph.D. in Electrical Engineering, August 2012, North Carolina State University, Raleigh, NC GPA: 3.93/4.00
Dissertation Title: *Shape Shifting Systems for Reconfigurable Front-end Applications.*
M.S. in Applied Mathematics, December 1993, North Carolina State University, Raleigh, NC GPA: 3.78/4.00
M.S. in Electrical Engineering, August 1989, The Ohio State University, Columbus, OH GPA: 3.83/4.00
Thesis Title: *Mutual Impedance Properties of an Infinite Line Array of Dipoles with Transverse Elements.*
B.S. in Electrical Engineering, May 1987, North Carolina State University, Raleigh, NC GPA: 3.93/4.00

TECHNICAL INTERESTS

Reconfigurable Components and Antennas
Liquid Metal Applications
Bioelectromagnetics
RF Propagation Analysis

RF Front-end Applications
Computational Electromagnetism
Microwave Systems
Communications and Radar Systems

ACADEMIC HONORS

Graduate Alumni Fellow, NCSU, 1991-92
Graduate University Fellow, OSU, 1987-88
Montclair State College Alumni Scholarship

Kiwanis Citizenship Award
Meuhler Academic Award
Tau Beta Pi, Eta Kappa Nu, Phi Kappa Phi

RELEVANT EXPERIENCE

President and Founder. Wireless Research Center of North Carolina, Wake Forest, NC Sep. 2010 to Present
Coordinated the formation of the Wireless Research Center of North Carolina from conception through operation. In collaboration with local, state, and federal government agencies and private industries, successfully solicited over \$2.5M in funding to cover capital expenses and initial operations of the non-profit, 501(c)(3), research organization. The WRC's mission supports the economic development of the regional wireless industry with an emphasis on the telecommunications, defense, and wireless medical market segments. In addition to hosting access to advances wireless engineering and testing services, the center maintains novel sociotechnical initiatives in IoT (RIoT), broadband accessibility supporting workforce development (Connected Communities), and multi-modal transportation (Advanced Mobility Collective) through close innovative collaborations with industry, universities, foundations, and government organizations.

Adjunct Assistant Professor. ECE Department, North Carolina State University, Raleigh, NC Aug. 2012 to 2022

Director of Engineering. GreenWave Scientific, Raleigh, NC Oct. 2009 to Sep. 2010
Within a start-up organization, managed the RF and antenna development efforts for several DoD antenna systems and RF circuit applications. Applications included projects for JIEDDO, NAVEODTECHDIV, and NAVSEA. In addition to providing technical governance over projects, responsibilities included program management (budgeting, resourcing, scheduling, and reporting) and new product development activities (grant solicitations, prototype development, and technical reporting).

Technical Manager. Sony Ericsson Inc., Research Triangle Park, NC Mar. 2001 to Sep. 2009
In the New Concept Team of the Technology and Research Organization, provided technical evaluation of emerging antenna, RF, and electromechanical technologies with respect to wireless communication products. Responsibilities included the design and evaluation of conceptual prototypes that incorporated these new technologies. The results of these investigations were provided to other design units for commercialization into high-volume production. Additional responsibilities included the evaluation and support of internal and external research investigations (including other global Sony Ericsson development sites and public universities). In support of the global Product Development and Type Approval Units, responsibilities included the supervision of the operations of an ISO 17025 certified SAR, CTIA-OTA, ESD, and HAC laboratory, assessment and implementation of regulatory and type-approval test criteria, and participation in the generation of emerging and developing standardization activities (such as IEEE, CTIA, and ANSI C63).

Senior Technical Leader. Ericsson Inc., Research Triangle Park, NC Nov. 1993 to Mar.2001
In the Platform Development group of the TDMA/CDMA Business Unit, supervised a group of antenna engineers to support a wide range of wireless products from concept through high-volume production. Responsibilities included the coordination of research activities to characterize antenna and SAR performance, identification of potential applications, selection of vendors, and support of the industrialization and verification processes through high-volume production. In addition to product development, responsibilities included the development and administration of budgets, schedules, and performance standards for the group.

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Relevant Experience (continued)

Graduate Research Assistant. North Carolina State University, Raleigh, NC

Aug. 1992 to Nov. 1993

In the Mathematics and Electrical Engineering Departments, supported the development of several microwave circuit simulation codes. Responsibilities encompassed the investigation and enhancement of non-linear optimization techniques with an emphasis on harmonic balance solvers. In addition to research activities, provided tutorial services for undergraduate mathematics classes.

Research Engineer. Lockheed Missiles and Space Co., Sunnyvale, CA

Sep. 1989 to Aug. 1992

At the Microwave Technology Center of the Space Systems Division, researched and implemented various RF bandpass filter designs. In addition, supported the development efforts of prototype satellite communications and radar links. Responsibilities included analysis of system performance requirements, generation of a sub-system configuration, and procurement of required materials.

SELECTED PUBLICATIONS

- Qusba, A.; RamRakhyani, A.K.; Ju-Hee So; Hayes, G.J.; Dickey, M.D.; Lazzi, G., "On the Design of Microfluidic Implant Coil for Flexible Telemetry System," *Sensors Journal, IEEE*, vol.14, no.4, pp.1074,1080, April 2014
- Hayes, G.J.; Ying Liu; Genzer, J.; Lazzi, G.; Dickey, M.D., "Self-Folding Origami Microstrip Antennas," *Antennas and Propagation, IEEE Transactions on*, vol.62, no.10, pp.5416,5419, Oct. 2014
- Hayes, G.J.; Ju-Hee So; Qusba, A.; Dickey, M.D.; Lazzi, G., "Flexible Liquid Metal Alloy (EGaIn) Microstrip Patch Antenna," *Antennas and Propagation, IEEE Transactions on*, vol.60, no.5, pp.2151,2156, May 2012
- Cela, C.J.; RamRakhyani, A.K.; Srinivas, S.; Hayes, G.; Dickey, M.; Lazzi, G., "Advances in bioelectromagnetics for implantable systems," *Biomedical Wireless Technologies, Networks, and Sensing Systems (BioWireless), 2012 IEEE Topical Conference on*, vol., no., pp.69,72, 15-18 Jan. 2012
- Hayes, G.J.; Qusba, A.; Dickey, M.D.; Lazzi, G., "Liquid metal antennas for implantable and on-body systems," *Antenna Technology (iWAT), 2012 IEEE International Workshop on*, vol., no., pp.156,156, 5-7 March 2012
- Khan, M.R.; Hayes, G.J.; Zhang, S.; Dickey, M.D.; Lazzi, G., "A Pressure Responsive Fluidic Microstrip Open Stub Resonator Using a Liquid Metal Alloy," *Microwave and Wireless Components Letters, IEEE*, vol.22, no.11, pp.577,579, Nov. 2012
- Ali, M.; Sittironnarit, T.; Hwang, H.-S.; Sadler, R.A.; Hayes, G.J., "Wide-band/dual-band packaged antenna for 5-6 GHz WLAN application," *Antennas and Propagation, IEEE Transactions on*, vol.52, no.2, pp.610,615, Feb. 2004
- Ali, M.; Sittironnarit, T.; Kunda, V.K.; Hwang, H.S.; Sadler, R.A.; Hayes, G.J., "Wideband patch antenna for 5-6 GHz WLAN applications," *Antennas and Propagation Society International Symposium, 2003. IEEE*, vol.2, no., pp.930,933 vol.2, 22-27 June 2003
- Ali, M.; Hayes, G.J.; Hwang, H.S.; Sadler, R.A., "A triple-band internal antenna for mobile hand-held terminals," *Antennas and Propagation Society International Symposium, 2002. IEEE*, vol.2, no., pp.32,35 vol.2, 2002
- Ali, M.; Sadler, R.A.; Hayes, G.J., "A uniquely packaged internal inverted-F antenna for Bluetooth or wireless LAN application," *Antennas and Wireless Propagation Letters, IEEE*, vol.1, no.1, pp.5,7, 2002
- Ali, M.; Hayes, G.J., "Analysis of integrated inverted-F antennas for Bluetooth applications," *Antennas and Propagation for Wireless Communications, 2000 IEEE-APS Conference on*, vol., no., pp.21,24, 2000
- Morris, A.S.; Trew, R.J.; Kelley, C.T.; Hayes, G.J., "A non-quasi-static modular model for HBTs," *High Speed Semiconductor Devices and Circuits, 1993. Proceedings., IEEE/Cornell Conference on Advanced Concepts in*, vol., no., pp.440,447, 2-4 Aug 1993

PATENTS

80 U.S. patents issued, 1996 to present.

ACTIVITIES

Sr. Member, IEEE: APS, Sensors Council, SA, Communications Society
Chair, Standards Committee, IEEE Sensors Council, 2015 to 2022
Member, Industry Liaison Committee, IEEE Sensors Council, 2015 to Present
Member, Rotary Club of Wake Forest, District 7710, Rotary International, 2018 to Present
Affiliate Member, Rotary Club of All Nations, District 7710, Rotary International, 2020 to Present
Board Member, Wake Forest Elementary School Foundation, Wake Forest, NC, 2022 to Present
Board Member, Trentini Foundation, Wake Forest, NC, 2013 to 2016
Board Member, B.W. Wells Association, Wake Forest, NC, 2010 to 2015, Vice President 2011-2015
Volunteer, Helen Wright Woman's Shelter, Raleigh, NC, 1999 to 2008
Volunteer, Wake Technical Community College, Adult Education Classes, 1995 to 2001.
Volunteer, Wake County Habitat for Humanity, 1994 to 2000
FCC Amateur Radio Operator, Technician Class, Call Sign: KE4QBT