Dr. Brett T. Walkenhorst

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Curriculum Vitae

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Professional Summary

Dr. Walkenhorst is currently the Chief Technology Officer at Bastille Networks, an RF sensor network company dedicated to securing the wireless entry points of enterprise networks. In this role, he oversees the enhancement of Bastille's products to meet new and emerging customer use cases. He also actively supports customer relationships and is the technology face of the company.

Prior to joining Bastille, Dr. Walkenhorst was an Engineering Fellow at Raytheon Technologies, serving as an RF, antenna, and signal processing subject matter expert. He was also the Director of Business Development and Program Management at Silvus Technologies where he led the acquisition and execution of contract R&D programs for the company, facilitating a total of $24M in new contract awards.

Dr. Walkenhorst has been a Senior Staff Engineer at NSI-MI Technologies working on advanced antenna measurement techniques, product design, and product portfolio strategy. His work on reflector design optimization was instrumental in securing $90M in new business for compact range installations. He was also a Principal Research Engineer at the Georgia Tech Research Institute (GTRI), the applied research arm of Georgia Tech, during which he led over $6M worth of research programs and contributed to many other programs involving adaptive telemetry, cognitive radio, cyber/EW modeling, and many others. He also served in various leadership roles at GTRI including Division Chief, Associate Division Chief, Principal Investigator, Program Manager, and Director of the Software-Defined Radio Lab.

Dr. Walkenhorst is a member of Eta Kappa Nu, a Senior member of IEEE, and has served as the Chair of the Atlanta Chapter of the IEEE Communications Society. He has also served as an expert witness in Georgia state criminal court.

Dr. Walkenhorst is a gifted speaker, presenter, and technical contributor. He has been invited to present at multiple technical venues and won the Best Paper Award at the 2016 AMTA Symposium. He was invited to contribute to a 2012 report to President Obama on spectrum sharing and cognitive radio due to his thought leadership on cognitive EM systems. He was recently a delegate to the 3GPP specification committee focused on 5G device and system testing. He has authored over 70 publications (papers, articles, and reports), has taught graduate, undergraduate, and professional short courses, and is an inventor of four patents and two trade secrets.

During his career, Dr. Walkenhorst has been involved in signal processing and electromagnetics research as applied to wireless communications, spectrum operations, and antenna measurement applications. Highlights of his research include multi-channel receiver design, sparse near-field sampling schemes, alternative near-field to far-field transformation algorithms, cyber/EW vulnerability assessments, next generation EW systems architecture, alternative navigation technologies, spatial- and polarization-based co-channel interference suppression, signal detection, geolocation, MIMO channel sounding and modeling, and computational neuroscience.

Education

Doctorate of Philosophy – Georgia Institute of Technology, Electrical Engineering, August 2009.

Dissertation: Achieving Near-Optimal MIMO Capacity in a Rank-Deficient LOS Environment

Wireless Communications Emphasis; Mathematics Minor

Master of Science – Brigham Young University, Electrical Engineering, August 2001.

Thesis: Development of a Radio Telescope Receiver for Research in Radio Frequency Interference Mitigation

Electromagnetics Emphasis

Bachelor of Science – Brigham Young University, Electrical Engineering, August 2001.

Physics and Mathematics Minors

Work Experience

Bastille Networks, Oro Valley, Arizona
Chief Technology Officer 3/22 to Present

- Key member of Bastille's executive team
- Leading R&D efforts within the company
- Technology face of the company to customers and media

Creydos Research, Marietta, Georgia
Founder and Chief Engineer 5/15 to Present

- Consultant and expert witness on RF spectrum, signal processing, and machine learning applications
    - Interviewed by WSB-TV as expert on 5G technology, Feb 2017
    - Expert witness in patent case related to traffic monitoring radar, Aug 2016.
    - Expert witness in Georgia state criminal court case for his expertise in wireless communications and networking, Oct-Dec 2012

Raytheon Technologies, Tucson, Arizona
Engineering Fellow 3/21 to 3/22

- Subject matter expert for RF, antenna, and signal processing technologies
- Co-PI on EP IRAD projects with $2M budget
- Conducted research on MIMO radar resulting in two trade secrets
- Analyzed and exonerated 59 shipped systems that had been defected due to a failed calibration
- Performed analysis leading to improved calibration and testing of radar systems

Georgia Institute of Technology, School of Electrical and Computer Engineering
Adjunct Professor 3/15 to 3/21

- Guest lecturer
- Served on Ph.D. dissertation committees

Silvus Technologies, Marietta, Georgia
Director of Business Development and Program Management 3/20 to 3/21

- Led the capture of $24M total contracts in R&D project funding
- Primary R&D customer liaison
    - DARPA
    - Army CCDC/C5ISR
    - Army CCDC/Aviation & Missile Center
    - Army PM Tactical Network
- Oversaw execution of contract R&D for 20-person R&D team

NSI-MI Technologies, Suwanee, Georgia
Senior Staff Engineer 6/18 to 2/20
Staff Applications Engineer 10/15 to 6/18

- Developed tool for automating calibration and acquisition/display of instantaneous polarization state information of an antenna under test using a dual-polarized probe
- Designed compact range reflectors and conducted performance analysis of reflector designs using GRASP
    - Developed MatLab front-end GUI to enable less-experienced users to simulate reflector performance
    - Developed MatLab tool to automate the design of serrated edge-treated reflectors
    - Developed MatLab tool to automate the design and simulation of rolled-edge reflectors
    - Designed and simulated new standard product reflector
    - These tools and analyses were instrumental in securing $90M in new business for compact range installations
- Developed advanced near-field sampling and reconstruction techniques
    - Investigated sparsely sampled near-field antenna pattern sampling and reconstruction
    - Developed concept of system for acquiring spherical near-field (SNF) data with a spiral acquisition including simulation, data acquisition, and analysis
    - Investigated alternative near-field sampling schemes based on compressed sensing theory
    - Investigated near-field sampling on non-canonical surfaces culminating in AMTA 2018 system demo including transformation using alternative basis functions
- Developed G/T measurement methodologies and uncertainty analyses in planar near-field (PNF) measurement systems
- Developed signal processing methodology for measuring material reflectivity at large oblique angles using spectral-domain subtraction of direct-path signal
- Analyzed system performance and specified architectures for various hardware-in-the-loop test facilities involving near-field antenna arrays for synthesizing far-field RF environments
- Designed digital architecture for multi-channel RF receiver system
- Developed new holography tools for estimating quiet zone performance from reflector surface metrology data applicable to blended rolled edge reflectors
- Member, NSI-MI 5G Steering Committee, Feb 2017 to Feb 2020
    - Guided company strategy related to providing solutions for 5G wireless testing
- 3GPP RAN4 Delegate representing NSI-MI Technologies, Oct 2017 to Feb 2020
    - Focused on requirements for over-the-air testing of 5G systems
- Member, NSI-MI Software Steering Committee, Dec 2016 to Feb 2020
    - Supported development of software architecture for next generation software product
- Investigated photonics probe technology for antenna measurement applications
- Developed method for characterizing and correcting polarization distortion and improving cross-

polarization discrimination of compact range feed antennas
  - Developed tool for automating the calibration and polarization correction for instantaneous polarization measurements

Georgia Tech Research Institute, Atlanta, Georgia

Principal Research Engineer 7/14 to 10/15
Program Manager 7/08 to 10/15
Interim Associate Chief, Systems Technology and Analysis Division 6/14 to 6/15
Senior Research Engineer 7/09 to 6/14
Division Chief, Communications, Systems, and Spectrum Division 3/13 to 3/14
Director, Software Defined Radio Laboratory 7/08 to 4/13
Research Engineer 8/03 to 6/09

- Responsible for business development, project management, and personnel management within GTRI's Systems Technology and Analysis Division including ~70 research faculty, support staff, graduate, and undergraduate students
- Member of second-place team in Competitive portion of DARPA Spectrum Challenge
- Presented lab research to multiple customers and potential customers including
  - **US Government**: Air Force Research Lab; Army Research Lab; DARPA (multiple PMs); IARPA; Office of Secretary of Defense, Acquisitions; US Joint Spectrum Center; SOCOM; NAVAIR; Naval Surface Warfare Center; Test Resource Management Center, Science & Technology; Office of Naval Research; Army Program Manager, Electronic Warfare (PM-EW); Defense Threat Reduction Agency; Chief of Naval Operations, Strategic Studies Group; Other DoD Agencies
  - **US Industry**: Boeing; Raytheon; Intelsat; Clearwire; Sypris Electronics; Intel; Sengex Electronics; Norfolk Southern and American Association of Railroads; AT&T; BAE; General Motors
  - **Non-US Gov't/Industry**: Fuerza Aérea de Chile (Chilean Air Force); NTT/Docomo; Ireland Development Agency; Singapore Institute for Infocomm Research; Instituto Tecnológico de Aeronáutica
- Primary customer interface on multiple projects, author of dozens of white papers and proposals, and contributor to many more
- Principal Investigator on $2.5M 3-year program for Test Resource Management Center to develop a link-dependent adaptive radio for aeronautical telemetry
- Principal Investigator and Program Manager on $2M 6-year program for Department of Defense customer investigating new and emerging wireless communication capabilities including WiMAX, LTE, MIMO, receiver performance analysis, and wireless secrecy
- Principal Investigator on Clearwire $200K MIMO channel sounding project
- GTRI team lead on $100K DARPA project in collaboration with Notre Dame investigating polarization-based interference suppression
- Project Director for $94K project investigating EM cartography and emitter localization
- Managed several other smaller programs and projects including an 8-year Army Research Lab program investigating antenna architectures, interference mitigation, and mobile-to-mobile MIMO channel modeling - see Research Funding section for more detail
- Helped define system architecture for next generation Army EW system on project with PM-EW including EW system and test planning and asset management tool
- Developed temporal spiking computational models for neuroscience research involving the anterior cingulate cortex
- Supported dozens of self-led and colleague-led projects in a broad range of research topics – see publication lists below for examples

Lucent Technologies, Bell Laboratories, Denver, Colorado
RF/DSP Engineer 5/01 to 6/03

- Researched demodulation of HDSL signals including decision feedback equalization, timing recovery, and deframing
- Developed and implemented a MatLab algorithm for mobile station location estimation for E-911 applications using the timing advance and doppler data of the mobile station received by the base station
- Designed the phase locked loop circuitry for the local oscillators of a GSM triband base station transceiver system
- Designed an amplifier/LNA/duplexer printed circuit board for a UMTS base station system
- Provided ongoing technical expertise to the customer by maintaining and debugging RF boards in various base station systems
  - Debugged and repaired 25+ base station RF boards that had failed in field work or had flawed PLL designs with marginal stability
  - Redesigned, implemented, and tested several existing PLL circuits to improve lock and VCO startup conditions on earlier RF board designs by correcting values of feedback capacitors and loop filter components

BYU Department of Electrical and Computer Engineering, Provo, Utah
Research Assistant 3/99 to 5/01

- Designed, built, and tested a radiometer for Master's thesis work on printed circuit board (PCB) to be used for research in RF interference mitigation for radio astronomy in partnership with the National Radio Astronomy Observatory (NRAO)
- Designed, built, and tested a chirp generating transmitter on PCB at 14 GHz for the altimeter radar on NASA's Jason-1 satellite
- Developed and tested the circuitry for a Graduate-level Microwave Transistor Circuits laboratory
  - Designed, built, and tested RF mixers, an oscillator, a Wilkinson power divider, a 90^{o} hybrid, and microstrip low pass filters using RF transistor theory and S-parameter analysis
  - Built and tested an analog wireless BPSK demodulator at 2.1 GHz using the components described above

Teaching Experience

CT1. Guest Lecturer, Georgia Tech ECE 4370 "Antenna Engineering," Nov 2019
CT2. Guest Lecturer, Georgia Tech ECE 4370 "Antenna Engineering," Nov 2018
CT3. Professional short course, "Near-Field Antenna Measurements," Sep 2018
CT4. Professional short course, "Near-Field Antenna Measurements," Sep 2017
CT5. Guest Lecturer, Georgia Tech ECE 4370 "Antenna Engineering," Dec 2016
CT6. Professional short course, "Near-Field Antenna Measurements," Sep 2016
CT7. Professional short course, "Basic RF Electronic Warfare Concepts," Aug 2015
CT8. Georgia Tech course ECE 2026, "Introduction to Digital Signal Processing," Spring 2015 *Average student evaluation of overall instructor effectiveness: 4.7/5.0*
CT9. Georgia Tech course ECE 2026, "Introduction to Digital Signal Processing," Fall 2014. *Average student evaluation of overall instructor effectiveness: 4.5/5.0*
CT10. Georgia Tech course ECE 6603, "Advanced Digital Communications," Spring 2011. *Average student evaluation of overall instructor effectiveness: 4.0/5.0*
CT11. Professional short course entitled "Fundamentals of Communications Systems and Developmental, Integration and Operational Testing," Sep 2010
CT12. Professional short course entitled "Introduction to Military Communication Systems," Jun 2006
CT13. Developed material for BYU graduate student lab course on Microwave Circuits, 2000

Journal Papers

J1. **B.T. Walkenhorst**, R.T. Cutshall, D.R. Frey, "Biases and uncertainties of RF noise power measurements," submitted to *IEEE Instrumentation & Measurement Magazine*, Feb 2021

J2. S. Lee, R.J. Baxley, M.A. Weitnauer, **B.T. Walkenhorst**, "Achieving undetectable communication", *IEEE Journal of Selected Topics in Signal Processing*, Apr 2015

J3. Z. Yu, R.J. Baxley, **B.T. Walkenhorst**, G.T. Zhou, "Channel sounding waveforms design for asynchronous multiuser MIMO systems", *arXiv:1302.4717*, http://arxiv.org/abs/1302.4717v1.pdf

J4. T. Pratt, H. Tapse, **B.T. Walkenhorst**, G. Acosta-Marum, "A modified XPC characterization for polarimetric channels", *IEEE Transactions on Vehicular Technology*, vol. 60, no. 7, Sep 2011

J5. T.G. Pratt, **B.T. Walkenhorst**, S. Nguyen, "Adaptive polarization transmission of OFDM signals in channels with polarization mode dispersion and polarization-dependent loss", *IEEE Transactions on Wireless Communications*, vol. 8, no. 7, Jul 2009

J6. T. Pratt, **B. T. Walkenhorst**, H. Kang, "Analysis of multiantenna architectures for non-LOS mobile-to-mobile communications in co-channel interference", *IEEE Transactions on Vehicular Technologies*, vol 56, num 4, pp 2168-2179, July 2007

J7. W. Xiang, P. Richardson, **B. T. Walkenhorst**, X. Wang and T. Pratt, "A high-speed four-transmitter four-receiver MIMO OFDM testbed: experiment results and analyses", *EURASIP Journal of Applied Signal Processing*, April 2006

J8. W. Xiang, D. Waters, T. Pratt, J. Barry, **B.T. Walkenhorst**, "Implementation and experimental results of a three-transmitter three-receiver OFDM/BLAST testbed", *IEEE Communications Magazine*, Dec 2004

Conference Papers and Presentations

C1. **B.T. Walkenhorst**, P. Pelland, T. Leifert, M. Berbeci, "A survey of MIMO OTA test methodologies for automotive applications," *IEEE Antennas and Propagation Symposium (AP-S)*, Jul 2020

C2. **B.T. Walkenhorst**, S. Nichols, "Revisiting the Poincaré sphere as a representation of polarization state," *European Conference on Antennas and Propagation (EuCAP)*, Mar 2020

C3. R. Cutshall, **B.T. Walkenhorst**, J. Dobbins, J. Freking, B. Williams, "A review of the CW-ambient technique for measuring G/T in a planar near-field antenna range," *Antenna Measurement Techniques Association (AMTA) Symposium*, Oct 2019

C4. **B.T. Walkenhorst**, S. Nichols, "A methodology for instantaneous polarization measurements using a calibrated dual-polarized probe," *Antenna Measurement Techniques Association (AMTA) Symposium*, Oct 2019

C5. M. Baggett, **B.T. Walkenhorst**, "A straightforward dynamic range error analysis," *Antenna Measurement Techniques Association (AMTA) Symposium*, Oct 2019

C6. D. Janse van Rensburg, **B.T. Walkenhorst**, Q. Ton, J. Demas, "A robotic near-field antenna test system relying on non-canonical transformation techniques," *Antenna Measurement Techniques Association (AMTA) Symposium*, Oct 2019

C7. C. Culotta-Lopez, **B.T. Walkenhorst**, Q. Ton, D. Heberling, "Practical considerations in compressed spherical near-field measurements," *Antenna Measurement Techniques Association (AMTA) Symposium*, Oct 2019

C8. M.C. Baggett, **B.T. Walkenhorst**, "CATR quiet zone depth variation," *Antenna Measurement Techniques Association (AMTA) Symposium*, Oct 2019

C9. **B.T. Walkenhorst**, V. Rodriguez, J. Bruun, "Measurement of RF absorber at large angles of incidence using spectral domain transformations," *Antenna Measurement Techniques Association (AMTA) Symposium*, Oct 2019

C10. **B.T. Walkenhorst**, A.C. Newell, "Measuring G/T of active antennas using planar near-field scanners," *IEEE International Conference on Electromagnetics in Advanced Applications (ICEAA)*, Sep 2019
C11. G. Cortes-Medellin, **B.T. Walkenhorst**, "3:1 bandwidth dual polarized feeds for compact range and near-field probes," *IEEE Antennas and Propagation Symposium (AP-S)*, Jul 2019
C12. **B.T. Walkenhorst**, V. Rodriguez, J. Bruun, "A method for the measurement of RF absorber using spectral domain transformations," *IEEE Antennas and Propagation Symposium (AP-S)*, Jul 2019
C13. **B.T. Walkenhorst**, "Test environments for 5G millimeter-wave devices", *European Conference on Antennas and Propagation (EuCAP)*, Apr 2019
C14. **B.T. Walkenhorst**, P. Ramachandran, "Measuring a 5G millimeter-wave device's spherical coverage", *European Conference on Antennas and Propagation (EuCAP)*, Apr 2019
C15. V. Rodriguez, **B.T. Walkenhorst**, J. Toney, "Near-field antenna measurements using a lithium niobate photonic probe", *European Conference on Antennas and Propagation (EuCAP)*, Apr 2018
C16. **B.T. Walkenhorst**, V. Rodriguez, J. Toney, "Characterization of a photonics E-field sensor as a near-field probe", *Antenna Measurement Techniques Association (AMTA) Symposium*, Oct 2017
C17. **B.T. Walkenhorst**, S.T. McBride, "Acquisition, reconstruction, and transformation of a spiral near-field scan", *Antenna Measurement Techniques Association (AMTA) Symposium*, Oct 2017
C18. **B.T. Walkenhorst**, "Thermal noise effects of a simple correlator for high dynamic range measurements", *European Conference on Antennas and Propagation (EuCAP)*, Mar 2017
C19. **B.T. Walkenhorst**, "Enabling extremely high dynamic range measurements using a simple correlator", *Antenna Measurement Techniques Association (AMTA) Symposium*, Nov 2016
C20. **B.T. Walkenhorst**, D. Tammen, "Correcting polarization distortion in a compact range feed", *Antenna Measurement Techniques Association (AMTA) Symposium*, Nov 2016 (**Best Paper Award**)
C21. Enkuang D. Wang, **Brett T. Walkenhorst**, Jieying Han, "A simulation testbed for adaptive modulation and coding in airborne telemetry", *International Telemetering Confernece (ITC)*, Oct 2014
C22. Jieying Han, **Brett T. Walkenhorst**, Enkuang D. Wang, "Adaptive modulation schemes for OFDM and SOQPSK using error vector magnitude (EVM) and Godard dispersion", *International Telemetering Confernece (ITC)*, Oct 2014
C23. B.M. Beck, J. Kim, R.J. Baxley, **B.T. Walkenhorst**, "RadioBOT: a spatial cognitive radio testbed", *IEEE Aerospace Conference*, Mar 2013
C24. **B.T. Walkenhorst**, A.D. Harper, R.J. Baxley, "Channel model and sounding method effects on wireless secret key rates", *IEEE Conference on Homeland Security Technologies*, Nov 2012
C25. T.G. Pratt, H. Tapse, R. Baxley, **B.T. Walkenhorst**, G. Acosta-Marum, "Polarization-based zero forcing with channel estimation", *IEEE Military Communications Conference*, Nov 2011
C26. T.G. Pratt, H. Tapse, B. Fette, R. Baxley, **B.T. Walkenhorst**, "Polarization-based zero forcing suppression with multiple degrees of freedom", *IEEE Military Communications Conference*, Nov 2011
C27. R.J. Baxley, **B.T. Walkenhorst**, G. Acosta-Marum, "Complex gaussian ratio distribution with applications for error rate calculation in fading channels with imperfect CSI", *IEEE Global Communications Conference*, Dec 2010
C28. B.R. Hamilton, X. Ma, R.J. Baxley, **B.T. Walkenhorst**, "Node localization and tracking using distance and acceleration measurements", *2010 IAPR Workshop on Cognitive Information Processing*, Jun 2010
C29. G. Acosta-Marum, **B.T. Walkenhorst**, R.J. Baxley, "Empirical doubly-selective dual-polarization vehicular MIMO channel model", *IEEE International Symposium on Wireless Vehicular Communications*, May 2010

C30. **B.T. Walkenhorst**, M.A. Ingram, "Multiple repeater placement for assisting long-range LOS MIMO links", *IEEE Global Communications Conference (Globecom)*, Dec 2009
C31. R.J. Baxley, **B.T. Walkenhorst**, "Nonlinear spreading for communications in co-band interference channels", *Proc. Asilomar Conference on Signals, Systems and Computers*, pp. 1130-1132, Nov 2009
C32. **B.T. Walkenhorst**, M.A. Ingram, "Repeater-assisted capacity enhancement (RACE) for LOS MIMO point-to-multipoint links", *IEEE Military Communications Conference (Milcom)*, Oct 2009
C33. R.J. Baxley, **B.T. Walkenhorst**, G.T. Zhou, "Signal classification using a peak-to-average power ratio statistic", *IEEE International Conference on Communications (ICC)*, Jun 2009
C34. **B.T. Walkenhorst**, M.A. Ingram, "Repeater-assisted capacity enhancement (RACE) for MIMO links in a line-of-sight environment", *IEEE International Conference on Communications (ICC)*, Jun 2009
C35. T. Pratt, S. Nguyen, **B.T. Walkenhorst**, "Dual-Polarized Architectures for Sensing with Wireless Communications Signals", *IEEE Military Communications Conference (Milcom)*, Nov 2008
C36. **B.T. Walkenhorst**, T. Pratt, "Polarization-based interference mitigation for OFDM signals in channels with polarization mode dispersion", *IEEE Military Communications Conference (Milcom)*, Nov 2008
C37. **B.T. Walkenhorst**, T. Pratt, M.A. Ingram, "Improving MIMO capacity in a line-of-sight environment", *IEEE Global Communications Conference (Globecom)*, pp. 3623-3628, Nov 2007
C38. **B.T. Walkenhorst**, T. Pratt, M.A. Ingram, S. Gaur "Antenna downselection for co-channel interference mitigation in a mobile-to-mobile channel", *IEEE Military Communications Conference (Milcom)*, October 2007
C39. **B.T. Walkenhorst**, T. Pratt, "Antenna downselection for co-channel interference mitigation in a non-LOS mobile-to-mobile channel", *IEEE Wireless Communications and Networking Conference (WCNC) proceedings*, April 2006
C40. T. Pratt, **B.T. Walkenhorst**, H. Kang, "Multi-antenna architectures for non-LOS mobile-to-mobile communications", *Fourth Generation Mobile Forum*, San Diego, CA, July 2005
C41. **B.T. Walkenhorst**, G. Miner, D. Arnold, "A low cost, radio controlled blimp as a platform for remote sensing", *Proceedings IEEE Geoscience and Remote Sensing Symposium*, Vol. 5, pp. 24-28, July 2000

Invited Conference/Seminar Presentations

CP1. **B.T. Walkenhorst**, "MIMO Communications: An Overview of Concepts and Applications", *Meeting of the IEEE Communications Society, Atlanta Chapter*, Mar 2016
CP2. **B.T. Walkenhorst**, "A path toward adaptive, multifunction electromagnetic systems", *AFRL Cognitive RF Tech Exchange*, Aug 5, 2015
CP3. **B.T. Walkenhorst**, "Cyber/EW convergence", Chilean Air Force Technology Seminar, Jun 17, 2015
CP4. **B.T. Walkenhorst**, "Physical layer research trends for 5G", *ATIS 5G Symposium*, Jun 9, 2015
CP5. **B.T. Walkenhorst**, "Cyber/EW Vulnerability Assessment Tool", *AOC 6th Annual Electronic Warfare / Cyber Convergence Conference*, Jun 3, 2015
CP6. **B.T. Walkenhorst**, "Data Links for EW", *Association of Old Crows, Peachtree Roost*, Jan 20, 2015
CP7. **B.T. Walkenhorst**, "Commercial Wireless Technologies: Trends and Opportunities", *National Special Communications Board*, Jan 16, 2015
CP8. R.J. Baxley, **B.T. Walkenhorst**, "Spatial cognitive spectrum operations", *National Special Communications Board*, Mar 2013

CP9. **B.T. Walkenhorst**, "Cognitive EM: distributed information collection to enable cognition", *Brigham Young University Seminar*, Jan 2013
CP10. **B.T. Walkenhorst**, "Cognitive EM: distributed information collection to enable cognition", *University of Notre Dame Seminar*, Jan 2013
CP11. **B.T. Walkenhorst**, "Signal processing research with software defined radios", *SDR Europe*, Madrid, Spain, Dec 2012
CP12. **B.T. Walkenhorst**, "Cognitive control of the EM spectrum", *Air Force Research Lab Cognitive RF Workshop*, Kirtland AFB, Sep 2012
CP13. **B.T. Walkenhorst**, "Channel-driven LPI communications", *National Special Communications Board*, Sep 2012
CP14. **B.T. Walkenhorst**, "Channel-driven LPI communications", *Low Probability of Intercept Communications Conference*, May 2012
CP15. **B.T. Walkenhorst**, T.G. Pratt, "Wideband polarization-based interference suppression", *Seedling Report for DARPA CommEx Industry Day*, Sep 2010
CP16. **B.T. Walkenhorst**, "Improved WiMax interception using frequency offset and channel estimates", *Low Probability of Intercept Communications Conference*, Jun 2010
CP17. **B.T. Walkenhorst**, "Comparative analysis", *Government Technical Review Committee*, Jun 2011
CP18. **B.T. Walkenhorst**, "Achieving near-optimal MIMO capacity in a rank-deficient LOS environment", *Dept of Electrical Engineering, Boise State University*, Nov 2009
CP19. **B.T. Walkenhorst**, "Software radio lab research", *GTRI Lab Briefing*, Feb 2009
CP20. **B.T. Walkenhorst**, "MIMO channel modeling", *Army Research Lab Collaborative Technology Alliance Review*, Princeton University, Mar 2006

Theses

T1. **B.T. Walkenhorst**, "Achieving Near-Optimal MIMO Capacity in a Rank-Deficient LOS Environment", Ph.D. Dissertation, Georgia Institute of Technology, Aug 2009
T2. **B.T. Walkenhorst**, "Development of a radio telescope receiver for research in radio frequency interference mitigation", M.S. thesis, Brigham Young University, July 2001

Major Technical Reports

TR1. **B.T. Walkenhorst**, M. Loper, J. Huggins, K. Harrigan, B. Whitaker, D. Campbell, L. Lerner, "Cyber/EW Vulnerability assessment tool", *Final Project Report, AFRL Sensors Directorate*, Mar 2015
TR2. **B.T. Walkenhorst**, J.D. McCreary, "GTRI final report to Shared Spectrum Corporation in support of DARPA STTR STA13-004", *Final Project Report, SSC*, Jan 2014
TR3. **B.T. Walkenhorst**, B.J. Baxley, D. Williams, M. Waller, G. Sasarita, "Demonstration of dynamic spectrum access (DSA) test methodology", *Final Project Report and Demonstration, Electronic Proving Grounds*, Jan 2014
TR4. Technical Contributor to "Report to the President: Realizing the full potential of government-held spectrum to spur economic growth", *The President's Council of Advisors on Science and Technology (PCAST)*, pp. 1-192, Jul 2012, online at http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf
TR5. **B.T. Walkenhorst**, R.J. Baxley, H.F. Engler, "Comparative analysis report", *Final Project Report, government customer*, Feb 2012
TR6. H.F. Engler, **B.T. Walkenhorst**, R.J. Baxley, "Impact of parameter estimation on MFI", *Technical Memorandum, government customer*, Feb 2012

TR7. **B.T. Walkenhorst**, R.J. Baxley, M. Lorenzana, J.S. Monteith, K. Dietze, "Cooperative emitter localization using compressive sensing techniques", *Final Project Report, Sypris Electronics*, Aug 2011
TR8. R.J. Baxley, **B.T. Walkenhorst**, H.F. Engler, "Matched filter and interferometry analysis", *Technical Memorandum, government customer,* Aug 2011
TR9. T.G. Pratt, H. Tapse, **B.T. Walkenhorst**, R. Baxley, G. Acosta-Marum, "Polarimetric processing techniques for signal detection and recovery in mainbeam co-channel interference", *Final Project Report, Notre Dame, DARPA*, May 2011
TR10. **B.T. Walkenhorst**, J.S. Monteith, R.J. Baxley, G. Acosta-Marum, "Channel sounding campaign and analysis", *Final Project Report, Clearwire*, Apr 2011
TR11. **B.T. Walkenhorst**, "Repeater-assisted capacity enhancement (RACE) for MIMO-enabled wireless sensor networks", *GTRI IRAD final report*, Jun 2010
TR12. R.J. Baxley, **B.T. Walkenhorst**, "Maximum likelihood signal detection for OFDM", *Technical Memorandum, government customer,* Mar 2010
TR13. D. Sale, M. Wheeler, T. Pratt, **B.T. Walkenhorst**, "IRAD Cosite Interference Mitigation Technical Report", *GTRI IRAD final report*, July 2008
TR14. **B.T. Walkenhorst**, T. Pratt, J. Schultz, J. Maloney, B. Baker, C. Ekangaki, E. Kuster, "Reflector-based array configurations for MIMO and signal extraction applications", final report for IR&D project, November 2006
TR15. J. Cofer, J. Hurst, D. Lamm, **B.T. Walkenhorst**, D. Sale, R. Bock, "Device Blitz Assessment", final technical report submitted to U.S. Army Rapid Equipping Force, Dec, 2005
TR16. **B.T. Walkenhorst**, T. Pratt, M.A. Ingram, V. Anreddy, "Reflector-based array configurations for MIMO and signal extraction applications", final report for IR&D project, July 2005
TR17. D. Leatherwood, **B.T. Walkenhorst**, D. Cruz, J. Maynard, "Exploratory radio frequency technology program", final report on investigation of phased array systems for specific emitter identification (SEI) to Air Force Research Lab, Dec 2004
TR18. **B.T. Walkenhorst**, T. Fidder, "Link budget analysis for GSM base station systems", final report on link budget study for Bell Labs government sponsor, April 2003
TR19. M. Berg, **B.T. Walkenhorst**, "PicoGSM mobility & location-based services study results", final report on location estimation study for Bell Labs government sponsor, April 2002

Patents

P1. M. Rachid, M. Sadeghi, B. Daneshrad, **B.T. Walkenhorst**, E. Pisek, "Relay Devices for Distributed Networks", Provisional US App No: 63/228321, filed Aug 2, 2021
P2. D. Janse van Rensburg, **B.T. Walkenhorst**, Q. Ton, "Arbitrary Surface Near-Field Antenna Test System", US Patent No: 16/671,743, filed Nov 1, 2019
P3. T. Pratt, **B.T. Walkenhorst**, "Methods for Polarization-Based Interference Mitigation", US App No: 12/525,297, filed July 30, 2009
P4. T. Pratt, **B.T. Walkenhorst**, "Systems and Methods for Adaptive Polarization Transmission", US App No: 12/525,299, filed July 30, 2009

Trade Secrets

TS1. B.T. Walkenhorst, A. Samuel, R. Scholes, "Virtual Transmit Beamforming", trade secret status granted by Raytheon Technologies, Nov 11, 2021
TS2. B.T. Walkenhorst, A. Samuel, "Nonlinear Processing of … DoFs", trade secret status granted by Raytheon Technologies, Nov 11, 2021

Magazine Articles (not peer reviewed)

M1. **B.T. Walkenhorst**, "The impact of LPI/LPD waveforms and anti-jam capabilities on military communications", *The Modern Battlespace*, Sep 4, 2020. Accessed on: Dec 19, 2020. Available: https://modernbattlespace.com/2020/09/24/impact-lpi-lpd-waveforms-anti-jam-capabilities-military-communications/#.X9eIzC9h3AZ.

M2. **B.T. Walkenhorst**, "Transmit beamforming in MIMO tactical communications systems", *The Modern Battlespace*, Dec 14, 2020. Accessed on: Dec 19, 2020. Available: https://modernbattlespace.com/2020/12/14/transmit-beamforming-mimo-tactical-communications-systems/?utm_source=TMB#.X9eIUS9h3AY.

Research Funding

Total funding as Capture Lead, PM, PI, co-PI, Technical Lead since 2004: **$30.3M**

1. *Title*: **Mosaic Scattered Wide-Area Resilient Network (MScWRN)**
   Sponsor: DARPA Special Technology Office
   Funding Level: $13.1M
   Dates: 2/2021 – 11/2024

2. *Title*: **Spread Modulation for Airborne Communications (SMAC)**
   Sponsor: Army/Aviation & Missile Center
   Funding Level: $7.53M
   Dates: 9/2020 – 9/2023

3. *Title*: **Reduced-SWaP CSfC Endpoint (RSCE)**
   Sponsor: Army/PM Tactical Network
   Funding Level: $704K
   Dates: 9/2020 – 9/2021

4. *Title*: **Scalable Wideband Autonomous RF Mapping MANET (SWARMM)**
   Sponsor: DARPA/STO
   Funding Level: $1.04M
   Dates: 9/2020 – 9/2021

5. *Title*: **Protected Communications for Manned/Unmanned Teams (PCM)**
   Sponsor: Army/C5ISR
   Funding Level: $1.69M
   Dates: 4/2020 – 4/2021

6. *Title*: **Enhancing Access to the Radio Spectrum (EARS)**
   Sponsor: National Science Foundation
   Funding Level: $425K
   Dates: 9/2013 – 8/2017

7. *Title*: **SDR Support and Assessment**
   Sponsor: Test Resource Management Center
   Funding Level: $264K
   Dates: 10/2013 – 9/2015

8. *Title*: **Ontology for Flexible MANET**
   Sponsor: DARPA
   Funding Level: $42K
   Dates: 8/2013 – 2/2014

9. *Title*: **Link-Dependent Adaptive Radio**
   Sponsor: Test Resource Management Center
   Funding Level: $2.267M
   Dates: 4/2013 – 3/2015

10. *Title*: **Trade Study**
    Sponsor: Office of Secretary of Defense
    Funding Level: $250K
    Dates: 10/2012 – 02/2013

11. *Title*: **DSA Testing Methodologies**
    Sponsor: Electronic Proving Grounds
    Funding Level: $50K
    Dates: 10/2012 – 04/2013

12. *Title*: **Technology Assessment**
    Sponsor: Department of Defense
    Funding Level: $2.038M
    Dates: 7/2008 – 12/2013

13. *Title*: **Geologic Tomography**
    Sponsor: Sypris Electronics
    Funding Level: $4K
    Dates: 3/2011 – 12/2011

14. *Title*: **Cooperative Emitter Localization**
    Sponsor: Sypris Electronics
    Funding Level: $94K
    Dates: 3/2011 – 12/2011

15. *Title*: **Wireless Testing**
    Sponsor: Clearwire
    Funding Level: $200K
    Dates: 7/2010 – 4/2011

16. *Title*: **Polarization-Based Interference Mitigation**
    Sponsor: DARPA
    Funding Level: $100K
    Dates: 4/2010 – 3/2011

17. *Title*: **Collaborative Technology Alliance**
    Sponsor: Army Research Lab
    Funding Level: $180K
    Dates: 7/2008 – 12/2009

18. *Title*: **RACE for MIMO-enabled Wireless Sensor Networks**
    Sponsor: GTRI
    Funding Level: $58K
    Dates: 1/2009 – 12/2009

19. *Title*: **Spread Spectrum Waveforms for Low-Bandwidth DACs**
    Sponsor: GTRI
    Funding Level: $26K
    Dates: 8/2008 – 6/2010

20. *Title*: **Modulation Comparison Study**
    Sponsor: American Association of Railroads
    Funding Level: $25K
    Dates: 9/2009 – 10/2009

21. *Title*: **Blitz Assessment**
    Sponsor: Army Rapid Equipping Force
    Funding Level: $67K
    Dates: 9/2005 – 12/2005

22. *Title*: **Reflector-Based Array Configurations**
    Sponsor: GTRI
    Funding Level: $109K
    Dates: 7/2004 – 6/2007

Software Languages

- MatLab
- Python, Numpy, Matplotlib, Django
- Javascript, JQuery, AJAX
- HTML, CSS

Honors and Awards

- Best Paper Award recipient, AMTA Symposium, 2016
- Recipient of Georgia Tech Provost Teaching Fellowship, 2011
- Elected Senior Member, IEEE, 2009
- Recipient of GTRI Ph.D. Fellowship Award, Jan 2007 – Jun 2008
- Member of Electrical Engineering Honor Society Eta Kappa Nu, 1998 - Present
- Eagle Scout, 1994

Professional Society Membership

- IEEE Antennas and Propagation Society Oct 2016 – Present
- Institute of Electrical and Electronics Engineers (IEEE) May 2009 – Present
- Antenna Measurement Techniques Association May 2016 – Oct 2020
- Association of Old Crows (AOC) Oct 2012 – Oct 2015
- IEEE Signal Processing Society May 2009 – Dec 2015
- IEEE Communications Society May 2009 – Dec 2015

Professional Service

- 3GPP Delegate Oct 2017 – Feb 2020
- Technical Program Committee, EuCAP Oct 2017 – Feb 2020
- Technical Program Committee, AMTA Mar 2017 – Feb 2020
- Session Chair, AMTA 2019 Oct 2019
- Session Chair, AP-S 2019 Jul 2019
- Session Chair, EuCAP 2019 Apr 2019
- Session Chair, AMTA 2018 Nov 2018
- Technical Program Committee, IEEE COMCAS Jan 2013 – 2017
- Technical Program Committee, IEEE PIMRC Jan 2013 – 2017
- Technical Program Committee, IEEE Vehicular Technology Conferences 2011 – 2017
- Session Chair, AMTA 2017 Oct 2017
- Member, Organizing Committee, 2017 AMTA Symposium Oct 2016 – Oct 2017
- Student Day Coordinator, 2017 AMTA Symposium Oct 2016 – Oct 2017
- Session Chair, EuCAP 2017 Mar 2017
- Chair, Atlanta Chapter, IEEE Communications Society Jan 2012 – Dec 2015
- Vice Chair, Atlanta Chapter, IEEE Communications Society Jan 2011 – Jan 2012
- Mentor to Dr. Bob Baxley in GTRI Mentor-Protégé Program Aug 2008 – Jul 2009
- Member, GTRI ICL Director's Council May 2007 – Aug 2009
- Technical Program Committee, Wireless Access in Vehicular Environments Conf 2008
- Session chair, IEEE Wireless Communications and Networking Conference (WCNC) 2006
- Member, Ph.D. Defense Committee
    - Cosme Culotta-López, "Fast Near-Field Antenna Measurements by Application of Compressed Sensing," RWTH Aachen Univeresity, 2020-2021
    - Dylan Crocker, "Numerical and Experimental Evaluation of Sinuous Antennas for Remote Sensing Applications," Georgia Institute of Technology, 2019
    - Malik Gul, "Timing and Frequency Synchronization for Orthogonal Frequency Division Multiple-Access Systems," Georgia Institute of Technology, 2014
- Reviewer
    - European Conference on Antennas and Propagation (EuCAP), 2016 (x4), 2017 (x3), 2018 (x3)
    - IEEE Vehicular Technologies Conference, 2012, 2013, 2015 (x4)
    - IEEE Access Journal, 2014
    - IEEE Conference on Microwaves, Communications, Antennas and Electronic Systems 2013 (x4), 2015 (x9)
    - IEEE Symposium on Personal, Indoor and Mobile Radio Communications, 2013 (x6), 2014 (x3), 2015 (x5), 2016 (x4)
    - International Journal of Electronics and Communications, 2013
    - International Journal of Advanced Robotic Systems, 2013
    - IEEE Journal on Selected Areas in Communications: Cognitive Radio Series, 2013.
    - IEEE Transactions on Vehicular Technologies, 2012
    - IEEE Military Communications Conference, 2008, 2012.
    - EURASIP Journal on Wireless Communications and Networking, 2008.
    - IEEE Personal, Indoor and Mobile Radio Communications Symposium, 2008.
    - IEEE Global Communications Conference, 2007, 2008.
    - IEEE Transactions on Wireless Communications, 2007, 2014.
    - IEEE Aerospace and Electronics Magazine, 2006.
    - IEEE Conference on Ultra Wideband Systems and Technologies, Nov 2003.

Special Training

- Near-Field Antenna Measurements 2016
- Advanced RF Electronic Warfare Principles 2014
- SysML: Model-Based Engineering Fundamentals 2012
- Managing Multiple Projects 2009
- GTRI Project Management 2006
- Mind Mapping 2005
- GTRI Excellence in Industrial Contracting 2005
- GTRI Mentor Program Jul 2004 – Jun 2005

Community Service

- Volunteer church leader and teacher
  - Youth/Children Leader and/or Sunday School teacher 2001-2004, 2006-2014
  - Adult Sunday School teacher 1995-1996, 1999, 2010-2011
  - Cubmaster 2011 – 2012
  - Boy Scout Varsity Team Coach 2012 – 2014
- Soccer Coach Aug 2012 – Oct 2012

Extra-Professional Activities and Interests

- Music
  - Tenor/Baritone singer in various choirs, small groups, and solos for volunteer organizations
    - Various volunteer church choirs 1998 – 2016
    - Chords of Faith community choir Sep 2011 – Dec 2011
  - Experienced Piano player
  - Trumpet player for volunteer community orchestra Sep 2008 – Apr 2009
  - Acoustic/folk guitar
    - Home concerts Jun 2012, Apr 2013, Apr 2014, Jul 2014
    - GTRI Christmas Music Concert Dec 2008
- Foreign languages
  - German, advanced
  - Spanish, basic
  - Latin, basic
- Interests
  - Philosophy – William James, Plato, Aristotle, Adam Smith, Immanuel Kant, G.E. Moore
  - Literature – Leo Tolstoy, Fyodor Dostoyevsky, George Eliot
  - Sports – Biking, Swimming, Racquetball, Hiking, Volleyball, Soccer