UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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AMERICAN HONDA MOTOR CO., INC.,

Petitioner,

v.

NEO WIRELESS, LLC,

Patent Owner.

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IPR2023-00790

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**DECLARATION OF DR. R. MICHAEL BUEHRER IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,467,366**

## I. Engagement

1. I have been retained by Petitioner American Honda Motor Co., Inc. to provide this declaration concerning the technical subject matter relevant to a petition for inter partes review of U.S. Patent No. 8,467,366 ("'366 patent").

2. I am over 21 years of age and otherwise competent to make this Declaration. I make this Declaration based on facts and matters within my own knowledge and on information provided to me by others.

3. Specifically, I was asked to review the declaration of Dr. Leonard J. Cimini, Jr. that was submitted by the petitioner in IPR2023-00426 as Exhibit 1003 ("the Cimini Declaration") and form an opinion of whether I agreed with the facts, analysis, and conclusions in that declaration.

4. My compensation in this matter is not based on the substance of my opinions or the outcome of this matter. I have no financial interest in Petitioner.

5. In writing this declaration, I have considered my own knowledge and experience, including my work experience in the field of electrical and computer engineering and my experience working with others involved in this field.

## II. Background and Qualifications

### A. Educational Background

6. My academic and professional background is in Electrical and Computer Engineering, and I have been working in those fields since the completion of my Ph.D. over 20 years ago. The details of my background and education, and a listing of all publications that I have authored, are provided in my Curriculum Vitae. See APPLE-1004. Below, I provide a short summary of my education and experience that I believe to be most pertinent to the opinions I have formed in this case.

7. I received a B.S. in Electrical Engineering from The University of Toledo in 1991, an M.S. in Electrical Engineering from The University of Toledo in 1993, and a Ph.D. in Electrical Engineering from Virginia Polytechnic Institute and State University in 1996. The focus of my graduate work was wireless communication systems. My Ph.D. thesis involved the application of multiuser detection (an advanced signal processing approach to interference mitigation) to CDMA-based cellular systems.

8. After completion of my Ph.D. in 1996, I joined Bell Laboratories, the research division of Lucent Technologies, where I worked for five years as a Member of Technical Staff and later as a Distinguished Member of Technical Staff. My work there focused on developing advanced technologies for cellular

telecommunications, including for 3G cellular standards. For example, while at Bell Labs, I developed and implemented algorithms for intelligent antenna systems which increased the voice capacity (i.e., number of simultaneous phone calls) and data capacity of cellular systems. These algorithms were included in Lucent Technologies' 3G CDMA cellular base station. I also developed techniques known as transmit diversity techniques which increased reliability (i.e., reduced the probability of a dropped call) of cellular systems. These transmit diversity techniques were standardized in the 3GPP2 cellular standard known as cdma2000. During that time, I supported the standardization of my ideas by writing contributions to the working groups developing the standards and attending standards meetings. In particular, I participated in the 3GPP2 standardization process. During that time, I worked with colleagues to include my ideas on the use of transmit diversity in CDMA systems in the 3GPP2 standard.

9. I am currently a Professor in the Bradley Department of Electrical and Computer Engineering at Virginia Polytechnic Institute and State University, where I have taught and conducted research in the area of wireless communications for nearly 20 years. Specifically, I have taught courses which cover wireless communications and signal processing (including the underlying concepts) at the undergraduate and graduate levels. For example, I teach a sophomore-level course which introduces the concepts of signals and systems, a

junior-level course which introduces the basic concepts of communication systems, senior-level and graduate-level courses which cover advanced digital communication topics, and also graduate-level courses which teach the advanced technologies underlying the latest wireless systems, such as Fourth and Fifth Generation (4G/5G) cellular communication standards (e.g., LTE, LTE-Advanced, New Radio) and Wi-Fi. I also teach graduate courses on advanced topics such as Information Theory, Machine Learning Applied to Communication Systems, Spread Spectrum Communications and CDMA.

10. From 2014 until 2022, I also served as the director of *Wireless @ Virginia Tech*, a comprehensive research group focusing on wireless communications which consists of 14 faculty members and approximately 85 graduate students. My specific research focuses on advanced wireless communications and geolocation techniques. This research has examined both advanced theoretical concepts as well as the application of these concepts to the latest wireless standards. As an example of the latter, I (along with my students) have conducted research applying multiuser/multi-antenna signal processing to LTE. I have also applied advanced geolocation techniques to LTE systems.

11. My research work has been funded by national agencies including the National Science Foundation (NSF), the Defense Advanced Research Projects

Agency (DARPA), the Office of Naval Research (ONR), the Army Research Lab, the Air Force Research Lab as well as many industrial sponsors.

12. During 2009, I was a visiting researcher at the Laboratory for Telecommunication Sciences (LTS), a Federal Research Lab which focuses on telecommunication challenges for national defense. While at LTS, my research focus was in the area of cognitive radio with a particular emphasis on statistical learning techniques.

13. I have authored and co-authored over 250 publications in my area of expertise, which have been published in the leading journals in my field including IEEE Transactions on Communications, IEEE Transactions on Wireless Communications, IEEE Transactions on Information Theory, Proceedings of the IEEE, and IEEE Transactions on Signal Processing, and at all of the major conferences in my field. This research has been cited over 11,000 times. A complete list of my publications over the last 25 years is included in my Curriculum Vitae.

14. I am a Fellow of the IEEE (so named "for contributions to wideband signal processing in communications and geolocation"). I was a co-recipient of the Vanu Bose Award for the best paper at the 2021 Military Communications Conference.

15. In 2010, I was awarded the Ellersick Best Paper Award in the Unclassified Technical Program, at the IEEE Military Communications Conference. I received the SDR Forum Best Paper Award in 2007 and the Outstanding Paper Award at the SDR Forum in 2008. I received the Dean's Award for Teaching Excellence in April 2014 and the Dean's Award for Outstanding New Assistant Professor, College of Engineering in 2003. While at Bell Laboratories, I was awarded the Bell Labs President's Silver Award for outstanding research contributions and the 1999 Best Paper Award in the Bell Labs Technical Journal.

16. As a consultant, I have examined in detail various aspects of the physical layer, MAC layer, RLC layer, and RRC layer including both user data transmission and the control signaling of the standards for 2G, 3G, and 4G cellular systems. I have also specifically studied the standardization process in 3GPP as it relates to the standardization of a particular aspect of 4G (LTE). I have also taught short-courses in the areas of cellular systems, geolocation and Wi-Fi communications.

17. I also hold 18 issued patents in the area of wireless communications, many of which relate to cellular communication systems.

18. I formerly served as an area editor for IEEE Transactions on Wireless Communications supervising a team of 12 editors. I also recently served

as a guest editor for a special issue of the Proceedings of the IEEE. I was formerly an associate editor for IEEE Wireless Communications Letters, IEEE Transactions on Vehicular Technologies, IEEE Transactions on Communications, IEEE Transactions on Signal Processing, and IEEE Transactions on Education.

19. Additionally, I formerly served as the guest editor for the IEEE Journal on Special Topics in Signal Processing. I served as the Technical Program Chair for the Signal Processing for Communications Symposium at the 2017 IEEE International Conference on Communications. Previously, I was the Organizer and Technical Co-Chair for both the 2015 and 2016 IEEE Global Communications Conference Workshop on Localization and Tracking: Indoors, Outdoors and Emerging Networks (LION). I have also served on the technical program committees of several other conferences and workshops in my field.

20. A complete copy of my curriculum vitae, which includes a list of my publications and contains further details on my education, experience, publications, patents, and other qualifications to render an expert opinion, is attached as Appendix A.

## III. Information Considered

21. In drafting this declaration and forming the opinions therein, I relied on my years of education, research, and industry and academic

experience, including my direct experience and contributions in the area of wireless networks.

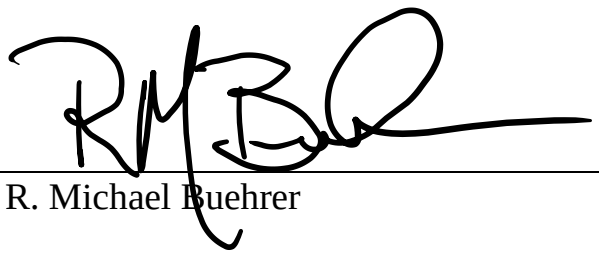
22. I reserve the right to supplement this declaration in response to additional evidence that may become known.

23. In connection with any testimony I may be asked to give to the Patent Trial and Appeal Board, I may use as exhibits various documents that relate to matters set forth in this declaration.

## IV. Opinions

24. After considering the Cimini Declaration, I agree with the facts, analysis, and conclusions in the Cimini Declaration, and I adopt the testimony in sections VIII-XI of the Cimini Declaration as my own for purposes of this proceeding.

25. I declare all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that the statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: 3/29/23 By: 

Dr. R. Michael Buehrer

# APPENDIX A


10

# R. Michael Buehrer, FIEEE

**Virginia Polytechnic Institute and State University**
The Bradley Department of Electrical and Computer Engineering
432 Durham Hall; Mail Stop 0350
Blacksburg, Virginia 24061
Telephone: 540.231.1898; Fax: 540.231.2968
buehrer@vt.edu

## Education

| | |
|---|---|
| June 1996 | Virginia Polytechnic Institute and State University, The Bradley Department of Electrical and Computer Engineering, Bradley Fellowship, Ph.D. |
| August 1993 | The University of Toledo, Department of Electrical Engineering and Computer Science, M.S. |
| June 1991 | The University of Toledo, Department of Electrical Engineering and Computer Science, B.S. |

## Employment

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|---|---|
| Aug. 2012 - Present | Professor, Virginia Polytechnic Institute and State University, Bradley Department of Electrical and Computer Engineering, Director of *Wireless @ Virginia Tech* |
| Aug. 2006 – Aug. 2012 | Associate Professor, Virginia Polytechnic Institute and State University, Bradley Department of Electrical and Computer Engineering, Mobile and Portable Radio Research Group. |
| Aug. 2009 – Dec. 2009 | Visiting Researcher at the Laboratory for Telecommunication Sciences (LTS) a federal research lab which focuses on telecommunication challenges for national defense. |
| Aug. 2001 – Aug. 2006 | Assistant Professor, Virginia Polytechnic Institute and State University, Bradley Department of Electrical and Computer Engineering, Mobile and Portable Radio Research Group. |
| Aug. 2001 – Present | Independent Consultant, self-employed. |
| Aug. 1996 – Aug. 2001 | Member Technical Staff, Bell Laboratories, Lucent Technologies, promoted to Distinguished Member of Technical Staff in September 2000. |
| Sep. 1993 – Jun. 1996 | Graduate Research Assistant, Virginia Polytechnic Institute and State University, Bradley Department of Electrical and Computer Engineering, Mobile and Portable Radio Research Group. |
| May 1994 – Aug. 1994 | Senior Engineer, Stanford Telecommunications, Advanced Programs. |
| Sep. 1991 – Aug. 1993 | Graduate Research Assistant, The University of Toledo, Department of Electrical Engineering and Computer Science, Communications Research Group. |

## Honors and Recognitions

- Fellow of the IEEE (So named "for contributions to wideband signal processing in communications and geolocation")
- Vanu Bose Best Paper Award *IEEE Military Communications Conference (MILCOM)* 2021.
- Dean's Award for Teaching Excellence - April 2014.
- Ellersick Best Paper Award in the Unclassified Technical Program, *IEEE Military Communications Conference (MILCOM)* 2010.
- SDR Forum Best Paper Award, 2007.
- Outstanding Paper Award, SDR Forum, 2008.
- Dean's Award for Outstanding New Assistant Professor, College of Engineering, 2003.
- Dean's List for Teaching Effectiveness (teaching evaluation greater than 3.6) 16 out of 18 semesters list was published.
- Nominated for Teaching Certificate, College of Engineering, Spring 2004 and Spring 2005.
- Bell Labs President's Silver Award for outstanding research contributions.
- 1999 Best Paper Award for *Bell Labs Technical Journal.*

## Patents

- S. D. Gordon, R.M. Vaghefi, and R.M. Buehrer, "Estimating the Location of a Wireless Terminal Based on Cooperative Measurements," *US Patent No. 10,527,708* , January 7, 2020.
- S. D. Gordon, R.M. Vaghefi, and R.M. Buehrer, "Estimating the Location of a Wireless Terminal Based on Radio-Frequency Pattern Matching and Cooperative Measurements," *US Patent No. 9,989,620 B1*, June 5, 2018.
- S. D. Gordon, R.M. Vaghefi, and R.M. Buehrer, "Estimating the Location of a Wireless Terminal Based on Radio-Frequency Pattern Matching and Cooperative Measurements," *US Patent No. 9,596,571 B1*, March 14, 2017.
- R.M. Buehrer, R.A. Soni, and J.A. Tsai, "Methods and Apparatus for Downlink Diversity in CDMA Using Walsh Codes," *U.S. Patent No. 7,400,614 B2*, July 15, 2008.
- R. D. Benning, R. M. Buehrer, Mark H Kramlm, and P. A. Polakos, " Space-Time Spreading and Phase Sweep Transmit Diversity", *US Patent No. 7,042,955 B2*, May 9, 2006.
- R.D. Benning, R.M. Buehrer, and R.A. Soni, " Biased Phase Sweep Transmit Diversity", *US Patent No. 7,035,599 B2*, April 25, 2006.
- R. D. Benning, R. M. Buehrer, P. A. Polakos, and R. A. Soni, "Split Shift Phase Sweep Transmit Diversity, " *US Patent No. 6,980,778 B2*, December 27, 2005.
- R.D. Benning, R.M. Buehrer, and R.A. Soni, " Symmetric Sweep Phase Sweep Transmit Diversity", *US Patent No. 6,920,314*, July 19, 2005.
- R.M. Buehrer, S.P. Nicoloso, R.A. Soni, and D. Uptegrove, "Cellular Communications System And Related Methods", *US Patent No. 6,801,791*, October 5, 2004.

- R.M. Buehrer, S.-C. Liu, S.P. Nicoloso, and D. Uptegrove, "Method of channel estimation and compensation based thereon," *U.S. Patent No. 6,542,560*, April 1, 2003.
- R.M. Buehrer and S.-C. Liu, "Code division multiple access system and method of operation with improved signal acquisition and processing," *U.S. Patent No. 6,549,565*, April 15, 2003.
- R.D. Benning, R.M. Buehrer, and R.A. Soni, "Apparatus and method of enhancing transmit diversity," U*.S. Patent No. 6,594,226*, July 15, 2003.
- R.M. Buehrer, S.-C. Liu, S.P. Nicoloso, and D. Uptegrove, "Iterative channel estimation and compensation based thereon," *U.S. Patent No. 6,614,857*, September 2, 2003.
- R.M. Buehrer and R.A. Soni, "Methods And Apparatus For Downlink Diversity In CDMA Using Walsh Codes", *U.S. Patent No. 6,515,978*, February 4, 2003.
- R.M. Buehrer, S. Gollamudi, and S.P. Nicoloso, "Multistage interference cancellation for CDMA applications using M-ary orthogonal modulation," *US Patent No. 6,363,103*, March 26, 2002.
- S.A. Allpress, R.M. Buehrer, and R.A. Soni, "Receiver Architecture Employing Space Time Spreading and Orthogonal Transmit Diversity Techniques," *US Patent No. 6,317,410 B1*, November 13, 2001.
- S.A. Allpress, R.M. Buehrer, Quinn Li, Ramesh Nallepilli, and R.A. Soni, "Transmitter Architecture Employing Space Time Spreading and Orthogonal Transmit Diversity Techniques," *US Patent No. 6,392,988*, May 21, 2001.
- R.M. Buehrer, M.D. Hahm, S.C. Liu, and S.P. Nicoloso, "Base Station System Including Parallel Interference Cancellation Processor," *US Patent No. 6,157,847*, December 5, 2000.

# Teaching

## Undergraduate Courses

- Engineering Exploration
- Electric Circuits
- Signals and Systems
- Introduction to Communications
- Digital Communications
- Analog and Digital Communication Laboratory – *developed this course with $70k grant from the State of Virginia.*

## Graduate Courses

- Spread Spectrum Communications – *developed this course for the ECE department. It is now a permanent offering.*
- Advanced Digital Communications
- Multi-Channel Communications (Course covers the fundamentals of OFDM and MIMO techniques the underlying technologies for 4G cellular communications) – *developed this course for the ECE dept.*
- Information Theory
- Machine Learning for Communication Systems

### Teaching Evaluations (through Spring 2011)

- Average student evaluation – 3.8/4.0 (17 courses, 450 students)
- Dean's List (student evaluation $>$ 3.6) in 16 of 18 semesters of teaching

### Short Courses Given

- Position Location
- Position Location using Ultra-Wideband Signals
- Radio Resource Management in CDMA Systems
- WiFi – An introduction to WLANs
- OFDM – Multicarrier transmission for high data rate systems; Application to 4G (LTE) cellular and Wi-Fi
- Ultra Wideband Communications
- Multi-Input Multi-Output (MIMO) Communication Systems; Application to 4G (LTE/LTE-Advanced) cellular and Wi-Fi

## Advising

### Current

- Charlie Thornton, " Distributed Cognitive Radar," Ph.D. candidate, expected graduation May 2023.
- William Howard, " Distributed Learning Approached for Cognitive Radar and Radio," Ph.D. candidate, expected graduation December 2023.
- Don-Roberts Emenonye, " Machine Learning Approaches to Remote Rehabilitation," Ph.D. candidate, expected graduation December 2023.
- Sam Shebert, "Automatically Classifying Modern Communication Waveforms," Ph.D. candidate, expected graduation May 2024.
- Megan Moore, "Machine Learning in Wireless Communications," Ph.D. candidate, expected graduation May 2025.
- Haozhou Hu, "Geolocation via Landmarks," Ph.D. candidate, expected graduation May 2025.
- Gaurav Duggal, "Combined Radar and Communications Signals for Geolocation," Ph.D. candidate, expected graduation May 2025.
- Harish Dureppagari, "Emergency Localization using UAVs and Collaborative Localization," Ph.D. candidate, expected graduation May 2026.

## Former

- Jianyuan Yu, "Wireless Sensing and Fusion using Deep Neural Networks," Ph.D., August 2022.
- Yue Xu, " Deep Recurrent Q Networks for Dynamic Spectrum Access in Dynamic Heterogeneous Environments with Partial Observations," Ph.D. , August 2022.
- Chris O'Lone, "Statistical Analysis of Geolocation Fundamentals Using Stochastic Geometry," Ph.D. December 2020.
- Jeff Poston, "ILoViT: Indoor Localization via Vibration Tracking," Ph.D. March 2018.
- Mahi Abdelbar, "Applications of Sensor Fusion in Classification, Localization and Mapping," Ph.D. February 2018.
- Mico Woolward, "SUPPLEMENTING LOCALIZATION ALGORITHMS FOR INDOOR FOOTSTEPS," Ph.D., July 2017.
- Daniel Jakubisin, "Advances in Iterative Probabilistic Processing for Communication Receivers," Ph.D., April, 2016, *currently employed by The Hume Center*.
- Jeannette Nounagnon "Using Kullback-Leibler Divergence to Analyze the Performance of Collaborative Positioning,", Ph.D., April, 2016, *currently employed by ComSat*.
- SaiDhiraj Amuru, "Intelligent Approaches for Communication Denial," Ph.D., September, 2015, *currently employed by Samsung*.
- Javier Schloemann, "Fundamental Analyses of Collaborative and Noncollaborative Positioning," Ph.D., August, 2015, *currently employed by Northrup-Grumman*.
- Reza Vaghefi, "Cooperative Positioning in Wireless Sensor Networks Using Semidefinite Programming," Ph.D., December 2014, *currently employed by Blue Danube Labs*.
- Jeong-heon Lee, "Physical Layer Security for Wireless Position Location in the Presence of Location Spoofing," Ph.D., March 2011, *currently employed by Samsung*.
- Haris I. Volos, "Cognitive Radio Engine Design For Link Adaptation," Ph.D., September 2010, *currently employed by the University of Arizona.*
- Tao Jia, "Collaborative Position Location for Wireless Networks in Harsh Environments," Ph.D., March 2010, *currently employed by Qualcomm, Inc.*
- Heba Shaban, "A Novel Highly Accurate Wireless Wearable Human Locomotion," Ph.D., April 2010, *currently employed by Arab Academy of Science and Technology.*
- Haesoo Kim, "Cooperative Communications," Ph.D., August 2008, *currently employed by LG Electronics.*
- Rekha Menon, - "Interference Avoidance based Underlay Techniques for Dynamic Spectrum Sharing," Ph.D., April 2007, *currently employed by Tyco Electronics*.
- Swaroop Ventkatesh, "The Design and Modeling of Ultra-Wideband Position-Location Networks," Ph.D., February 2007, *currently employed by Marvel Semiconductor*.
- Jihad Ibrahim, "Algorithms and Architectures for UWB Receiver Design," Ph.D. January 2007, *currently employed by MathWorks*.
- Chris Anderson, "A Software Defined Ultra Wideband Transceiver Testbed for Communications, Ranging, or Imaging," Ph.D., September 2006, *currently an Associate Professor at the US Naval Academy.*
- Samir Al-Ghadhban - " Multi-layered Space Frequency Time Codes," Ph.D. October, 2005, *currently an associate professor at King Fahd University*.

- Jing Jiang – "Increasing the Capacity of Wireless Data Systems - A Cross Layer Perspective," Ph.D., July 2004, *currently employed by Texas Instruments*.
- Jiann-An Tsai – "Overloaded Array Processing Using Interference Cancellation," Ph.D., May 2002. *Currently employed by Samsung.*
- Sebastian Rodriguez, "Value of Machine Learning and Cognition on Target Tracking," M.S., June 2022.
- C. Tanner Fredieu, "Spectrum Awareness: Deep Learning and Isolation Forest Approaches for Open-set Identification of Signals," M.S. May 2022.
- Dhwan Wanjara, "A Python Software Library to Improve the Accessibility of the Apple Watch as a Research Tool," M.S. May 2022.
- Daniel Tait, " Electromagnetic Vector-Sensor Direction-of-Arrival Estimation in the Presence of Interference," M.S. August 2020.
- Don-Roberts Emenonye, " Application of Machine Learning to Multi-Antenna Transmission and Machine Type Resource Allocation," M.S. July 2020.
- Charlie Thornton, " Learning Schemes for Adaptive Spectrum Sharing Radar," M.S. May 2020.
- Mark Kozy, "Creation of a Cognitive Radar with Machine Learning: Simulation and Implementation," M.S., May 2019.
- Bryse Flowers, "Adversarial RFML: Evading Deep Learning Enabled Signal Classification," M.S., June 2019.
- Parker White, "Constrained Clustering for Frequency Hopping Spread Spectrum Signal Separation," M.S., August 2019.
- Ersin Selvi, " Cognitive Radar Applied To Target Tracking Using Markov Decision Processes," M.S. December 2017, *currently employed by Raytheon*.
- Ali Gaber Mohamed, "Navigating via Discrete Astronomical Radio Sources: Geolocation Using Fringe Rates," M.S. April 2017, *currently employed by Alexandria University*.
- Eric Sollenberger, "Iterative Leakage-Based Precoding for Multiuser-MIMO Systems," M.S., May, 2016, *currently employed by Qualcomm, Inc.*.
- Kevin McDermott, "On the Improvement of Positioning in LTE with Collaboration and Pressure Sensors," M.S., May, 2015, *currently employed by Northrup Grumman*
- Tori Jewell, "Use of GIS in Radio Frequency and Positioning Applications,", M.S. June 2014.
- Jacob Overfield, "The Impact of MIMO on Signal Localization," MS, May 2013, *currently employed by n-ask, inc.*
- Zachary Biskaduros, "Collaborative GPS," MS, June 2013, *currently employed by n-ask, inc.*
- Hunter DeJarnette, "Measuring Noise in the VHF Band and Its Effect On Low SNR Signal Detection," MS Thesis, September 26, 2012, *currently employed by Johns Hopkins Applied Physics Lab.*
- Benton Thompson, "Characterization and Improvement of the Collaborative and Non-Collaborative Position Location Problems," MS, August 2011, *currently employed by G3, Inc*.
- Corey Cooke, "Attenuation Field Estimation using Radio Tomography," MS, August 2011, *currently a Ph.D. student at Georgia Tech.*
- Harpreet Dhillon, "The Optimal Sum-Rate of Multi-Band MIMO Interference Channel," MS, July 2010, *currently an Assistant Professor at Virginia Tech.*

- Justin Kelly, "The Value of Collaboration in Dynamic Spectrum Access," MS, July 2009, *currently employed by the Department of Energy*.
- Matthew Roney, "Dual-Channel Direction Finding in Multipath Channels," M.S. candidate, *currently employed by DRS Signal Solutions*.
- Jesse Reed, "Approaches to Multiple-source Localization and Signal Classification," MS, May, 2009, *currently employed by Arinc, Inc.*
- Chang Li, "Non-contact Estimation of Respiration and Heartbeat Rate using Ultra Wideband," MS, August 20, 2008, *currently employed by Qualcomm, Inc.*
- Arjun Bhupathi Raju, "Characterization of Uplink Transmit Power and Talk-Time in WCDMA Networks", MS, July 15, 2008, *currently employed by Qualcomm, Inc.*
- Rajaraman Parameswaran – "Effects of user and spatial diversity on high data rate wireless systems," M.S., August 2005, *currently employed by Qualcomm Inc*.
- Nathan Harter, "Single Channel Direction Finding in Multipath Channels," M.S., April 2007, *currently employed by IO-Max*.
- John Keaveny – "The Implementation of Single-Channel Direction Finding," M.S., February 2005. *Currently employed by Boeing.*
- Brian Donlan, "Ultra-wideband Narrowband Interference Cancellation and Channel Modeling for Communications," M.S., January 2005, *currently employed by IOMAX USA.*
- Vivek Baradwaj, "Ultra-Wideband for Communications: Spatial Characteristics and Interference Suppression," M.S., April 2005. *Currently employed by Qualcomm, Inc.*
- Liu Yang, "On the Applicability of the Tap-delay Line Model to UWB Channel Modeling," M.S., August 2004, *currently employed by Microsoft.*
- Dan Hibbard, "The Impact of Bandwidth on Indoor Communication System Performance," M.S., May 2004. *Currently employed by Raytheon.*
- Nishant Kumar – "MAC and Physical Layer Design for Ultra-Wideband Communications," M.S., May 2004. *Currently employed by Staccato Communicaitons.*
- Samir Ginde – "A Game-theoretic Analysis of Link Adaptation in Cellular Radio Networks," M.S., May 2003. *Currently employed by Qualcomm, Inc.*
- Rahul Mahajan – "Cross Layer Optimization: System Design and Simulation Methodologies," M.S., December, 2003. *Currently employed by Qualcomm, Inc.*
- Aaron Orndorf, "Transceiver Design for Ultra Wideband Communications," M.S., completed May 2004.
- David McKinstry – "Channel Models and Receivers for Ultra Wideband Communications," M.S., May 2003. *Currently employed by Johns Hopkins Applied Physics Lab.*
- Venkatasubramanian Ramasamy – "MC-CDMA/OFDM and Adaptive Antennas," M.S., June 2002. *Currently employed by Apple.*
- Ray Chan – "Link Adaptation for Public Safety Wireless Information Networks," M.S., June 2003. *Currently employed by Northrup Grummond Corp.*
- Payal Jain – "Software Radio Implementation of Adjustable High Data Rate Receivers," M.S., November 2002. *Currently employed by Digital Receiver Technology, Germantown, MD.*

## Funded Research

1. Title: “Development of Machine Learning Methodologies for Radar Signal Classification,”
   Sponsor: Alion,
   Fudning: $118,000,
   Period of Performance: January 26, 2023 – December 31, 2024
   Percent: 100

2. Title: “Prototyping 5G-enabled Indoor Geolocation System for Fire Fighters using UAVs,”
   Sponsor: National Institutes of Standards and Technology (through George Mason University),
   Fudning: $849,994,
   Period of Performance: June 1, 2022 – May 31, 2025
   Percent: 34

3. Title:“ SWIFT: Electronically-Reconfigurable Surfaces for Improved Coexistence Between Radio Astronomy and Satellite Communications Systems,”
   Sponsor: National Science Foundation,
   Funding: $748,463,
   Period of Performance: September 1, 2021 - August 31, 2024.
   Percent: 50%.

4. Title:“ Collaborative Research: CNS Core: Medium: Localization in Millimeter Wave Cellular Networks: Fundamentals, Algorithms, and Measurement-inspired Simulator,”
   Sponsor: National Science Foundation,
   Funding: $635,000,
   Period of Performance October 2021 – September 2025.
   Percent: 33%.

5. Title:“ SWIFT: SMALL: Interference Canceling for Improved Coexistence for Passive and Active Radio Systems,”
   Sponsor: National Science Foundation,
   Funding: $499,999,
   Period of Performance January 2021– January 2024.
   Percent: 50%.

6. Title: “SCH:INT: Collaborative Research: Semi-Automated Rehabilitation in the Home,”
   Sponsor: National Science Foundation,
   Funding: $1.1M
   Period of Performance: August 2020 – July 2024,
   Percent: 10%

7. Title: “Vector Sensor Processing in the Presence of Multipath”
   Sponsor: Applied Signals Intelligence
   Funding: $170,000
   Period of Performance: April 2020 - April 2021.
   Percent: 90%

8. Title: “Machine Learning Approaches to Optimize Army Radar, Communication and EW Systems”
   Sponsor: Army Research Lab
   Funding: $975,000
   Period of Performance: May 11, 2020 - May 10, 2024.
   Percent: 100%

9. Title: “Vector Sensor Processing in the Presence of Interference”
   Sponsor: Applied Signals Intelligence
   Funding: $232,193

Period of Performance: December 20, 2018 - April 30, 2019.
Percent: 60%

10. Title: “Digital Beamforming and Interference Mitigation for MIMO Systems ”
Sponsor: GIRD Systems
Funding: $1,575,398
Period of Performance: October 17, 2018 - October 16, 2021.
Percent: 50%

11. Title: “Cognitive Radar for C-SCoRE: Enhancing Radar Functionality though Interference Analysis and Avoidance,”
Sponsor: Georgia Tech Research Institute (AFRL)
Funding: $285,000
Period of Performance: December 15, 2018 – May 30, 2022
Percent: 100%

12. Title: “Collaborative Learning for Harmonious Coexistence of Heterogeneous Wireless Networks”
Sponsor: Defense Advanced Research Projects Agency
Funding: $1,999,994
Period of Performance: January 1, 2017 - December 30, 2019.
Percent: 25%

13. Title: “MU-MIMO Channel Characterization”
Sponsor: GIRD Systems
Funding: $117,712
Period of Performance: April 1, 2017 - March 31, 2019.
Percent: 100%

14. Title: “Cognitive Radio Approaches to Optimize Army Radar Systems”
Sponsor: Army Research Lab
Funding: $250,000
Period of Performance: January 1, 2018 - December 30, 2020.
Percent: 100%

15. Title: “Cognitive Radio Approaches to Optimize Army Radar and Communication Systems”
Sponsor: Army Research Lab
Funding: $190,282
Period of Performance: January 1, 2017 - December 30, 2017.
Percent: 50%

16. Title: “Hyper-wideband Communications”
Sponsor: Defense Advanced Research Projects Agency
Funding: $182,451
Period of Performance: May 1, 2015 - April 30, 2016.
Percent: 50%

17. Title: “IUSE: Gamification of Wireless Communication Testbeds for Authentic STEM Learning”
Sponsor: National Science Foundation
Funding: $626,665
Period of Performance: Sept. 1, 2014 - Aug. 31, 2017.
Percent: 20%

18. Title: “Advanced Cognitive Radio Design using SDRs”
Sponsor: Lockheed Martin Advanced Technologies
Funding: $494,600
Period of Performance: April 1, 2014 – Sept. 30, 2015
Percent: 100%

19. Title: “SDR Technology Development Support”
    Sponsor: DoD
    Funding: $375,000
    Period of Performance: 5/1/14 – 4/30/14
    P.I.: J.H. Reed
    Percent: 30%

20. Title: “Improving Cellular Positioning through Collaboration”
    Sponsor: Polaris Wireless
    Funding: $82,813
    Period of Performance: 11/01/2013 - 10/31/2014
    Percent: 100%

21. Title: “Advanced Wireless Systems and Technologies”
    Sponsor: DoD
    Funding: $3,883,320
    Period of Performance: 07/01/2012 - 06/30/2014
    P.I. R.W. McGwier
    Percent: 10%

22. Title: “Cognitive Radio Development”
    Sponsor: Lockheed Martin – Advanced Technologies Lab
    Funding: $325,000
    Period of Performance: 7/1/2012 – 12/31/2013
    P.I. R.M. Buehrer
    Percent: 50%

23. Title: “Next Generation Secure, Scalable Communication Network for the Smart Grid”
    Sponsor: Oak Ridge National Labs
    Funding: $626,671
    Period of Performance: 1/1/2011-10/31/2012
    PI – R.M. Buehrer
    Co-PI: J.H. Reed
    Percent: 50%

24. Title: “Software Defined Radio Waveform and Device Development And Component Deployment Using Ossie”
    Sponsor – DoD (Maryland Procurement Office)
    PI – RM Buehrer
    Period of Performance: Aug. 1, 2010 – July 31, 2013
    Funding: $299,227
    Percent: 100%

25. Title: “SDR Technology Development Support”
    Sponsor – DoD (Maryland Procurement Office)
    PI – R.M. Buehrer and J.H. Reed
    Funding: $638,653
    Period of Performance: 9/30/2010 – 4/30/2014
    Percent: 75%

26. Title: “Signal Processing Research”
    Sponsor: Aerospace Corp.
    PI: T.C. Clancy
    Co-PI: R.M. Buehrer
    Period of Performance: 1/1/2011 – 10/31/2011
    Funding: $130k
    Percent: 50%

27. Title: "IHCS: Proactive Cross-Layer Adversary Localization for Hostile or Harsh Wireless Environments"
    Sponsor: National Sceince Foundation
    Funding: $494,788
    Period of Performance: 5/1/08 – 4/30/11
    PI: Y. Yang
    Co-PI's: R.M. Buehrer and J.M. Park
    Percent: 33%

28. Title: "A Fundamental Analysis of Spectrum Sharing"
    Sponsor: Qualcomm, Inc.
    Funding: $120,000
    Period of Performance: 5/1/08 – 4/30/10
    PI: Buehrer
    Co-PI's: Y. Yang
    Percent: 85%

29. Title: "Reasoning and Learning in Adaptive Wireless Networks"
    Sponsor: BBN/DARPA
    Funding: $605,000
    Period of Performance: 10/1/07 – 3/31/10
    PI: L. DaSilva
    Co-PI's: R.M. Buehrer, C. Bostian, A. MacKenzie, and J.H. Reed
    Percent: 25%

30. Title: DRS Graduate Fellowship
    Sponsor: DRS Signal Solutions
    Funding: $76,000
    Period of Performance: 9/01/07 – 8/30/09
    PI: R.M. Buehrer
    Percent: 100%

31. Title: U-PoLo Nets – Position Location in Harsh Environments
    Sponsor: National Science Foundation
    Funding: $175k
    Period of Performance: 8/1/05 – 7/30/08
    PI: R.M. Buehrer
    Percent: 100%

32. Title: NeTS ProWiN: An Open Systems Approach for Rapid Prototyping Waveforms for Software Defined Radio
    Sponsor: National Science Foundation
    Funding: $1M
    Period of Performance: 8/1/05 – 7/30/09
    PI: J.H. Reed (lead), R.M. Buehrer, and W.H. Tranter
    Percent: 33%

33. Title: Node and Network Benefits of Improved RF Characteristics in CDMA Cellular Networks
    Sponsor: ParkerVision
    Funding: $131,474
    Period of Performance: 11/1/07 – 10/31/08
    PI: R. M. Buehrer
    Percent: 100%

34. Title: UWB Propagation in Office Environments
    Sponsor: Freescale Semiconductor
    Funding: $35,000
    Period of Performance: 5/1/05 – 4/30/06

PI: R. M. Buehrer
Percent: 100%

35. Title: Networking Issues for Peer-to-Peer VoIP Link for Radio Interoperability, Fire Management and Security
Sponsor: Catalyst Communications
Funding: $67,500
Period of Performance: 1/1/05 – 5/15/05
PI: S.M. Midkiff (lead) and R.M. Buehrer
Percent: 33%

36. Title: AWINN: Advanced Wireless Networking for the Navy
Sponsor: ONR
Funding: $3M
Period of Performance: 12/20/04 – 6/19/06
PI: Warren Stutzman
Co-PI's: J.H. Reed, Scott Midkiff, R. M. Buehrer, W.H. Tranter, Peter Athanas, Tom Hou, Binoy Ravindran, Rick Habayeb
Percent: 10%

37. Title: Ultra Wideband Communications Systems
Sponsor: ASPIRES
Funding: $118,360
Period of Peformance: 7/1/03 – 6/30/04
PI: R. M. Buehrer
Percent: 100%

38. Title: UWB Communications
Sponsor: Motorola
Period of Performance: 12/15/03 – 12/14/04
Funding: $35,000
PI: Buehrer
Percentage: 100%

39. Title: Simulation of Ultra Wideband Communications
Sponsor: ITRI
Funding: $10,000
Period of Performance: 9/1/03 – 12/31/03
PI: R.M. Buehrer
Percent: 100%

40. Title: Receiver Design for Ultra Wideband Communications
Sponsor: ITRI
Funding: $15,000
Period of Performance: 9/1/03 – 12/31/03
PI: R.M. Buehrer
Percent: 100%

41. Title: Indoor Propagation
Sponsor: Qualcomm, Inc.
Funding: $14,000
Period of Performance: 12/1/03 – 5/15/04
PI: R.M. Buehrer
Percent: 100%

42. Title: Single Channel Direction Finding
Sponsor: DRS Technologies
Funding: $91,000

Period of Performance: 10/18/02 – 10/17/05
PI: R. M. Buehrer
Percent: 100%

43. Title: Flexible High Data Rate Transmission for Wireless Data Applications
Sponsor: BAE Systems
Funding: $29,000
Period of Performance: 10/18/01 – 10/17/02
PI: R. M. Buehrer
Percent: 100%

44. Title: UWB Propagation Measurements, Modeling, and Communication System Enhancements
Sponsor: Defense Advanced Research Projects Agency
Funding: $688,620
Period of Performance: 5/13/02-5/12/03
PI: R.M. Buehrer
Co-PI: A.S. Safaai-Jazi, W. Davis, D. Sweeney
Percentage: 35%

45. Title: Modeling and Simulation for the FCS Development Environment
Sponsor: Boeing
Funding: $127,022
Period of Performance: 5/1/02 - 4/1/03
PI: W. H. Tranter
Co-PI: R. M. Buehrer, A. Annamalai
Percentage: 33%

46. Title: The Benefits of Multiple Antennas at the Handset for Cellular CDMA
Sponsor: e-Tenna Corporation
Funding: $15,000
Period of Performance: 5/15/02 – 8/14/02
PI: R. M. Buehrer
Percent: 100%

47. Title: MPRG Affiliates Program
Sponsor: Analog Devices, ARO, Cingular, DRS Technologies, General Motors, General Dynamics, Huawei Technologies, Hughes, Lucent Technologies, Motorola, Qualcomm, Raytheon, Samsung, SW Bell, Texas Instruments, et. al.
Funding: $2M
Period of Performance: 8/25/01 – 5/15/11
PI: J.H. Reed
Co-PI's: R.M. Buehrer, W.H. Tranter, S.W. Ellingson, others
Percent: 20%

## Book Publications

S. Zekavat and R.M. Buehrer, editors, Position Location - Theory, Practice and Advances, Second Ed., Wiley-IEEE, 2019.

S. Zekavat and R.M. Buehrer, editors, Position Location - Theory, Practice and Advances, Wiley-IEEE, 2011.

J.H. Lee and R.M. Buehrer, "Security Issues in Position Location," Chapter 3 in Position Location - Theory, Practice and Advances, Wiley-IEEE, 2011.

R. M. Buehrer and S. Venkatesh, "Fundamentals of Time-of-Arrival-based Position Location," Chapter 6 in Position Location - Theory, Practice and Advances, Wiley-IEEE, 2011.

J.H. Lee and R.M. Buehrer, "Fundamentals of Received Signal Strength Based Position Location," Chapter 11 in Position Location - Theory, Practice and Advances, Wiley-IEEE, 2011.

T. Jia and R.M. Buehrer, "Collaborative Position Location," Chapter 23 in Position Location - Theory, Practice and Advances, Wiley-IEEE, 2011.

R.M. Buehrer, An Introduction to Code Division Multiple Access (CDMA), Morgan-Claypool Publishers, 2007.

R.A. Soni and R.M. Buehrer, "Multiple Antenna Techniques in 3G Wireless Systems," Chapter 25 in Space-Time Wireless Systems: From Array Processing to MIMO Communications, H. Bolecskei, D. Gesbert, C. Papadias, and A.J. vander Veen, editors, Cambridge University Press, 2005.

R.M. Buehrer, "Channel Modeling," Chapter 3 in An Introduction to Ultra Wideband Communication Systems, Jeff Reed, editor, pp. 73-158, Prentice-Hall, 2005.

A.F. Molisch, J. Kunisch, R. Qiu, D. Cassioli, M. Buehrer, M. Pendergrass, I.Z. Kvacs, G.F. Pedersen, P.C.F. Eggers, S. Roy and I. Ramachandran, "UWB Propagation Channels," Chapter 2 in UWB Communication Systems – A Comprehensive Overview, M.-G. Di Bendetto, T. Kaiser, A.F. Molisch, I. Oppermann, C. Politano, and D. Porcino, editors, pp.21-142, Hindawi Publishing Company, 2006.

M. Dohler, J. Liu, S. Venkatesh, R.M. Buehrer and B. Allen, "Large- and Medium-Scale Propagation Modelling," Chapter 14 in Ultra-wideband Antennas and Propagation for Communications, Radar and Imaging, B. Allen, et. al., editors, pp. 283-308, John Wiley and Sons, 2006.

S. Venkatesh, R.M. Buehrer, J. Liu, and M. Dohler, "Small-Scale Ultra-wideband Propagation Modelling," Chapter 15 in Ultra-wideband Antennas and Propagation for Communications, Radar and Imaging, B. Allen, et. al., editors, pp. 309-330, John Wiley and Sons, 2006.

R. Muhamed, R.M. Buehrer, A. Doradla, and T.S. Rappaport, "Mobile and Portable Radio Communications," Chapter 139 in The Engineering Handbook, Second Ed., R.C. Dorf, Editor, pp. 139-1 - 139-19, CRC Press, 2004.

T.S. Rappaport, R. Muhamed, M. Buehrer, and A. Doradla, "Mobile and Cellular Radio Systems," The Engineering Handbook, R. C. Dorf Editor, CRC Press, 1996.

R.M. Buehrer and B.D. Woerner, "Spread Spectrum for Wireless Communications," Wireless Personal Communications: Research Developments, B.D. Woerner, T.S. Rappaport, and J.H. Reed editors, Kluwer Academic Press, 1995.

H. Shaban, M. A. El-Nasr, and R. M. Buehrer, "A Full-Body Wireless Wearable UWB-Based Human Motion Capture and Gait Analysis System," Chapter 20 in E-Healthcare Systems and Wireless Communications: Current and Future Challenges, pp. 434-459, Prof. Mohamed K. Watfa, Editor.

## Journal Publications

S.W. Ellingson and R.M. Buehrer,"Coherent Time-Domain Canceling of Interference for Radio Astronomy," *Publications of the Astronomical Society of the Pacific*, to be published, 2022. doi:10.1088/1538-3873/ac9b92

W.W. Howard, A.F. Martone, and R.M. Buehrer, "Distributed Online Learning for Coexistance in Cognitive Radar Networks," *IEEE Transactions on Aerospace and Electronic Systems*, 2022, doi: 10.1109/TAES.2022.3198038.

J. Yu, P. Wang, T. Koike-Akino, Y. Wang, P. V. Orlik and R. M. Buehrer, "Multi-Band Wi-Fi Sensing with Matched Feature Granularity," *IEEE Internet of Things Journal*, vol. 9, no. 23, pp. 23810-23825, 2022, doi: 10.1109/JIOT.2022.3190826

M. O. Moore, R. M. Buehrer and W. C. Headley, "Decoupling RNN Training and Testing Observation Intervals for Spectrum Sensing Applications," *Sensors* 2022, 22(13), *Special Issue on Radio Frequency Machine Learning (RFML) Applications* 4706; doi: 10.3390/s22134706.

C.E. Thornton, R.M. Buehrer, H.S. Dhillon, and A.F. Martone, "Universal Learning Waveform Selection Strategies for Adaptive Target Tracking," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 58, no. 6, pp. 5798-5814, Dec. 2022. doi: 10.1109/TAES.2022.3181554

A. Sarker, D.R. Emenonye, A. Kelliher, T. Rikakis, R. M. Buehrer, A. Asbeck, "Capturing Upper Body Kinematics and Localization with Low-cost Sensors for Rehabilitation Applications,' Sensors 2022 , 22 , 2300. https://doi.org/10.3390/s22062300.

D.R. Emenonye, C. Dietrich, and R.M. Buehrer, "Differential Modulation in Massive MIMO With Low-Resolution ADCs," *IEEE Transactions on Wireless Communications,* vol. 21, No. 6, pp. 4482-4496, June 2022, DOI: 10.1109/TWC.2021.3130499

C. E. Thornton, R. M. Buehrer, and A. F. Martone, "Constrained Contextual Bandit Learning for Adaptive Radar Waveform Selection," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 58, no. 2, pp. 1133-1148, April 2022, Digital Object Identifier: 10.1109/TAES.2021.3109110.

L.J. Wong, W. H. Clark IV, B. Flowers, R. M. Buehrer, A. J. Michaels, and W. C. Headley, "An RFML Ecosystem: Considerations for the Application of Deep Learning to Spectrum Situational Awareness," *IEEE Open Journal of the Communications Society*, vol. 2, pp. 2243-2264, 2021, doi: 10.1109/OJCOMS.2021.3112939.

C.E. O'Lone, H.S. Dhillon, and R.M. Buehrer, "Characterizing the First-Arriving Multipath Component in 5G Millimeter Wave Networks: TOA, AOA, and Non-Line-of-Sight Bias", *IEEE Transactions on Wireless Communications*, vol. 21, no. 3, pp. 1602 - 1620, March 2022, Digital Object Identifier: 10.1109/TWC.2021.3105641.

A. F. Martone, J. A. Kovarskiy, C. E. Thornton, B. H. Kirk, J. W. Owen, B. Ravenscroft, A. Egbert, A. Goad, R. M. Buehrer, R. M. Narayanan, S. Blunt, C. Baylis, and K. D. Sherbondy, "Closing the Loop on Cognitive Radar for Spectrum Sharing", *IEEE Aerospace and Electronic Systems Magazine*, vol. 36, no. 9, pp. 44-55, September 2021, Digital Object Identifier: 10.1109/MAES.2021.3072698.

S. R. Zekavat, R. M. Buehrer, G. D. Durgin, L. Lovisolo, Z. Wang, S.T. Goh, and A. Ghasem, "An Overview of Position Location: Past, Present, Future," *International Journal of Wireless Information Networks*, vol. 28, pp. 45–76, March 2021, Digital Object Identifier: 10.1007/s10776-021-00504-z.

C.E. Thornton, M. Kozy, A. F. Martone, K. Sherbondy, and R.M. Buehrer, "Deep Reinforcement Learning Control for Radar Detection and Tracking in Congested Spectral Environments," *IEEE Transactions on Cognitive Communications and Networking*, Vol. 6, No. 4, pp. 1335-1349, December 2020, Digital Object Identifier: 10.1109/TCCN.2020.3019605.

E. Selvi, R.M. Buehrer, A. Martone, and K. Sherbondy, "Reinforcement Learning For Adaptable Bandwidth Tracking Radars," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 56, No. 5, pp. 3904-3921, October 2020. Digital Object Identifier: 10.1109/TAES.2020.2987443.

Y. Xu, J. Yu, and R.M. Buehrer, "The Application of Deep Reinforcement Learning to Distributed Spectrum Access in Dynamic Heterogeneous Environments with Partial Observations," *IEEE Transactions on Wireless Communications*, vol. 19, no. 7, pp. 4494-4506, July 2020.

R. Shahanaghi, R.M. Buehrer, and Y. Yang, "Stochastic Link Modeling of Static Wireless Sensor Networks Over the Ocean Surface," *IEEE Transactions on Wireless Communications*, vol. 19, no. 6, pp. 4154-4169, June 2020.

C.E. O'Lone, H. Dhillon, and R.M. Buehrer, "Single-Anchor Localizability in 5G Millimeter Wave Networks," *IEEE Wireless Communications Letters*, vol. 9, no. 1, pp. 65-69, January 2020.

B. Flowers, W.C.Headley, and R.M. Buehrer, "Evaluating Adversarial Evasion Attacks in the Context of Wireless Communications," *IEEE Transactions on Information Forensics and Security*, vol. 15, no. 1, pp. 1102-1113, January 2020.

S. Aditya, H. Dhillon, A.F. Molisch, R.M. Buehrer and H.M. Behairy, "Characterizing the Impact of SNR Heterogeneity on Time-of-Arrival-Based Localization Outage Probability," *IEEE Transactions on Wireless Communications*, vol. 18, no. 1, pp. 637-649,Jan. 2019.

C.E. O'Lone, H.S. Dhillon, and R.M. Buehrer, "A Statistical Characterization of Localization Performance in Wireless Networks," *IEEE Transactions on Wireless Communications*, vol. 17, no. 9, pp. 5841-5856, Sept. 2018.

R.M. Buehrer, H. Wymeersch, and R. Vaghefi, "Collaborative Sensor Network Localization: Algorithms and Practical Issues," *Proceedings of the IEEE*, vol. 106, no. 6, pp. 1089-1114, June 2018.

M. Z. Win, R. M. Buehrer, G. Chrisikos, A. Conti, and H. Vincent Poor, "Foundations and Trends in Localization Technologies – Part 1", *Proceedings of the IEEE*, vol. 106, no. 6, pp. 1019 – 1021, June 2018.

M. Z. Win, R. M. Buehrer, G. Chrisikos, A. Conti, and H. Vincent Poor, "Foundations and Trends in Localization Technologies – Part 2", *Proceedings of the IEEE*, vol. 106, no. 7, pp. 1132 - 1135, July 2018.

J.D. Poston, R.M. Buehrer and P.A. Tarazaga, "A Framework for Occupancy Tracking in a Building via Structural Dynamics Sensing of Footstep Vibrations," *Frontiers in Built Environment: Structural Sensing*, 06 November 2017.

J. Poston, P. Tarazaga, and R.M. Buehrer, " Indoor Footstep Localization from Structural Dynamics Instrumentation," *Mechanical Systems and Signal Processing*, vol. 88, pp. 224-239, May, 2017.

S. Amuru, H. Dhillon, and R.M. Buehrer, " On Jamming Against Wireless Networks, " *IEEE Transactions on Wireless Communications*, vol. 16, no. 1, pp. 412-428, January 2017.

D.J. Jakubisin and R.M. Buehrer, "Approximate Joint MAP Detection of Co-Channel Signals in Non-Gaussian Noise," *IEEE Transactions on Communications*, vol. 64, no. 10, pp. 4224-4237, October 2016.

R.M. Vaghefi and R.M. Buehrer, "Cooperative Source Node Tracking in Non-line-of-sight Environments," *IEEE Transactions on Mobile Computing*, vol. 16, no. 5, pp. 1287-1299, May 2017.

S. Garlapati, P.T. Kuruganti, R.M. Buehrer, and J.H. Reed, "SMAC : A Soft MAC to Reduce Control Overhead and Latency in CDMA based AMI Networks," *ACM/IEEE Transactions on Networking*, vol. 24, no. 5, 2648 - 2662, October, 2016.

S. Amuru, C. Tekin, M. van der Scharr, and R.M. Buehrer, "Jamming Bandits - A Novel Learning Method for Optimal Jamming," *IEEE Transactions on Wireless Communications*, vol. 15, no. 4, pp. 2792-2808, April 2016.

J. Schloemann, H. Dhillon, and R.M. Buehrer, "A Tractable Metric for Evaluating Base Station Geometries in Cellular Network Localization," *IEEE Wireless Communication Letters*, vol. 5, no. 2, pp. 140-143, February 2016.

J. Schloemann, H. Dhillon, and R.M. Buehrer, "A Tractable Analysis of the Improvement in Unique Localizability Through Collaboration," *IEEE Transactions on Wireless Communications*, vol. 15, no. 6, pp. 3934-3948, June 2016.

J. Schloemann, H. Dhillon, and R.M. Buehrer, "Towards a Tractable Analysis of Localization Fundamentals in Cellular Networks," *IEEE Transactions on Wireless Communications*, vol. .14, no. 3, pp. 1768-1782, March 2016.

J. Schloemann and R.M. Buehrer, "On the Value of Collaboration In Location Estimation," *IEEE Transactions on Vehicular Technology*, vol. 65, no. 5, pp. 3585-3596, May 2016.

M. Lichtman, S. Amuru, J. H. Reed, and R.M. Buehrer, "A Communications Jamming Taxonomy"," *IEEE Security & Privacy*, vol 14, no. 1, pp. 47-54, January 2016.

S. Amuru, M. van der Scharr, and R.M. Buehrer, "Blind Network Interdiction Strategies-A Learning Approach," *IEEE Transactions on Cognitive Communications and Networking*, vol. 1, no. 4, pp. 435-449, December 2015.

D.J. Jakubisin and R.M. Buehrer, "Performance, Complexity, and Receiver Design for Code-Aided Frame Synchro-

nization in Multipath Channels," *IEEE Transactions on Communications*, vol. 63, no. 9, pp. 3363-3376, September, 2015.

S. Amuru and R.M. Buehrer, "Optimal Jamming against Digital Modulation," *IEEE Transactions on Information Forensics and Security*, vol. 10, no. 10, pp. 2212-2224, October 2015.

R.M. Vaghefi and R.M. Buehrer, "Cooperative Localization in NLOS Environments Using Semidefinite Programming," *IEEE Communications Letters*, vol. 19, no. 8, pp. 1382 – 1385, August, 2015.

R.M. Vaghefi and R.M. Buehrer, "Cooperative Joint Synchronization and Localization in Wireless Sensor Networks," *IEEE Transactions on Signal Processing*, vol. 63, no. 14, pp. 3615 – 3627, July 15, 2015.

R. M. Buehrer, C. R. Anderson, R. K. Martin, N. Patwari, and M. G. Rabbat, "Introduction to the Special Issue on Non-Cooperative Localization Networks", *IEEE Journal on Selected Topics in Signal Processing*, vol. 8, no. 1, pp. 2-4, January 2014.

S. Amuru, R. Tandon, R.M. Buehrer, and T.C. Clancy, "Retroactive Anti-Jamming for MISO Broadcast Channels," *IEEE Transactions on Information Theory,* vol. 60, no. 6, pp. 3593-3619, June 2014.

C.R. Anderson, H.I. Volos, and R. M. Buehrer, "Characterization of Low Antenna Ultra Wideband Propagation in a Forest Environment," *IEEE Transactions on Vehicular Technologies*, vol. 62, no. 7, pp. 2878-2895, July 2013.

R. M. Vaghefi, M.R. Gholami, R.M. Buehrer, and E.G. Strom, "Cooperative Received Signal Strength-Based Sensor Localization with Unknown Transmit Powers", *IEEE Transactions on Signal Processing*, vol.61, no.6, pp.1389-1403, 2013.

M. Baidas, R.M. Buehrer, and A.B. MacKenzie, "Network-Coded Bi-Directional Relaying for Amplify-and-Forward Cooperative Networks: A Comparative Study," IEEE Transactions on Wireless Communications, vol. 12, no. 7, pp. 3238 – 3252, July 2013.

H. I. Volos and R.M. Buehrer, "Cognitive Radio Engine Training," *IEEE Transactions on Wireless Communications*, vol. 11, no. 11, pp. 3878-3889, November, 2012.

C.R. Anderson, D. Hibbard, and R. M. Buehrer, "The Impact of Bandwidth on the Performance of DSSS Signals in Indoor Office Environments," *IEEE Transactions on Wireless Communications,* vol. 10, no. 9, pp. 2792-2799.

H.S. Dhillon, J.-O. Jeong, D. Datla, M. Benonis, R.M. Buehrer, and J.H. Reed, "A Sub-Space Method to Detect Multiple Wireless Microphone Signals in TV Band White Space," *accepted for publication in Analog Integrated Circuits and Signal Processing*, July, 2011.

J.H. Lee and R.M. Buehrer, "Characterization and Detection of Location Spoofing Attacks," *Journal of Communications and Networks*, vol. 14, no. 4, pp. 396-409, August, 2012.

J.H. Lee, A. Bhupathi Raju, and R.M. Buehrer, "Characterization of WCDMA Uplink Transmit Power for Mobile Usage Patterns," *IET Proceedings on Microwaves, Antennas and Propagation*, vol. 5, no. 5, pp. 535 – 544, May 2011.

T. Jia and R.M. Buehrer, "A Set-Theoretic Approach to Collaborative Position Location for Wireless Networks," *IEEE Transactions on Mobile Computing, vol. 10, no. 9, pp. 1264-1275, September, 2011.*

H. I. Volos and R.M. Buehrer, "Cognitive Engine Design for Link Adaptation: An Application to Multi-Antenna Systems," *IEEE Transactions on Wireless Communications*, vol. 9, no. 9, pp. 2902 – 2913, September 2010.

H. Shaban, M. A. El-Nasr, and R.M. Buehrer, "Towards a Highly Accurate Ambulatory System for Clinical Gait," *IEEE Transactions on Information Technology in Biomedicine,* vol. 14, no. 2, pp. 284 – 291, March 2010.

T. Jia and R.M. Buehrer, "On the Optimal Performance of Collaborative Position Location," *IEEE Transactions on Wireless Communications*, vol. 9, no. 1, pp. 374-383, January 2010.

S. Venkatesh, D.R. McKinstry, J.Ibrahim, and R.M. Buehrer "A Spatio-Temporal Channel Model for Ultra-Wideband Indoor NLOS Communications," *IEEE Transactions on Communications*, vol. 57, no. 12, pp. 3552-3555, December 2009.

R. Menon, A.B. MacKenzie, R.M. Buehrer and J.H. Reed, "Interference Avoidance in Networks with Distributed Receivers," *IEEE Transactions on Communications*, vol. 57, no. 10, pp. 3078-3091, October 2009.

C. R. Anderson, S. Venkatesh, J.Ibrahim and R.M. Buehrer, "Analysis and Implementation of a Time-Interleaved ADC Array for a Software-Defined UWB Receiver," *IEEE Transactions on Vehicular Technology,* vol. 58, no. 8, pp. 4046-4063, October 2009.

R. Menon, A.B. MacKenzie, J. Hicks, R.M. Buehrer, and J.H. Reed, "A Game-Theoretic Framework for Interference Avoidance," *IEEE Transactions on Communications,* vol. 57, no. 4, pp. 1087-1098, April 2009.

A.B. MacKenzie, J.H. Reed, P. Athanas, C.W. Bostian, R.M. Buehrer, L.A. DaSilva, S.W. Ellingson, Y. T. Hou, M. Hsiao, J.-M. Park, C. Patterson, S. Raman, and C.R.C. M. da Silva, "Cognitive Radio and Networking Research at Virginia Tech," *Proceedings of the IEEE*, vol. 97, no. 4, pp. 660-688, April 2009.

M. Muhamad and R.M. Buehrer, "The Effects of Ordering Criteria in Linear Successive Interference Cancellation in CDMA Systems," *IEEE Transactions on Wireless Communications*," vol. 7, no. 11, pp. 4128-4132, November 2008.

R. Menon, R.M. Buehrer, and J.H. Reed, "On the Impact of Dynamic Spectrum Sharing Techniques on Legacy Radio Systems," *IEEE Transactions on Wireless Communications,* vol. 7, no. 11, pp. 4198-4207, November 2008.

**Invited Paper** - N. Kumar and R. M. Buehrer, "The Ultra Wideband WiMedia Standard," *IEEE Signal Processing Magazine*, vol. 25, no. 5, pp. 115-119, September 2008.

S. Ginde, A. MacKenzie, R.M. Buehrer, and R. Komali, "A Game-Theoretic Analysis of Link Adaptation in Cellular Radio Networks," *IEEE Transactions on Vehicular Technology, ,* vol. 57, no. 5, pp. 3108 - 3120, September 2008.

H. Kim and R.M. Buehrer, "A Technique to Exploit Cooperation for Packet Retransmission in Wireless Ad Hoc Networks," *IEEE/KICS Journal of Communications and Networks (JCN)*, *special issue on Cooperative Communications*, vol. 10, no. 2, pp. 148-155, June 2008.

S. Venkatesh and R.M. Buehrer, "NLOS Mitigation Using Linear Programming in Ultrawideband Location-Aware Networks," *IEEE Transactions on Vehicular Technology*, vol.56, no. 5, pp. 3182-3198, September 2007.

J.Ibrahim and R.M. Buehrer, "NBI Mitigation for UWB Systems Using Multiple Antenna Selection Diversity," *IEEE Transactions on Vehicular Technology*, vol. 56, no. 4, pp. 2363-2374, July 2007.

S. Venkatesh and R.M. Buehrer, Non-line-of-sight identification in ultra-wideband systems based on received signal statistics, *IET Microwaves, Antennas and Propagation,* vol. 1, no. 6, pp. 1120-1130, Nov. 2007.

**Invited Paper -** S. Venkatesh and R.M. Buehrer, "Multiple-access insights from bounds on sensor localization," *Pervasive and Mobile Computing* (2007), doi:10.1016/j.pmcj.2007.09.003.

B.M. Donlan, D.R. McKinstry, and R.M. Buehrer, "The UWB Indoor Channel: Large and Small Scale Modeling," *IEEE Transactions on Wireless Communications*, vol. 5, no. 10, pp. 2863- 2873, October 2006.

J. Jiang, R.M. Buehrer, and W.H. Tranter, "Greedy Scheduling Performance for a Zero-Forcing Dirty-Paper Coded System," *IEEE Transactions on Communication*, vol. 54, no. 5, pp. 789-792, May 2006.

R. Menon, J. Ibrahim, and R.M. Buehrer, "UWB Signal Detection Based on Sequence Optimization for Dense Multipath Channels," *IEEE Communications Letters,* vol. 10, no. 4, pp. 228-230*,* April 2006.

J.Ibrahim and R.M. Buehrer, "Two-Stage Acquisition for UWB in Dense Multipath," *IEEE Journal on Selected Areas in Communications*, vol. 24, no. 4, pp. 801-807, April 2006.

V. Bharadwaj and R.M. Buehrer, "An interference suppression scheme for UWB signals using multiple receive antennas," *IEEE Communications Letters*, vol. 9, no. 6, pp. 529-531, June 2005.

M. Muhamed and R.M. Buehrer, "On the Impact of SNR Estimation Error on Adaptive Modulation," *IEEE Communications Letters*, vol. 9, no. 6, pp. 490-492, June 2005.

R.M. Buehrer, R.A. Soni, and R.D. Benning, "Transmit Diversity for Combined 2G and 3G Systems," *IEEE Transactions on Communications*, vol. 52, no. 10, pp. 1648-1653, October 2004.

R.A. Soni and R.M. Buehrer, "On the Performance of Open Loop Transmit Diversity Methods for IS-2000 Systems: A Comparative Study," *IEEE Transactions on Wireless Communications,* vol. 3, no. 5, pp. 1602-1615, September 2004.

J.A. Tsai, R.M. Buehrer, and B.D. Woerner, "The BER Performance of the Uniform Cicular Array Versus the Uniform Linear Array in a Mobile Radio Environment," *IEEE Transactions on Wireless Communications* vol. 3, no. 3, pp. 695-700, May 2004.

J. Jiang, R.M. Buehrer, and W.H. Tranter, "Antenna Diversity in Multiuser Data Networks," *IEEE Transactions on Communications,"* vol. 52, no. 3, pp. 490-497, March 2004.

R.M. Buehrer and R. Mahajan, "On the Usefulness of Outer-loop Power Control for Successive Interference Cancellation," *IEEE Transactions on Communications*, vol. 51, no. 12, pp. 2091-2102, December 2003.

R. Gozali, R.M. Buehrer, and B.D. Woerner, "The Impact of Multiuser Diversity on Space-Time Block Coding," *IEEE Communications Letters*, vol. 7, no. 5, pp. 213-215, May 2003.

R.A. Soni, R.M. Buehrer, and R.D. Benning, "An Intelligent Antenna System for *CDMA2000*," *IEEE Signal Processing Magazine*, vol. 19, no. 4, pp 54-67, July 2002.

T.S. Rappaport, A. Annamalai, R.M. Buehrer and W.H. Tranter, "Wireless Communications: Past Events and a Future Prospective," *IEEE Communications Magazine,* vol. 40, 50th Anniversary, pp. 148-161, May 2002.

J.A. Tsai, R.M. Buehrer, and B.D. Woerner, "Spatial Fading Correlation Function of Circular Antenna Arrays with Laplacian Energy Distribution," *IEEE Communication Letters*, vol. 6, no. 5, pp. 178-180, May 2002.

R.M. Buehrer, "Equal BER Performance in Linear Successive Interference Cancellation for CDMA Systems," *IEEE Transactions on Communications*, vol. 49, no. 7, pp. 1250-1258, July 2001.

R.M. Buehrer, N.S. Correal, and B.D. Woerner, "A Simulation Comparison of Multiuser Receivers for Cellular CDMA," *IEEE Transactions on Vehicular Technology*, vol. 49, no. 4, pp. 1065-1085, July 2000.

R.M. Buehrer, A.G. Kogiantis, S.-C. Liu, J.-A. Tsai, and D. Uptegrove, "Intelligent Antennas for Wireless Communications – Uplink," *Bell Labs Technical Journal*, vol. 4, no. 3, pp. 73-103, July-September 1999.

R.M. Buehrer, S.P. Nicoloso, and S. Gollamudi, "Linear Versus Non-linear Interference Cancellation," *IEEE/AIEI Journal on Communications Networks*, vol. 1, no. 2, pp. 118-133, June 1999.

R.M. Buehrer and S.P. Nicoloso, "Comments on Partial Parallel Interference Cancellation for CDMA," *IEEE Transactions on Communications*, vol. 47, no. 5, pp. 658-661, May 1999.

N. Correal, R.M. Buehrer, and B.D. Woerner, "A DSP Based DS-CDMA Multiuser Receiver Based on Partial Parallel Interference Cancellation," *IEEE Journal on Selected Areas in Communications,* vol. 17, no. 4, pp. 613-630, April 1999.

A. Park, R.M. Buehrer, and B.D. Woerner, "Throughput Performance of an FHMA System with Variable Rate Coding," *IEEE Transactions on Communications*," vol. 46, no. 4, pp. 521-532, April 1998.

R.M. Buehrer and B.D. Woerner, "Analysis of Adaptive Multistage Interference Cancellation for CDMA Using an Improved Gaussian Approximation," *IEEE Transactions on Communications*, vol. 44, no. 10, pp. 1308-1321, October 1996.

R.M. Buehrer and B.D. Woerner, "Analysis of DS-CDMA Parallel Interference Cancellation with Phase and Timing Errors," *IEEE Journal on Selected Areas in Communications*, vol. 14, no. 8, pp. 1522-1535, October 1996.

## Conference Publications

D.-R. Emenonye, H.S. Dhillon, and R.M. Buehrer, "Limitations of RIS-Aided Localization: Inspecting the Relationships between Channel Parameters," accepted for presentation at the *IEEE 2023 International Conference on Communications (ICC'23) SynComm6G Workshop*, June 2023, Rome, Italy.

S.V. Hum, S.W. Ellingson, and R.M. Buehrer, "Toward Electronically Reconfigurable Rims for Reflectors in Radio Astronomy," accepted for presentation at *URSI General Assembly and Scientific Symposium 2023*.

S.V. Hum, S.W. Ellingson, and R.M. Buehrer,"Reflectarray Concept for Interference Mitigation in Radio Astronomy," accepted for presentation at *2023 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting*, 23-28 July, 2023, Portland, OR.

W.H. Howard and R.M. Buehrer, "Timely Target Tracking in Cognitive Radar Networks," accepted for presentation at *2023 IEEE Radar Conference*, San Antonio, Texas, May 1-5, 2023.

C.E. Thornton and R.M. Buehrer, "When Is Cognitive Radar Beneficial?" accepted for presentation at *2023 IEEE Radar Conference*, San Antonio, Texas, May 1-5, 2023.

D.-R. Emenonye, H.S. Dhillon, and R.M. Buehrer, "Estimation of RIS Misorientation in both Near and Far Field Regimes," accepted for presentation at *IEEE 2023 IEEE International Conference on Communications (ICC'23)*, 28 May – 01 June 2023, Rome, Italy.

G. Duggal, R.M. Buehrer, J. Reed, and N. Tripathi, "Line-of-Sight Probability for Outdoor-to-Indoor UAV-Assisted Emergency Networks," accepted for presentation at *IEEE 2023 IEEE International Conference on Communications (ICC'23)*, 28 May – 01 June 2023, Rome, Italy.

R.M. Buehrer and S.W. Ellingson, "Weight Selection for Pattern Control of Paraboloidal Reflector Antennas with Reconfigurable Rim Scattering," *Proceedings of the 2023 IEEE Aerospace Conference*, March 5-9, 2023, Big Sky, Montana.

S.W. Ellingson and R.M. Buehrer, "Techniques for Observing through Satellite Interference," *2023 USNC-URSI National Radio Science Meeting (NRSM)*, accepted for presentation. Boulder, CO, January 10-14, 2023,

S. Shebert, M.G. Amin, B.H. Kirk, and R.M. Buehrer, "Multi-Signal Classification Using Deep Learning and Sparse Arrays," *2022 IEEE Military Communications Conference (MILCOM '22)*, Rockville, MD, November 2022.

C.E. Thornton and R.M. Buehrer, "Linear Jamming Bandits: Sample-Efficient Learning for Non-Coherent Digital Jamming," *2022 IEEE Military Communications Conference (MILCOM '22)*, Rockville, MD, November 2022.

W.H. Howard and R.M. Buehrer, "Decentralized Bandits With Feedback for Cognitive Radar Networks," *2022 IEEE Military Communications Conference (MILCOM '22)*, Rockville, MD, November 2022.

R.M. Buehrer & S.W. Ellingson, "Pattern Control for Reflector Antennas Using Electronically-Reconfigurable Rim Scattering", *2022 IEEE Ant. & Prop. Sym.*, July 2022. (DOI pending)

W.H. Howard , A.F. Martone, and R.M. Buehrer, "Adversarial Multi-Player Bandits for Cognitive Radar Networks",

*2022 IEEE Radar Conference*, New York, NY, March 21-25, 2022.

C.E. Thornton, R.M. Buehrer, and A.F. Martone, "Online Meta-Learning for Scene-Diverse Waveform-Agile Radar Target Tracking," *2022 IEEE Radar Conference*, New York, NY, March 21-25, 2022.

B. K. Chalise, D. Wong, M. G. Amin, R. M. Buehrer, A. Martone, B. Kirk, K. Sherbondy, "Sparsity-Based Distributed DoA Estimation for Radar Networks", *2022 IEEE Radar Conference*, New York, NY, March 21-25, 2022.

S. R. Shebert, A. F. Martone and R. M. Buehrer, "Wireless Standard Classification Using Convolutional Neural Networks," *2021 IEEE Global Communications Conference (GLOBECOM)*, 2021, pp. 1-6, doi: 10.1109/GLOBECOM46510.2021.9685799.

C.T. Fredieu, R.M. Buehrer and A. F. Martone, "Open-set Classification of Common Waveforms Using A Deep Feedforward Network and Binary Isolation Forest Models," *accepted for presentation at the 2022 IEEE Wireless Communications and Networking Conference (WCNC 2022)*, December 2021.

W.H. Howard and R.M. Buehrer, "Multi-Target Localization Using Polarization Sensitive Arrays," *2021 IEEE Military Communications Conference (MILCOM2021)*, October 2, 2021.

C.E. Thornton, R.M. Buehrer, and A.F. Martone, "Waveform Selection for Radar Tracking in Target Channels With Memory via Universal Learning," *2021 IEEE Military Communications Conference (MILCOM2021)*, October 2, 2021. **(Received Vanu Bose Best Paper Award)**

S. Shebert, A.F. Martone, and R.M. Buehrer, "Open Set Wireless Standard Classification Using Convolutional Neural Networks," *2021 IEEE Military Communications Conference (MILCOM2021)*, October 2, 2021.

J. Yu, Y. Xu, H. Saad, and R.M. Buehrer, "Predicting Bit Error Rate from Meta Information Using Random Forests and Partial Data Augmentation," *SoutheastCon 2021*, Feb. 2021.

J. Yu, W. Howard, D. Tait, and R.M. Buehrer, "Direction-of-Arrival Estimation With A Vector Sensor Using Deep Neural Networks," *2021 IEEE Spring Vehicular Technology Conference*, Spring, 2021.

C.E. Thornton, R.M. Buehrer and A.F. Martone, "Constrained Online Learning to Mitigate Distortion Effects in Pulse-Agile Cognitive Radar", *2021 IEEE Radar Conference*, May 10-14, 2021.

W.H. Howard, C.E. Thornton, R.M. Buehrer and A.F. Martone, "Multi-Player Bandits for Distributed Cognitive Radar", *the 2021 IEEE Radar Conference*, May 10-14, 2021.

M. Moore, W.H. Clark IV, R.M. Buehrer, and W.C. Headley, "When is Enough Enough? "Just Enough" Decision Making with Recurrent Neural Networks for Radio Frequency Machine Learning," *39th IEEE – International Performance Computing and Communications Conference (IPCCC 2020)*, November 6th - 8th 2020.

C.E. Thornton, R.M. Buehrer and A.F. Martone, "Efficient Online Learning for Cognitive Radar-Cellular Coexistence via Contextual Thompson Sampling," *IEEE 2020 Global Communications Conference, GlobeCom2020*, Taipei, Taiwan, 7-11 December 2020.

J. Yu, M. S. Alhassoun, and R.M. Buehrer, "Interference Classification Using Deep Neural Networks," *IEEE Vehicular Technology Conference – Fall*, Victoria, British Columbia, July 2020.

A. Martone, K. Sherbondy, J. Kovarskiy, B. Kirk, J. Owen, B. Ravenscroft, A. Egbert, A. Dockendorf, A. Goad, C.E. Thornton, S. Blunt, R.M. Buehrer, C. Baylis, and R.M. Narayanan, "Practical Aspects of Cognitive Radar', *IEEE RadarConf2020*, June 2020.

D. Tait, J. Yu, W. Howard, and R.M. Buehrer, "Direction of Arrival Estimation of Digital Sources With Uni-Vector-Sensor ESPRIT," *Proceedings of The 21st IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC 2020)*, Atlanta, GA, USA, May 26-29, 2020.

A. Shahanaghi, Y. Yang, and R. M. Buehrer, "Link Stability Analysis of Wireless Sensor Networks Over the Ocean Surface," *Proceedings of the 17th Annual IEEE International Conference on Sensing, Communication and Networking (IEEE SECON 2020)*, June 22-25, 2020, Como, Italy.

J. Yu, H. Saad, and R. M. Buehrer, "Indoor Localization from Channel State Information with Recurrent Neural Networks," *Proceedings of NAVIGATIONPORTLANDIEEE/ION Position Location and Navigation Symposium (PLANS),* Portland, OR, April 20–23, 2020.

C.E. Thornton, R.M. Buehrer and A.F. Martone, "Experimental Analysis of Reinforcement Learning Techniques for Spectrum Sharing Radar", *Proceedings of 2020 IEEE International Radar Conference (RADAR2020)*, Washington D.C., April 27 - May 1, 2020.

A. F. Martone, K. D. Sherbondy, J. A. Kovarskiy, B. H. Kirk, C. E. Thornton, J. W. Owen, B. Ravenscroft, A. Egbert, A. Goad, A. Dockendorf, R. M. Buehrer, R. M. Narayanan, S. D. Blunt, and C. Baylis, "Metacognition for Radar Coexistence," *Proceedings of 2020 IEEE International Radar Conference (RADAR2020)*, Washington D.C., April 27 - May 1, 2020.

C.E. O'Lone, H.S. Dillon, and R.M. Buehrer, ""A Mathematical Justification for Exponentially Distributed NLOS Bias", *Proceedings of the IEEE Global Communications Conference (GLOBECOM 2019)*, Waikoloa, Hawaii, December 9 – 13, 2019.

A. Shahanaghi, Y. Yang, and R. M. Buehrer, "On the Stochastic Link Modeling of Static Wireless Sensor Networks in Ocean Environments," *IEEE Conference on Computer Communications (IEEE INFOCOM 2019)*, Paris, France, April 29 - May 2, 2019.

M. Kozy, J. Yu, R. M. Buehrer, A. Martone, and K. Sherbondy, "Applying Deep-Q Networks to Target Tracking to Improve Cognitive Radar," *Proceedings of 2019 IEEE Radar Conference*, Boston, MA, April 22-26, 2019.

B. Kirk, M. Kozy, K. Gallagher, R. Narayanan, R. Buehrer, A. Martone, K. Sherbondy, "Cognitive Software Defined Radar: Evaluation of Target Detection with RFI Avoidance", *Proceedings of 2019 IEEE Radar Conference*, Boston, MA, April 22-26, 2019. [FINALIST FOR BEST STUDENT PAPER]

J. A. Kovarskiy, M. Kozy, C. Thornton, A. F. Martone, R. M. Narayanan, R. M. Buehrer, and K. D. Sherbondy Comparing stochastic and Markov decision process approaches for predicting radio frequency interference, *Proc. SPIE Conference on Commercial and Defense Sensing*, April 14-18, 2019, doi: 10.1117/12.2519675.

Y. Xu, J. Yu, and R.M. Buehrer, "Dealing with Partial Observations in Dynamic Spectrum Access: Deep Recurrent Q-Networks," *IEEE 2018 Military Communications Conference (MILCOM'18)*, Los Angeles, CA, October 29 - 31, 2018.

Y. Xu, J. Yu, W.C. Headley, and R.M. Buehrer, "Deep Reinforcement Learning for Dynamic Spectrum Access in Wireless Networks," *IEEE 2018 Military Communications Conference (MILCOM'18)*, Los Angeles, CA, October 29 - 31, 2018.

S. Dhiraj and R.M. Buehrer, "On Jammer Power Allocation Against OFDM Signals in Fading Channels," IEEE 2018 Military Communications Conference (MILCOM'18), Los Angeles, CA, October 29 - 31, 2018.

M. Abdelbar and R.M. Buehrer, "Pedestrian GraphSLAM using Smartphone-based PDR in Indoor Environments," accepted for publication/presentation in IEEE ICC 2018 Workshop - 6th IEEE Workshop on Advances in Network Localization and Navigation (ANLN), Kansas City, MO, May 24, 2018.

E. Selvi, A. Martone, K. Sherbondy, R.M. Buehrer, "On the Use of Markov Decision Processes in Cognitive Radar: an Application to Target Tracking," *2018 IEEE Radar Conference*, Oklahoma City, USA, April 23-27, 2018.

M. Abdelbar and R. M. Buehrer, "Indoor Localization Through Trajectory Tracking Using Neural Networks," *Proceedings of the 2017 IEEE Military Communications Conference (MILCOM'17)*, Oct. 23-25, 2017, Baltimore, MD.

C.B. Dietrich, R. Goff, N. Polys, V. Marojevic, R. M. Buehrer, X. Gomez, S. Kim, A. Gaber Mohamed Ali and J. Garcia-Sheridan, "Remote laboratory exercises and tutorials for spectrum-agile radio frequency systems)," *Proceedings of 2017 IEEE Frontiers in Education Conference (FIE)*, Oct. 18-21, 2017, Indianapolis, IN.

J. A. García-Sheridan, R. M. Goff, C.B Dietrich, V. Marojevic, N.F Polys, and R. M. Buehrer, "A Pretest-Posttest Quasi-Experimental Study for a Game Intervention in an Undergraduate Wireless Communications Course," *2017 ASEE Annual Conference & Exposition*, June 25 - 28, 2017, Columbus, OH.

V. Marojevic, R. M. Goff, C. B Dietrich, T.Yang, C. W. Hearn, N. F Polys, and R.M.Buehrer, "Wireless Communication Testbed and Tools for Authentic STEM Learning," Innovations in Communications and Wireless Systems Education Collection, *2015 ASEE Annual Conference & Exposition"*, June 14 – 17, 2015, Seattle, WA.

C.E. O'Lone and R.M. Buehrer, "Towards a Characterization of Localization Performance in Networks with Random Geometries," *IEEE ICC Workshop on Advances in Network Localization and Navigation (ANLN)*, May 25, 2017, Paris, France.

S. Amuru, M. van der Schaar, and R.M. Buehrer, "Bandit Strategies for Blindly Attacking Networks," *Proceedings of the 2017 IEEE International Conference on Communications (ICC'17)*, May 21-25, 2017, Paris, France.

A. A, Gaber, H. Tillman, R.M. Buehrer, and S.W. Ellingson, "Sensitivity Analysis of Localization Using Discrete Astronomical Radio Sources," *Proceedings of the 2017 IEEE Wireless Communications and Networking Conference*, March 2017, San Francisco, CA.

S.W. Ellingson and R.M. Buehrer, "Frequency Channel Delay Modulation for Interference-Robust Low Data Rate Communication," *Proceedings of 2016 IEEE Military Communications Conference*, November 1-3 2016, Baltimore, MD.

T. Bhandari, H. Dhillon, and R.M. Buehrer, "The Impact of Proximate Base Station Measurements on Localizability in Cellular Systems," *Proceedings of 2016 IEEE 17th International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, July 3-6, 2016 in Edinburgh, UK.

D.J. Jakubisin and R.M. Buehrer, "BP, MF, and EP for Joint Channel Estimation and Detection of MIMO-OFDM Signals," *Proceedings of the 2016 IEEE Global Communications Conference (GLOBECOM'16)*, December 5-7, 2016.

M. Abdelbar and R.M. Buehrer, "A Novel Approach for Indoor Localization Through Motion Trajectories Similarities in Smart Buildings," in *Proceedings of IEEE/ION PLANS 2016 Conference*, Savannah, Georgia, April 11-14, 2016.

A. A. Gaber, H. Tillman, R.M. Buehrer, and S.W. Ellingson, "Navigating via Celestial Bodies: Geolocalization Using Fringe Rates," in *Proceedings of IEEE/ION PLANS 2016 Conference*, Savannah, Georgia, April 11-14, 2016.

C. E. O'Lone and R.M. Buehrer, "An Analysis of the Convex Hull's Impact on Localization Performance," in *Proceedings of IEEE/ION PLANS 2016 Conference*, Savannah, Georgia, April 11-14, 2016.

J. Poston, R.M. Buehrer, A. G. Woolard, and P.A. Tarazaga, "Indoor Positioning from Vibration Localization in Smart Buildings," in *Proceedings of IEEE/ION PLANS 2016 Conference*, Savannah, Georgia, April 11-14, 2016.

R. M. Vaghefi, D. Jakubisin, and R.M. Buehrer, "MIMO-Radar-Based Indoor Passive Localization and Tracking," *Proceedings of IEEE/ION PLANS 2016 Conference*, Savannah, Georgia, April 11-14, 2016.

R. M. Vaghefi and R.M. Buehrer, "On the CRLB of TDOA/FDOA Estimation from MIMO Signals," in *Proceedings of IEEE/ION PLANS 2016 Conference*, Savannah, Georgia, April 11-14, 2016.

S. Amuru, H. Dhillon and R.M. Buehrer, "An Error Probability Analysis of Jamming Against Wireless Networks," in the *Proceedings of IEEE International Conference on Communications (ICC'16)*, June 2016.

N. El Gamel, J. Schloemann, F. Jondral, and R.M. Buehrer, "Improved Indoor Positioning Using the Baum-Welch Algorithm," in Proceedings of the 2015 IEEE Global Communications Conference Workshop on Localization and

Tracking: Indoors, Outdoors and Emerging Networks (GC - LION '15), San Diego, CA, December 6, 2015.

J. Schloemann, H. Dhillon, and R.M. Buehrer, "Effect of Collaboration on Localizability in Range-Based Localization Systems," in *Proceedings of the 2015 IEEE Global Communications Conference Workshop on Localization and Tracking: Indoors, Outdoors and Emerging Networks (GC - LION '15)*, San Diego, CA, December 6, 2015.

K. McDermott, R. M. Vaghefi, and R.M. Buehrer, "Cooperative UTDOA Positioning in LTE Cellular Systems," in *Proceedings of the 2015 IEEE Global Communications Conference Workshop on Localization and Tracking: Indoors, Outdoors and Emerging Networks (GC - LION '15)*, San Diego, CA, December 6, 2015.

D.J. Jakubisin and R.M. Buehrer, "Approximate Joint MAP Detection of Co-Channel Signals," in *Proceedings of the 2015 IEEE Military Communications Conference (MILCOM'15)*, Tampa, FL, October 26-28, 2015.

S. Amuru and R.M. Buehrer, "To Send or Not to Send - Learning MAC Contention," in *Proceedings of the 2015 IEEE Global Communications Conference (GLOBECOM '15)*, San Diego, CA, December 6-10, 2015.

J.D. Poston, J. Schloemann, R.M. Buehrer, V.V. N. S. Malladi, A. Woolard, P. Tarazaga, "Vibration Sensing in Smart Buildings for Indoor Positioning of Pedestrians," in *Proceedings of the 2015 Indoor Positioning and Indoor Navigation Conference*, Oct. 13-16,2015, Banff, Alberta, Canada.

J. D. Poston, J. Schloemann, R. M. Buehrer, V. S. Malladi, A. G. Woolard, and P. A. Tarazaga, "Towards Indoor Localization of Pedestrians via Smart Building Vibration Sensing," in *Proceedings of the International Conference on Localization and GNSS*, June 22-24, 2015, Goethenburg, Sweden.

S. Yousefi, R.M. Vaghefi, X.-W Chang, B. Champagne, and R.M. Buehrer, "Sensor Localization in NLOS Environments with Anchor Uncertainty and Unknown Clock Parameters," *in Proceedings of the 2015 ICC Workshop on Advances in Network Localization and Navigation*, June 8-12, 2015.

J. Schloemann, H.S. Dhillon, and R.M. Buehrer, "Localization Performance in Cellular Networks," *in Proceedings of the 2015 ICC Workshop on Advances in Network Localization and Navigation*, June 8-12, 2015.

S. Amuru and R.M. Buehrer "A Systematic Learning Method for Optimal Jamming ", *to appear in Proceedings of the 2015 IEEE International Conference on Communications (ICC'15)*, June 8-12, 2015.

R.M. Vaghefi and R.M. Buehrer, "Improving Mobile Node Tracking Performance in NLOS Environments Using Cooperation", *to appear in Proceedings of the 2015 IEEE International Conference on Communications (ICC'15)*, June 8-12, 2015.

J. Schloemann, S. Malladi, P. Tarazaga, and R.M. Buehrer, "Vibration event localization in an instrumented building", *Proceedings of IMAC XXXIII - A Conference and Exposition on Structural Dynamics*, February 2-5 2015.

S. Amuru and R.M. Buehrer "Optimal Jamming Strategies in Digital Communications-Impact of Modulation", *Proceedings of the 2014 IEEE Global Communications Conference* (GlobeCom'14), Austin, TX, December 2014.

R. Vaghefi and R.M. Buehrer, "A Linear Estimator for Joint Synchronization and Localization in Wireless Sensor Networks," *Proceedings of the 2014 IEEE Global Communications Conference* (GlobeCom'14), Austin, TX, December 2014.

J. Schloemann and R.M. Buehrer, "On the Value of Collaboration in Multidimensional Location Estimation," *Proceedings of the 2014 IEEE Global Communications Conference* (GlobeCom'14), Austin, TX, December 2014.

J. Schloemann and R.M. Buehrer, "On the Value of Collaboration in Non-Line-of-Sight Location Estimation", *Proceedings of the 2014 IEEE Military Communications Conference (MILCOM'14)*, Baltimore, MD, October, 2014.

S. Amuru and R.M. Buehrer, "Optimal Jamming using Delayed Learning", *Proceedings of the 2014 IEEE Military Communications Conference (MILCOM'14)*, Baltimore, MD, October, 2014.

R. M. Vaghefi and R.M. Buehrer, "Cooperative RF Pattern Matching Positioning for LTE," *Proceedings of the IEEE Personal, Indoor, Mobile Radio Conference (PIMRC'14)*, Washington, DC. 2014

D.J. Jakubisin and R.M. Buehrer, "On the Complexity-Performance Trade-off in Code-Aided Frame Synchronization," *The 15th IEEE International Workshop on Signal Processing Advances in Wireless Communications*, Toronto, Canada, 22-25 June 2014.

A. Amini, R. M. Vaghefi, J.M. da la Garza and R.M. Buehrer, "Improving GPS-Based Vehicle Positioning for Intelligent Transportation Systems," *Proceedings of 2014 IEEE Intelligent Vehicles Symposium*, Dearborn, Michigan, June 8 - 11, 2014.

R. M. Vaghefi and R.M. Buehrer, "Improving Positioning in LTE through Collaboration," *11th Workshop on Positioning, Navigation and Communications 2014 (WPNC'14)*, Dresden, Germany, March 12-13, 2014.

A. Amini, R. M. Vaghefi, J.M. da la Garza and R.M. Buehrer, "GPS-Free Cooperative Mobile Tracking with the Application in Vehicular Networks," *11th Workshop on Positioning, Navigation and Communications 2014 (WPNC'14)*, Dresden, Germany, March 12-13, 2014.

R. Vaghefi and R.M. Buehrer, "Joint TOA-Based Sensor Synchronization and Localization Using Semidefinite Programming," *Proceedings of the 2014 IEEE International Conference on Communications (ICC'14)*, Sydney, Australia, June 6-10, 2014.

R. Tandon, S. Amuru, R.M. Buehrer, and T.C. Clancy, "On Secure Distributed Storage Systems with Exact Repair," *Proceedings of the 2014 IEEE International Conference on Communications (ICC'14)*, Sydney, Australia, June 6-10, 2014.

S. Amuru, R. Tandon, R.M. Buehrer, and T.C. Clancy, "Jamming Countermeasures for Multi-User MISO Broadcast Channels - a DoF perspective," *Proceedings of the 2013 IEEE Global Communications Conference (GlobeCom'13)*, December 2013.

R. Vaghefi and R.M. Buehrer, "Asynchronous Time-of-Arrival-Based Source Localization," *Proceedings of the 2013 International Conference on Acoustics, Speech, and Signal Processing (ICASSP'13)*, May 26-31, 2013, Vancouver, Canada.

R. Vaghefi and R.M. Buehrer, "Received signal strength-based sensor localization in spatially correlated shadowing," *Proceedings of the 2013 International Conference on Acoustics, Speech, and Signal Processing (ICASSP'13)*, May 26-31, 2013, Vancouver, Canada.

S. Amuru, D. Jakubisin, R. M. Buehrer, and C. da Silva, "Asynchronous Signal Detection in Frequency-Selective Non-Gaussian Channels," *Proceedings of the 47th Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA, Nov. 3-6, 2013.

S. Amuru, R. Tandon, R. M. Buehrer, and T.C. Clancy, "Interference Alignment for MISO Broadcast Channels under Jamming attacks," Proceedings of the 47th Asilomar Conference on Signals, Systems and Computers, Pacific Grove, CA, Nov. 3-6, 2013.

Y. Hasan and R. M. Buehrer, "Interference Analysis of Multi-hop Cellular Networks," *Proceedings of the 47th Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA, Nov. 3-6, 2013.

J. Schloemann and R.M. Buehrer, "Using Fisher Information Matrix Summary Statistics to Assess the Value of Collaborative Positioning Opportunities," *Proceedings of the 2013 IEEE Military Communications Conference*, San Diego, CA, Nov. 18-20, 2013.

R. Vaghefi and R.M. Buehrer, "Target Tracking in NLOS Environments Using Semidefinite Programming, " *Proceedings of the 2013 IEEE Military Communications Conference*, San Diego, CA, Nov. 18-20, 2013.

S. Amuru, R. Tandon, R.M. Buehrer, and T.C. Clancy, "MIMO Radar Waveform Design to support Spectrum Sharing," *Proceedings of the 2013 IEEE Military Communications Conference*, San Diego, CA, Nov. 18-20, 2013.

R. Vaghefi, J. Schloemann, and R.M. Buehrer, "NLOS Mitigation in TOA-Based Localization Using Semidefinite Programming," *Proceedings of the 10th Workshop on Positioning, Navigation, and Communication*, Dresden, Germany, March, 2013.

C.I. Phelps and R.M. Buehrer, "Signal Classification by Probabilistic Reasoning," *Proceedings of Radio Wireless World 2013*, January 20-23, 2013.

A.E. Martin, Y. Hasan, and R.M. Buehrer, "Physical Layer Security of Hybrid Spread Spectrum Systems, " *Proceedings of Radio Wireless World 2013*, January 20-23, 2013.

J. Schloemann and R.M. Buehrer, "On the Value of Collaboration in Anchorless Robot Self-Localization," *Proceedings of the 2012 IEEE Military Communications Conference (MILCOM '12)*, Orlando, FL, Oct. 29 – Nov. 1, 2012.

D. Jakubisin and R.M. Buehrer, "Improved Modulation Classification using a Factor-Graph-based Iterative Receiver," *Proceedings of the 2012 IEEE Military Communications Conference (MILCOM '12)*, Orlando, FL, Oct. 29 – Nov. 1, 2012.

M. W. Baidas, A.B. MacKenzie, and R.M. Buehrer, 'Performance Analysis of Network-Coded Bi-Directional Relaying for Amplify-and-Forward Cooperative Wireless Networks' accepted to *IEEE IWCMC 2012*, Limassol, Cyprus, August 27-31, 2012.

J. Overfield, Z. Biskadurous, and R.M. Buehrer, "Geolocation of MIMO signals using the Cross Ambiguity Function and TDOA/FDOA," *Proceedings of the International Conference on Communications (ICC'12) – Signal Processing for Communications Symposium*, Ottawa, Canada, June 11-16, 2012.

R. Vaghefi and R.M. Buehrer, "Cooperative Sensor Localization with NLOS Mitigation Using Semidefinite Programming," *Proceedings of the 9th Workshop on Positioning, Navigation, and Communication*, Dresden, Germany, March 15-16, 2012.

B. Thompson and R.M. Buehrer, "Characterizing and Improving the Collaborative Position Location Problem," *Proceedings of the 9th Workshop on Positioning, Navigation, and Communication*, Dresden, Germany, March 15-16, 2012.

Z. Biskadurous and R.M. Buehrer, "Collaborative Localization Enhancement to the Global Positioning System," *Proceedings of the 9th Workshop on Positioning, Navigation, and Communication*, Dresden, Germany, March 15-16, 2012.

B. Thompson and R.M. Buehrer, "Cooperative Indoor Position Location Using Reflected Estimations," *European Wireless 2011*, pp. 644-649, Vienna, Austria, April 27-29, 2011. (**Invited Paper**).

J.-H. Lee and R.M. Buehrer, "Location Spoofing Attack Detection in Wireless Networks," *2010 IEEE Global Communications Conference (GLOBECOM'11)*, pp. 1-6, Miami, FL, December 6-10, 2010.

H. Dhillon and R.M. Buehrer ,"On the Sum-Rate of Peer-to-Peer MIMO Multiuser Gaussian Interference Channels," *2010 IEEE Global Communications Conference (GLOBECOM)*, pp. 1-6, Miami, FL, December 6-10, 2010.

T. Jia and R.M. Buehrer, "Collaborative Position Location for Wireless Networks Using Iterative Parallel Projection Method ," *2010 IEEE Global Communications Conference (GLOBECOM)*, pp. 1-6, Miami, FL, December 6-10, 2010.

H. Dhillon and R.M. Buehrer, "On the Maximum Sum-Rate of Cognitive MIMO Interference Channels," *2010 IEEE Military Communications Conference (MILCOM 2010)*, pp. 755-761, San Jose, CA, Oct. 31 2010-Nov. 3 2010.

H. Volos and R.M. Buehrer, "Robust Training of A Link Adaptation Cognitive Engine," *2010 IEEE Military Communications Conference (MILCOM 2010)*, pp. 1442 – 1447, San Jose, CA, Oct. 31 2010-Nov. 3 2010. **NOTE: Fred W.**

**Ellersick MILCOM Award for Best Paper in the Unclassified Technical Program.**

T. Jia and R.M. Buehrer, "Collaborative Position Location with NLOS Mitigation," *IEEE to the Personal, Indoor, and Mobile Radio Conference (PIMRC2010), Workshop on Advanced in Positioning and Location Enabled Communications (APLEC)*, pp. 267 – 271, Istanbul, Turkey, Sept. 26, 2010. **(Invited Paper)**

R. M. Buehrer, B. Thomson, and T. Jia, "Cooperative Indoor Position Location," *2010 International Conference on Indoor Positioning and Indoor Navigation (IPIN)*, pp. 1-10, Zurich, Switzerland, September 17-19, 2010

H. I. Volos and R. M. Buehrer, "On Balancing Exploration vs. Exploitation on a Cognitive Engine for Multi-Antenna Systems," *IEEE Global Communications Conference*, pp. 1-6, November 30-December 5, 2009.

J. H. Lee and R. M. Buehrer, "Location Estimation Using Differential RSS with Correlated Shadow Fading," *IEEE Global Communications Conference*, November 30-December 5, 2009.

H Shaban, M. A. El-Nasr, and R. M. Buehrer, "Performance of Ultralow-power IR-UWB Correlator Receivers for Highly Accurate Wearable Human Locomotion Tracking and Gait Analysis Systems," *IEEE Global Communications Conference*, November 30-December 5, 2009.

J. Reed, C.A. da Silva, and R.M. Buehrer, "An Optimization Approach to Single-Source Localization with a Sensor Network using Direction and Range Estimates," *IEEE Global Communications Conference*, November 30-December 5, 2009.

H. Dhillon and R.M. Buehrer, "Cognitive MIMO Radio: Incorporating Dynamic Spectrum Access in Multiuser MIMO Network," *IEEE Global Communications Conference*, pp. 1-6, November 30-December 5, 2009.

H.I. Volos, R. M. Buehrer, and C. Anderson, "A practical link budget for I-UWB systems," *IEEE Vehicular Technology Conference (VTC'09) – Spring*, pp. 1-5, Barcelona, Spain, April 26-29, 2009.

C. Anderson, H. I. Volos, C. Headley, F. Muller, and R. M. Buehrer, "Low-Antenna Ultra Wideband Spatial Correlation Analysis in a Forest Environment," *IEEE Vehicular Technology Conference – Spring*, pp. 1-5, Barcelona, Spain, April 26-29, 2009.

J.-H. Lee, A. Bhupathi raju, and R. M. Buehrer, "Experimental Investigation of WCDMA Uplink Transmit Power for Practical Usage Scenarios," *10$^{th}$ IEEE Wireless and Microwave Technology Conference (WAMICON2008)*, Clearwater, FL, April 20-21, 2009.

J.-H. Lee, A. Bhupathi raju, and R. M. Buehrer, "An Analysis of Uplink Transmit Power in WCDMA Networks," *10$^{th}$ IEEE Wireless and Microwave Technology Conference (WAMICON2008)*, Clearwater, FL, April 20-21, 2009.

C.I. Phelps and R.M. Buehrer, "A Simplified Technique for Adaptive MIMO, Modulation, and Coding," *2009 IEEE Radio and Wireless Symposium (RWS2009),* pp. 566-569, San Diego, CA, January 18-22, 2009.

U. Shukla, H.I. Volos, and R.M. Buehrer, "On The Effect of Antenna Height On the Characterization of The Indoor Ultra Wideband Channel," *2008 IEEE Global Communications Conference (GlobeCom'08)*, New Orleans, LA, November 29 - December 2, 2008.

T. Jia and R.M. Buehrer, "A New Cramer-Rao Lower Bound for TOA-based Localization," *2008 IEEE Military Communications Conference (MILCOM'08), San Diego, California, November 17-19, 2008.*

H. Volos, C.I. Phelps, and R.M. Buehrer, "Physical Layer Cognitive Engine for Multi-Antenna Systems," *2008 IEEE Military Communications Conference (MILCOM'08),"* San Diego, California, November 17-19, 2008.

J.R. Reed, C.R.M. da Silva and R.M. Buehrer, "Multiple-Source Localization using Line-of-Bearing Measurements," *2008 IEEE Military Communications Conference (MILCOM'08),* San Diego, California, November 17-19, 2008.

C. Anderson and R.M. Buehrer, "An Undergraduate Research Experience: Wireless Propagation and Position Location in a Forest Environment," *2008 ASEE Conference on Excellence in Education*, Pittsburgh, PA, June 21-25, 2008.

H. Volos and R.M. Buehrer, "Design and Scaled Implementation of a UWB Sensor System for Cargo Transfer," *IEEE Global Communications Conference, (GlobeCom 2007), Ad Hoc and Sensor Networking Symposium,* pp. 1081-1085, Washington, D.C., November 2007.

R. Menon, A.B. MacKenzie, R.M. Buehrer, and J.H. Reed, "Joint Power Control and Waveform Adaptation for Distributed Networks," *IEEE Global Communications Conference, (GlobeCom 2007), Ad Hoc and Sensor Networking Symposium,* Washington, D.C., November 2007.

M. Di Renzo, R.M. Buehrer, and J. Torres, "Pulse Shape Distortion and Ranging Accuracy in UWB-Based Body Area Networks for Full-Body Motion Capture and Gait Analysis," *2007 IEEE Global Telecommunications Conference (GLOBECOM'07)*," pp. 3775–3780, November 26-30, 2007.

H. Volos, C.Anderson, C. Headley, R.M. Buehrer, C. da Silva, and A. Nieto, "Preliminary UWB Propagation Measurements in an Underground Limestone Mine," *IEEE Global Communications Conference, (GlobeCom 2007), Ad Hoc and Sensor Networking Symposium,* pp. 3770-3774, Washington, D.C., November 2007.

H. I. Volos, C. I. Phelps, and R. M. Buehrer, "Initial Design of a Cognitive Engine for MIMO Systems," *SDR Forum Technical Conference*, Nov. 2007. **Best Paper Award**.

W.C. Headley, R.M. Buehrer, and C. da Silva, "Indoor Location Positioning of Non-Active Objects Using Ultra-Wideband Radios," *2007 IEEE Radio and Wireless Symposium*, pp. 105–108, San Diego, CA, January 2007.

H. Kim and R.M. Buehrer, "Power Allocation Strategies in Cooperative MIMO Networks," *IEEE Wireless Communications and Networking Conference (WCNC)*, 2006.

S. Venkatesh and R.M. Buehrer, "MAC Design for UWB Position-Location Networks," *IEEE Wireless Communications and Networking Conference (WCNC)*, 2006.

R. Menon, A.B. MacKenzie, R.M. Buehrer, and J.H. Reed, "A Game-Theoretic Framework for Interference Avoidance in Ad hoc Networks," *2006 IEEE Global Telecommunications Conference (GLOBECOM '06)*, pp. 1–6, San Francisco, CA, Nov. 2006.

S. Venkatesh, C.R. Anderson, R.M. Buehrer, and J.H. Reed, "On the use of Pilot-Assisted Matched Filtering in UWB Time-Interleaved Sampling," *2006 IEEE 2006 International Conference on Ultra-Wideband*, pp. 119–124, September 2006, Boston, MA.

J. Ibrahim and R.M. Buehrer, "A Modified Tracking Algorithm for UWB Pilot-Assisted Receivers," *2006 IEEE 2006 International Conference on Ultra-Wideband*, pp. 1-6, September 2006, Boston, MA.

N. V. Rivera, S. Venkatesh, C.Anderson, and R.M. Buehrer, "Multi-Target Estimation of Heart and Respiration Rates Using Ultra Wideband Sensors," *14$^{th}$ European Signal Processing Conference (EUSIPCO 2006),* September 6-8, 2006, Florence, Italy. **(Invited Paper)**

N. V. Rivera, S. Venkatesh, and R.M. Buehrer, "Non-invasive Wireless Application of Ultra Wideband (UWB) for Estimation of Single and Mutliple Person Vital-Signs," *2006 Engineering in Medicine and Biology Conference*, New York, August 30-September 3, 2006.

J. Ibrahim and R.M. Buehrer, "A UWB Multiple Antenna System for NBI Mitigation under Rayleigh and Ricean Fading," *2006 IEEE International Conference on Communications*, pp. 3953–3959, Istanbul, Turkey, June 11-15, 2006.

S.Venkatesh, and R.M. Buehrer, "Power Control in UWB Position-Location Networks," *2006 IEEE International Conference on Communications*, pp. 3953–3959, Istanbul, Turkey, June 11-15, 2006.

S. Venkatesh and R.M. Buehrer, "Multiple-access insights from bounds on sensor localization," *International Symposium on a World of Wireless, Mobile and Multimedia Networks, (WoWMoM 2006)*, pp. 26-29, June 10, 2006.

R.M. Buehrer and S.Venkatesh, "On the Impact of Propagation on UWB-Based Communication and Position Location Networks," *IEE Seminar on Ultra Wideband Systems, Technologies and Applications*, London, UK, April 21, 2006. **(Invited Keynote Speech)**

S.Venkatesh and R.M. Buehrer, "A Linear Programming Approach to NLOS Error Mitigation in Sensor Networks," *5th International Conference on Information Processing in Sensor Networks (ISPN 2006),* pp. 301-308, April 19-21, 2006.

A. Hugine, H. I. Volos, J. Gaeddert, and R. M. Buehrer, "Measurement & Characterization of the Near-Ground Indoor Ultra Wideband Channel," *Wireless Communications and Networking Conference*, pp. 1062-1067, Las Vegas, NV, April 3-6, 2006.

S.Venkatesh, C.R. Anderson, N.V.Rivera, and R.M. Buehrer, "On Respiration-Rate Estimation using Impulse-based Ultra-Wideband," *National Radio Science Meeting of United States National Committee of the International Union of Radio Science (URSI)*, pp. K1-1, Boulder, CO, January 4-7, 2006.

R. Menon, R.M. Buehrer, and J.H. Reed, "Outage Probability based Comparison of Underlay and Overlay Spectrum Sharing Techniques," *1st IEEE International Symposium on New Frontiers in Dynamic Spectrum Access Networks (DySPAN 2005)*, pp. 101-109, Baltimore, MD, November 8-11, 2005.

N. Harter, J. Keaveny, S. Venkatesh, and R.M. Buehrer, "Analysis and Implementation of a Single Channel Direction Finding System," *IEEE Military Communications Conference (MILCOM2005)*, pp. 2530–2533, Atlantic City, NJ, October 2005.

J.Ibrahim, R. Menon, and R.M. Buehrer, "UWB Sequence Optimization for Enhanced Energy Capture and Interference Mitigation," *IEEE Military Communications Conference (MILCOM2005)*, pp. 2086-2092, Atlantic City, NJ, October 2005.

J. Ibrahim and R.M. Buehrer, "Two-Stage Acquisition for UWB in Dense Multipath," *IEEE Military Communications Conference (MILCOM2005)*, pp. 1898-1904, Atlantic City, NJ, October 2005.

S.Venkatesh, C.R. Anderson, N.V.Rivera and R.M. Buehrer, "Implementation and Analysis of Respiration-Rate Estimation using Impulse-based Ultra-Wideband," *IEEE Military Communications Conference (MILCOM2005)*, Atlantic City, NJ, October 2005.

J. Ibrahim and R.M. Buehrer, "A Data-Aided Iterative UWB Receiver with LDPC," *IEEE Vehicular Technology Conference (VTC'05), Fall*, pp. 33-37, Dallas, TX, September 25-28, 2005.

S. Ventkatesh, N. Kumar, and R.M. Buehrer, "A Spread-Spectrum MAC Protocol for Impulse-Radio Networks," *IEEE Vehicular Technology Conference (VTC'05), Fall*, pp. 665-669, Dallas, TX, September 25-28, 2005.

S. Venkatesh, V. Bharadwaj, and R.M. Buehrer, "A New Spatial Model for Impulse-based Ultra-Wideband Channels," *IEEE Fall Vehicular Technology Conference*, pp. 2617–2621, September 25-28, 2005.

R. Menon, J.Ibrahim, and R.M. Buehrer, "UWB Signal Detection Based on Sequence Optimization," *2005 International Conference on Wireless Networks, Communications and Mobile Computing*, pp. 1231–1236, June 13-16, 2005.

N. Harter, J. Keaveny, S. Venkatesh, and R.M. Buehrer, "Analysis and Implementation of a Novel Single-Channel Direction-Finding Method," *Wireless Communications and Networking Conference*, pp. 2530 – 2533, New Orleans, LA, 13-17 March 2005.

S. Venkatesh, J. Ibrahim, and R. M. Buehrer, "A new 2-cluster model for indoor UWB channel measurements," *IEEE*

*AP-S International Symposium and UNSC/URSI National Radio Science Meeting*, pp. 946- 949, June 2004.

J. Jiang, R. M. Buehrer, and W. H. Tranter, "High-speed downlink packet transmission with spatial multiplexing and scheduling," *Wireless Communications and Networking Conference*, WCNC 2004, pp. 2148 - 2152, Atlanta, GA, March 2004.

M. Gong, S.F. Midkiff, and R.M. Buehrer, "A Self-Organized Clustering Algorithm for UWB Ad Hoc Networks," *Wireless Communications and Networking Conference*, WCNC 2004, pp. 1806 - 1811, Atlanta, GA, March 2004.

Y. Ahmed, J.H. Reed, W.H. Tranter, R.M. Buehrer, "A model-based approach to demodulation of Co-channel MSK signals," *Global Telecommunications Conference*, pp. 2442 – 2446, Dec. 1-5, 2003

M. Gong, S.F. Midkiff, and R.M. Buehrer, "A New Piconet Formation Protocol for UWB Ad Hoc Networks," *2003 Ultra Wideband Systems and Technologies Conference*, pp. 180 – 184, Reston, VA, Nov. 16-19, 2003.

D.A. McKinstry and R.M. Buehrer, "LMS Analog and Digital Narrowband Rejection System for UWB Communications," *2003 Ultra Wideband Systems and Technologies Conference*, pp. 91-95, Reston, VA, Nov. 16-19, 2003.

R.M. Buehrer, A. Safaai-Jazi, W.A. Davis, and D. Sweeney, "Characterization of the Ultra-wideband Channel," *2003 Ultra Wideband Systems and Technologies Conference*, pp. 26-31, Reston, VA, Nov. 16-19, 2003.

D.R. McKinstry and R.M. Buehrer, "UWB Small Scale Channel Modeling and System Analysis," *Fall 2003 Vehicular Technology Conference*, pp. 6-10, Orlando, FL, Oct. 6-9, 2003.

S. Ginde, J.Neel, and R.M. Buehrer, "Game Theoretic Analysis of Joint Link Adaptation and Distributed Power Control in GPRS," *Fall 2003 Vehicular Technology Conference*, pp. 732–736, Orlando, FL, October 6-9, 2003.

J. Jiang, R.M. Buehrer, and W.H. Tranter, "Spatial T-H Precoding for Packet Data Systems with Scheduling," *Fall 2003 Vehicular Technology Conference*, pp. 537-541, Orlando, FL, October 6-9, 2003.

R.M. Buehrer, "The Impact of Channel Estimation Error on 2 X 1 Space-Time Block Codes," *IEEE Vehicular Technology Conference – Fall 2002,* Vancouver, British Columbia, Canada, pp. 1921-1925, September 24-29, 2002.

R.M. Buehrer, "On the Usefulness of Outer-loop Power Control with Successive Interference Cancellation," *IEEE Vehicular Technology Conference – Fall 2002,* Vancouver, British Columbia, Canada, pp. 1897-1901, September 24-29, 2002.

R.M. Buehrer, "The Impact of Angular Energy Distribution on Spatial Correlation," *IEEE Vehicular Technology Conference – Fall 2002,* Vancouver, British Columbia, Canada, pp. 1173-1177, September 24-29, 2002.

J. Tsai, R.M. Buehrer, and B.D. Woerner, "BER Analysis of Orthogonal Transmit Waveform with Space-Time Diversity for MIMO CDMA Systems," *IEEE Vehicular Technology Conference – Fall 2002,* Vancouver, British Columbia, Canada, pp. 1051-1055, September 24-29, 2002.

J. Tsai, R.M. Buehrer, and B.D. Woerner, "Performance of Transmit Beamforming in Rician Fading Channels: Robustness of Quantization Error and Feedback Error," *IEEE Vehicular Technology Conference – Fall 2002,* Vancouver, British Columbia, Canada, pp. 1792-1795, September 24-29, 2002.

R. Gozali, R.M. Buehrer, and B.D. Woerner, "On the Performance of Scheduling Over Space-time Architectures," *IEEE Vehicular Technology Conference – Fall 2002,* Vancouver, British Columbia, Canada, pp. 415-419, September 24-29, 2002.

R. Gozali, R.M. Buehrer, and B. D. Woerner, "The Impact of Multiuser Diversity on Space-time Block Coding," *IEEE Vehicular Technology Conference – Fall 2002,* Vancouver, British Columbia, Canada, pp. 420-424, September 24-29, 2002.

N.A. Kumar and R.M. Buehrer, "Application of Layered Space-Time Processing to Ultra-Wideband Communication,"

*45th IEEE Midwest Symposium on Circuits and Systems,* Tulsa, OK, pp. 597-600, August 4-7, 2002.

P. Jain and R.M. Buehrer, "Implementation of Adaptive Modulation on Sunrise Software Radios," *45th IEEE Midwest Symposium on Circuits and Systems,* Tulsa, OK, pp. 405-408, August 4-7, 2002.

R. Venkatasubramanian, J. Tsai, and R. M. Buehrer, "Beamforming for MC-CDMA," *45th IEEE Midwest Symposium on Circuits and Systems,* Tulsa, OK, pp. 441-444, August 4-7, 2002.

D.R. McKinstry and R.M. Buehrer, "Issues in the Performance and Covertness of UWB Communications Systems," *45th IEEE Midwest Symposium on Circuits and Systems,* Tulsa, OK, pp. 601-604, August 4-7, 2002.

J. Neel, R.M. Buehrer, J.H. Reed, and R.P. Gilles, "Game theoretic analysis of a network of cognitive radios," *45th IEEE Midwest Symposium on Circuits and Systems,* Tulsa, OK, pp. 409-412, August 4-7, 2002.

J.A. Tsai, R.M. Buehrer, and B.D. Woerner, "The Impact of AOA Energy Distribution on the Spatial Fading Correlation of Linear Antenna Array," *55th IEEE Vehicular Technology Conference – VTC Spring 2002,* Birmingham, AL, vol. 2, pp. 933-937, May 2002.

R.A. Soni, R.M. Buehrer, and R.D. Benning, "Transmit Beamforming Combined with Diversity Techniques for cdma2002 Systems," *IEEE International Conference on Acoustics, Speech, and Signal Processing – ICASSP 01,* Salt Lake City, UT, vol. 2, pp. 1029-1032, May 2001.

R.M. Buehrer, S. Arunachalam, and K. Wu, "Spatial Channel Model and Measurements for IMT-2000 Systems," *53rd IEEE Vehicular Technology Conference – VTC Spring 2001,* Rhodes, Greece, vol. 1, pp. 342-246, May 2001.

R.M. Buehrer, R.A. Soni, and Q. Li, "Transmit Diversity with More than Two Transmit Antennas," *10th Virginia Tech Symposium on Wireless Personal Communications*, Blacksburg, VA, pp. 131-143, June 2000.

R.M. Buehrer, "Generalized Equations for Spatial Correlation for Low to Moderate Angle Spread," *10th Virginia Tech Symposium on Wireless Personal Communications*, Blacksburg, VA, pp. 101-108, June 2000.

S.P. Nicoloso, M. Metke, and R.M. Buehrer, "Frame-Quality-Based vs. Eb/No-Based Forward Power Control Methods for *cdma2000*," *10th Virginia Tech Symposium on Wireless Personal Communications*, Blacksburg, VA, pp. 239-248, June 2000.

R.M. Buehrer, "On the Convergence of Multistage Interference Cancellation," *33rd IEEE Conference on Signals, Systems and Computers - Asilomar*, Pacific Grove, CA, vol. 1, pp. 634-638, October 1999.

R.A. Soni, R.M. Buehrer, and J. Tsai, "Open-Loop Transmit Diversity in IS-2000 Systems," *33rd IEEE Conference on Signals, Systems and Computers - Asilomar*, Pacific Grove, CA, vol. 1, pp. 654-658, October 1999.

J.-A. Tsai, R.M. Buehrer, and D. Uptegrove, "Performance Comparisons of Adaptive Antenna Arrays with Fixed Multibeam Systems for TDMA Systems," *49th IEEE Vehicular Technology Conference – VTC Spring 99,* Houston, TX, vol. 2, pp. 1079-1083, May 1999.

S. Gollamudi, S. Nagaraj, Y.-F. Huang, and R.M. Buehrer, "Optimal Multistage Interference Cancellation for CDMA Systems Using the MMSE Criterion," *32nd IEEE Conference on Signals, Systems and Computers – Asilomar,* Pacific Grove, CA, vol. 1, pp. 665-669, November 1998.

A. Kogiantis and R.M. Buehrer, "Adaptive Antenna Arrays on 3G CDMA Systems: Performance Characteristics," *5th Smart Antenna Workshop*, Stanford University, July 23, 1998, Palo Alto, CA.

J.-A. Tsai and R.M. Buehrer, "Frequency Reuse Reduction for IS-136 Using a Four Element Adaptive Array," *8th Virginia Tech Symposium on Wireless Personal Communications*, Blacksburg, VA, pp. 11-22, June 10-12, 1998.

N.S. Correal, R.M. Buehrer, and B.D. Woerner, "Real-Time DSP Implementation of a Coherent Partial Interference Cancellation Multiuser Receiver for DS-CDMA," *IEEE International Conference on Communications - ICC,* Atlanta,

GA, vol. 3, pp. 1536-1540, May 1998.

R.M. Buehrer and B.D. Woerner, "The Asymptotic Multiuser Efficiency of *M*-Stage Interference Cancellation Receivers," *8th IEEE International Symposium on Personal, Mobile, and Indoor Radio Conference*, Helsinki, Finland, vol. 2, pp. 570-574, September 1997.

N. Correal, R.M. Buehrer, and B.D. Woerner, "Improved CDMA Performance Through Bias Reduction for Parallel Interference Cancellation," *International Conference on Personal, Mobile, and Indoor Radio Conference*, Helsinki, Finland, vol. 2, pp. 565-569, September 1997.

N. Correal, R.M. Buehrer, and B.D. Woerner, "DSP Implementation of Parallel Interference Cancellation," *Symposium on Interference Rejection and Signal Separation in Wireless Communications*, George Washington University, Washington, D.C., (proceeding pages unnumbered), March 1997.

R.M. Buehrer, N.S. Correal, and B.D. Woerner, "A Comparison of Multiuser Receivers for Cellular CDMA," *IEEE Global Telecommunications Conference ' 96*, London, England, pp. 1571-1577, November 11-18, 1996.

J. Feil, L. Ippolito, M. Buehrer, G. Feldhake, and S. Horan, "The First Two Years of Experimental Results from the New Mexico ACTS Propagation Terminal at 20.185 and 27.505 GHz," 1*996 IEEE International Symposium on Antennas and Propagation*, Baltimore, MD, vol. 3, pp. 1868-1871, July 21-26, 1996.

J. Feil, L. Ippolito, M. Buehrer, G. Feldhake, and S. Horan, "First Year Propagation Experiment Results from the New Mexico ACTS Receiver Terminal at 20.185 and 27.505 GHz," *16th AIAA International Communications Satellite Systems Conference*, Washington, D.C. pp. 1-11, February 1996.

R.M. Buehrer and B.D. Woerner, "Performance of CDMA Multistage Interference Cancellation with Phase and Timing Errors," *1995 IEEE Conference on Universal Personal Communications – UPC'95*, Tokyo, Japan, pp. 153-157, November 6-9, 1995.

R.M. Buehrer and B.D. Woerner, "Analysis of Adaptive Multistage Interference Cancellation for CDMA Using an Improved Gaussian Approximation," *1995 IEEE Military Communications Conference*, San Diego, CA, vol. 3, pp. 1195-1199, November 5-8, 1995.

A. Park, R.M. Buehrer, and B.D. Woerner, "Throughput Performance for a FHMA System with Variable Rate Coding," *1995 IEEE Military Communications Conference*, San Diego, CA, vol. 1, pp. 320-324, November 5-8, 1995.

R.M. Buehrer and B.D. Woerner, "Spread Spectrum for Wireless Communications," *4th Virginia Tech Symposium on Wireless Personal Communications*, Blacksburg, VA, pp. 3-1 – 3-20, June 1994.

R.M. Buehrer, S.C. Kwatra, and J. Kim, "A Satellite/Terrestrial Hybrid System for the National Research and Education Network," *15th AIAA International Communications Satellite Systems Conference*, San Diego, CA, March 1994.

M. Keaton, R.M. Buehrer, S.C. Kwatra, and J. Kim, "A Wideband Communications Satellite for the National Research and Education Network," *1993 IEEE Global Communications Conference*, Houston, TX, vol. 3, 1644-1648, December 1993.

M. Keaton, R.M. Buehrer, S.C. Kwatra, and J. Kim, "Network Requirements for a Satellite Based National Research and Education Network," *1993 IEEE Military Communications Conference*, Boston, MA, vol. 3, pp. 993-997, November 1993.

## Technical Reports

National Research Council. 2009. "Toward a Universal Radio Frequency System for Special Operations Forces", Washington, D.C.: The National Academies Press.

R. M. Buehrer, W.A. Davis, A. Saffai-Jazi, and D. Sweeney, "Ultra-wideband Propagation Measurements and Modeling - Final Report," submitted to DARPA as part of the NETEX Program.

R. M. Buehrer, A. Safaai-Jazi, W. A. Davis, D. Sweeney, "Path Loss Calculations for Ultra-wideband Signals in Indoor Environments," invited contribution to the International Telecommunications Union, Document Number USWP 3K-1, October 26, 2003.

15 technical memoranda in the areas of multiuser detection, intelligent antennas, and OFDM for Bell Labs – Lucent Technologies. Titles and abstracts are proprietary information.

## Professional Affiliations

- *Fellow*, Institute of Electrical and Electronics Engineers (IEEE)
- Member, IEEE Communications Society
- Member, IEEE Vehicular Technologies Society
- Member, IEEE Signal Processing Society
- Member, Eta Kappa Nu
- Member, Tau Beta Pi
- Member, Pi Mu Epsilon

## Selected Professional Activities

- Area Editor, *IEEE Transactions on Wireless Communications*, 2017 - present.
- Guest Lead Editor, *IEEE Journal on Special Topics in Signal Processing*, special issue on non-cooperative position location networks.
- Guest Editor, *Proceedings of the IEEE*, special issue on cooperative localization.
- Associate Editor, *IEEE Wireless Communications Letters*, 2010 - 2014
- Associate Editor, *IEEE Transactions on Communications*, 2009 - 2014
- Associate Editor, *IEEE Transactions on Wireless Communications*, 2005 - 2012, 2015 - 2017
- Associate Editor, *IEEE Transactions on Vehicular Technologies*, 2005 - 2009
- Associate Editor, *IEEE Transactions on Signal Processing*, 2006-2007
- Associate Editor, *IEEE Transactions on Education*, 1997-2000
- Organizer and Technical Co-Chair, 2015 IEEE Global Communications Conference Workshop on Localization and Tracking: Indoors, Outdoors and Emerging Networks (GC - LION '15), December 6, 2015.
- "Signal Processing for Communications" symposium co-chair for IEEE ICC 2017

- Symposium co-chair for IEEE ICC 2017 Signal Processing for Communications Symposium
- Technical Program Co-Chair, WPNC 2013.
- Technical Program Chair for UWBST2003.
- Technical Program Committee, 2008-2016 IEEE Global Communications Conference
- Technical Program Committee, 2007-2016 IEEE International Conference on Communications
- Technical Program Committee, IEEE RWS 2006
- Technical Program Committee, IEEE 2006 International Conference on Ultra Wideband
- Technical Program Committee, IEEE Vehicular Technology Conference 2006 - Fall
- Technical Program Committee, 2004 IEEE International Workshop on Ultra Wideband Systems / Ultra Wideband Systems and Technologies.
- Technical Program Committee, 2004 IEEE Radio and Wireless Conference (RAWCON), September 2004.
- Technical Program Committee, 2005 Wireless Communications and Networking Conference.
- Reviewer for *IEEE Journal on Selected Areas in Communications*, *IEEE Transactions on Communications, IEEE Transactions on Vehicular Technology, IEEE Communications Letters, IEEE Transactions on Signal Processing, ETRI Research Journal, Army Research Office, State of Tennessee*
- Session Chair, IEEE Vehicular Technology Conference – Fall 2002

## Selected Consulting

- Lutron Electronics
  - Provided recommendations on the design and testing of indoor wireless networks, August - Sept. 2019.
  - Evaluated RF coexistence plan, March 2020.
  - Evaluated RF coverage and planning techniques for 2.4GHz indoor networks, September - October 2021.
- Polaris Wireless - Provided an evaluation of Z-axis estimation algorithm, Sept-Oct 2018.
- ENSCO, Inc. – Provided an evaluation of spread spectrum ranging system. March 2011.
- FCC – Delivered short courses on various topics in wireless communications including WiFi, spread spectrum, and 3G technologies. Summer 2004, Summer 2005.

## Selected Expert Witness Experience

- Ericsson vs. Apple
  - Law firm: Fish and Richardson
  - Represented: Apple
  - Analyzed technical aspects of various patents to aid validity/invalidity and infringement/non-infringement analysis. Included both Inter Partes Review proceedings and ITC case. **Was deposed multiple times. Testified at trial.**
  - Dates: September 2021 - December 2022

- Godo Kaisha IP Bridge vs. Nokia
  - Law firm: Alston & Bird
  - Represented: Nokia (defendant)
  - Served as expert witness for non-infringement and invalidity.
  - Case No. 2:21-CV-215-JRG
  - Technology: Sounding Reference Signal, RACH, ACK/NACK and CQI reporting in cellular networks. **Was deposed.**
  - Dates: September 2021 - November 2022
- Honeywell, Int'l., Inc., et. al. vs. Sisvel International
  - Law firm: K&L Gates
  - Represented: Honeywell (Petitioner)
  - Served as expert in Inter Partes Review proceedings. Wrote declaration supporting petitioner. **Was deposed.**
  - IPR2021-00640
  - Technology: Cell selection and reselection in Radio Resource Control
  - Dates: December 2021 - Current
- Thales, et. al. vs. Sisvel International
  - Law firm: AddyHart
  - Represented: Thales (Petitioner)
  - Served as expert in Inter Partes Review proceedings. Wrote declarations supporting petitioner. **Was deposed.**
  - IPR2021-00639
  - Technology: Data connection management.
  - Dates: December 2021 - Current
- ZTE, et. al. vs. Sisvel International
  - Law firm: Banner-Witcoff
  - Represented: ZTE (Petitioner)
  - Served as expert in Inter Partes Review proceedings. Wrote declarations supporting petitioner.
  - IPR2021-00639, IPR2021-00640
  - Technology: Cell selection and reselection in Radio Resource Control; Data connection management.
  - Dates: January 2021 - April 2021
- HP, Inc. vs. Ozmo
  - Law firm: DLA-Piper
  - Represented: HP
  - Served as testifying expert
  - 6:21-cv-00383-ADA
  - Technology: Wireless local area and personal ara networks (WLANs and WPANs)
  - Dates: August 2021 - October 2021
- Samsung vs. Ericsson

  - Law firm: Fish & Richardson
  - Represented: Samsung
  - Wrote declarations for IPR filings.
  - IPR2021-00615, IPR2021-00685
  - Technology: Cellular communications
  - Dates: January 2021 - April 2021

- Tesla, Inc. vs. Optis
  - Law firm: Munger, Tolles, & Olson
  - Represented: Tesla (defendant)
  - Case 2:20-cv-00310
  - Served as testifying expert witness
  - Technology: Control channels/information in cellular systems
  - Dates: November 2020 - March 2021

- Apple, Inc.
  - Law firm: Wilmer-Hale
  - Wrote declaration in support of request for ex parte reexamination
  - Reexam Control Numbuer 90/014,653
  - Technology: Control information in cellular systems
  - Dates: November 2020 - January 2021

- Phillips vs. Garmin
  - Law firm: Alston-Bird
  - Represented: Garmin (defendant)
  - Served as testifying expert witness for Federal Trade Commission proceedings
  - Technology: Local and Cellular Wireless Connections in Personal Emergency Response Systems
  - District: FTC
  - Dates: June - July 2020

- ZTE vs. Sisvel International
  - Law firm: Banner-Witcoff
  - Represented: ZTE (Petitioner)
  - Served as expert in Inter Partes Review proceedings. Wrote declarations supporting petitioner. **Was deposed.**
  - IPR2020-01070, IPR2020-01071
  - Technology: Radio Resource Control
  - Dates: March 2020 - May 2021

- Apple, Inc. vs. Optis
  - Law firm: Wilmer-Hale
  - Represented: Apple (Plaintiff)
  - Served as testifying expert witness for litigation. **Was deposed. Testified at trial.**
  - Case 2:19-cv-66 (E.D. Tex.)

  - Technology: Control information in cellular systems
  - District: Eastern District of Texas
  - Dates: July 2019 - August 2020.

- Apple, Inc. vs. Wi-LAN
  - Law firm: DLA Piper
  - Represented: Apple (Plaintiff)
  - Served as testifying expert witness for litigation. **Was deposed. Testified at trial.**
  - Technology: Resource Allocation in Wireless Systems
  - District: Southern District of California
  - Dates: January '19 - January '20

- TELUS Communications, Bell Mobility, and Rogers Communications vs. WiLAN, Inc.
  - Law firm: Torys, LLP.
  - Represented: TELUS Communications, Bell Mobility, and Rogers Communications
  - Served as testifying expert. Analyzed certain patents (and the prior art) and provided technical reports on sufficiency, validity and potential double-patenting.
  - Technology: Resource allocation in wireless networks
  - Dates: January 2019 - November 2019

- Samsung vs. Sharp
  - Law firm: Fish and Richardson
  - Represented: Samsung
  - Analyzed technical aspects of patent to aid validity/invalidity analysis.
  - Technology: Feedback in MIMO-OFDM systems
  - Dates: April 2019 - July 2019

- American Patents, LLC vs. HP, Inc.
  - Law firm: DLA Piper
  - Represented:HP, Inc.
  - Analyzed technical aspects of two patents to aid validity/invalidity analysis.
  - Case 18-cv-700 (E.D. Tex.)
  - Technology:MIMO/OFDM synchronization in cellular systems
  - Dates: June 2019

- Blackberry vs. Uniloc, LLC.
  - Law firm: Oblon
  - Represented: Blackberry (Petitioner)
  - Wrote declaration to the USPTO concerning the disclosure of certain features of two patents in previous references.
  - Technology: Traffic mapping between logical channels and transport channels in wireless systems
  - Dates: June 2019.

- Apple, Inc. vs. Wi-LAN
  - Law firm: DLA Piper

  - Represented: Apple (Plaintiff)
  - Served as testifying expert witness for litigation (non-infringing alternatives). **Was deposed. Testified at trial.**
  - Case 3:14-cv-2235-DMS-BLM
  - Technology: Resource Allocation in Wireless Systems
  - District: Southern District of California
  - Dates: November '17 - July '18

- Apple, Inc., LG Electronics Inc., Samsung Electronics Co., Ltd., and Samsung Electronics America, Inc. vs. Uniloc, LLC.
  - Law firm: Fish and Richardson
  - Represented:Apple, Inc., LG Electronics Inc., Samsung Electronics Co., Ltd., and Samsung Electronics America, Inc. (Petitioner)
  - Wrote declarations to the USPTO concerning the disclosure of certain features of two patents in previous references.
  - IPR2019-00219, IPR2019-00222
  - Technology: Traffic mapping between logical channels and transport channels in Wireless Systems; Multi-mode transceivers
  - Dates: September 2018 - November 2019.

- CCE vs. Apple, Inc.
  - Law firm: DLA Piper
  - Represented: Apple (Defendant)
  - Served as testifying expert witness for litigation (infringement analysis). **Was deposed.**
  - 2:15-cv-00576-RWS-RSP
  - Technology: Power Headroom Reporting in Cellular Systems
  - District: Eastern District of Texas
  - Dates: January 2017 - July 2017

- Nokia Technologies vs. Apple, Inc.
  - Law firm: Wilmer-Hale
  - Represented: Apple (Defendant)
  - Served as testifying expert witness for litigation (infringement analysis)
  - Technology: antennas for handheld mobile devices
  - District: Eastern District of Texas
  - Dates: January 2017 - June 2017

- Core Wireless vs. Apple, Inc.
  - Law Firm: Wilmer-Hale
  - Represented: Apple (Defendant)
  - Role: Served as testifying expert witness for litigation (infringement and validity analysis). **Was deposed. Testified at trial.**
  - Case 5:15-cv-5008
  - Technology: Control Channels and Frame Stealing in 2G (GSM) cellular networks.
  - District: The US District Court for the Northern District of California

  - Dates: May 2015 - December 2016.

- AMERICAN SYSTEMS vs. US Navy
  - Law Firm: Miles and Stockbridge
  - Represented: AMERICAN SYSTEMS (Plaintiff)
  - Role: Served as testifying expert witness for litigation (case settled prior to expert reports being filed).
  - Technology: Wireless mesh networks.
  - Dates: Nov. 2014 - June 2015.

- TruPosition,Inc. vs. LM Ericsson Telephone Company, et. al.
  - Law Firm: Constantine-Cannon LLP
  - Represented: TruePosition (Plaintiff)
  - Role: Served as testifying expert witness for litigation. Case settled prior to depositions being taken.
  - Case 2:11-cv-04574-RK
  - Technology: Cellular-based geolocation for 4G (LTE) cellular networks.
  - District: The US District Court for the Eastern District of Pennsylvania
  - Dates: March 2013 - July 2014.

- Andrew, LLC vs TruPosition, Inc.
  - Law Firm: Patterson Belknap Webb & Tyler LLP
  - Represented: Andrew, LLC (Plaintiff)
  - Role: Served as testifying expert witness for patent litigation. **Was deposed.**
  - Civil Action 09-669
  - Technology: Cellular-based (2G, 3G) geolocation.
  - District: The US District Court for the District of Delaware
  - Dates: Nov. 2009 - March 2010.

- TCL vs. Ericcson
  - Law Firm: Sheppard Mullin
  - Provided Services for: TCL (Plaintiff)
  - Role: Served as consulting expert witness for essentiality analysis.
  - Technology: digital communications in 2G, 3G, and 4G cellular systems.
  - District: The US District Court for the Central District of California
  - Dates: March 2015 - December 2015.

- Univ. of Minnesota vs. Sprint
  - Law Firm: McGuire-Woods
  - Provided Services for: Sprint (Defendant)
  - Role: Served as consulting expert for validity analysis.
  - Technology: 4G cellular networks.
  - Dates: October 2015 - January 2016.

- Eon Corp, IP Holdings, LLC vs Research In Motion Corporation, et. al.
  - Law Firm: Sidley-Austin

  - Provided Services for: Research in Motion Corporation (Defendant)
  - Served as consulting expert for patent litigation
  - Technology: Cellular technologies
  - Dates: March 2012

- InterDigital vs. Nokia
  - Law Firm: Alston-Bird LLP
  - Provided Services for: Nokia
  - Served as a consulting expert
  - Technology: Cellular CDMA and power control
  - Date: Oct. 2011 - Dec. 2011.

- SPH America, LLC vs Acer, Inc.
  - Law Firm: Spotts Fain PC
  - Provided Services for: UT Starcomm
  - Role: Served as a consulting expert for patent litigation
  - Technology: CDMA (spread spectrum) and 3G cellular technologies.
  - Dates: Jan. 2011 - March 2011

## References

Available upon request.