Dr. Gregory J. Mazzaro

Curriculum Vitae
updated August 12, 2020

Education

- **Ph.D., Electrical Engineering**, North Carolina State University, *Raleigh, NC*, 2009
- **M.S., Electrical Engineering**, State University of NY at Binghamton, *Binghamton, NY*, 2006
- **B.S., Electrical Engineering**, Boston University, *Boston, MA*, 2004, *summa cum laude*

Areas of Expertise

- Radar: Non-linear and ultra-wideband
- RF electronics and systems
- Electromagnetics

Experience

- **Associate Professor**, The Citadel, Elec. & Comp. Eng. Dept, *Charleston, SC*, 2018-present
- **Engineering Consultant**, Fibertek, Inc., *Herndon, VA*, 2019-present
- **Assistant Professor**, The Citadel, Elec. & Comp. Eng. Dept, *Charleston, SC*, 2013-2018
- **Engineering Consultant**, General Technical Services, LLC, *Wall Township, NJ*, 2014-2019
- **Electronics Engineer**, U.S. Army Research Laboratory, *Adelphi, MD*, 2009-2013
- **Intern**, U.S. Army Research Laboratory, *Adelphi, MD*, Summer 2007
- **Research Assistant**, Electronics Research Lab., N.C. State University, *Raleigh, NC*, 2006-2009
- **Intern**, U.S. Air Force Research Laboratory, *Rome, NY*, Summer 2006
- **Teaching Assistant**, State University of New York, *Binghamton, NY*, 2004-2006

Short Biography

Gregory James Mazzaro was born in Bronxville, NY and raised in Carmel, NY. He earned a Bachelor of Science in Electrical Engineering from Boston University in 2004, a Master of Science from the State University of New York at Binghamton in 2006, and a Ph.D. from North Carolina State University in 2009. While working towards his doctoral degree, Mr. Mazzaro interned at the U.S. Army Research Laboratory (ARL) in Adelphi, MD during the summer of 2007. After graduating, he returned to ARL to work full-time as an Electronics Engineer from 2009 to 2013.

While at ARL, Dr. Mazzaro was a member of the Radio-Frequency (RF) Signal Processing and Modeling Branch of the Sensors and Electron Devices Directorate. His primary responsibilities were (a) to design, prototype, and evaluate RF circuits for linear ultra-wideband radar, (b) to design and conduct experiments for the exploitation of electronic properties of RF devices using nonlinear radar, and (c) to measure and catalogue the electromagnetic properties of soils and energetic materials, in the laboratory as well as in-situ.

Dr. Mazzaro has authored more than 90 publications and has given more than 30 technical talks at national conferences and workshops. He holds 9 patents. His present research focuses on studying the unintended behaviors of RF electronics illuminated by electromagnetic waves and on developing experimental radars for the remote detection and characterization of those electronics.

Dr. Mazzaro joined The Citadel as an Assistant Professor of Electrical Engineering in the Fall of 2013. He has been an instructor for *Fundamentals of Electrical Engineering* (ELEC 106), *Electric Circuit Analysis I* (ELEC 201), *Electric Circuit Analysis II* (ELEC 202), *Electrical Laboratory* (ELEC 204), *Principles of Electrical Engineering* (ELEC 208), *Electronics Laboratory* (ELEC 313), *Electromagnetic Fields* (ELEC 318), *Interference Control in Electronics* (ELEC 425), *Antennas & Propagation* (ELEC 426), *Electromagnetic Compatibility* (ELEC 620), and *RF Systems* (ELEC 625).

Patents, Recognitions, & Other Participations

patents awarded:

"Passive Non-Linear Synthetic Aperture Radar and Method Thereof" (US patent # 10,649,080)
"Method and Apparatus for Detecting Objects using... Radio and Acoustic Signals" (US patent # 10,564,280)
"Methods and Systems for Locating Targets Using Non-Linear Radar ..." (US patent # 10,234,543)
"Multitone Radar with Range Determination and Method of Use" (US patent # 10,203,405)
"Automated Cancellation of Harmonics... Feed-Forward Reflection..." (US patent # 10,018,707)
"Combined Radar Assembly with Linear and Nonlinear Radar" (US patent # 9,476,973)
"Method and Apparatus for Cognitive Nonlinear Radar" (US patent # 9,435,882)
"Multitone Harmonic Radar and Method of Use" (US patent # 9,395,434)
"Method ... for the Measurement of ... Permittivity by a Meander-Line Ring Resonator" (US patent # 9,151,787)

patents pending:

"Benchtop Assembly for Generating, Measuring, & Recording the Acoustic-Radar Response of Electronics"
"Enhanced Passive Transmitter-Based Synthetic Aperture Radar and Method Thereof"

research advisor

internships at the U.S. Army Research Laboratory in Adelphi, MD:
A. J. Sherbondy, "Detection of ... Electronic Radar Targets by Acoustic Modulation of Electromagnetic Waves"
A. J. Sherbondy, "Linearizing an Intermodulation Radar Transmitter"
S. F. McGowan, "Phase Responses of Harmonic Radar Targets"
K. A. Gallagher, "Linearization of a Harmonic Radar Transmitter by Feed-Forward Filter Reflection"
J. M. Wetherington, "High Dynamic Range Measurement System using Analog Cancellation"
J. Hu, "Portable Ring Resonator Permittivity Measurement System"
undergraduate research at The Citadel in Charleston, SC:
W. J. Widener, "Anechoic Chamber Construction and Characterization for the EMITTER Laboratory..."
winner, Design division, Student Excellence Day Poster Session 2018, The Citadel, Mar. 2018
P. J. Singletary and C. A. Smith, "Half-Wave Parabolic Reflector Antenna Optimization"
participants, Citadel Student Research Conference 2015, The Citadel, Mar. 2015
participants, Altair FEKO Student Competition 2015, Sept. 2015
E. R. Eisenach, "Evaluation of an Ultra-Wideband Diplexer for ... UHF and X-Band Operation..."

special member, committee, *Doctor of Philosophy in Electrical Engineering*

Kyle Alexander Gallagher, Pennsylvania State University, graduated Dec. 2015
"Harmonic Radar: Theory and Applications to Nonlinear Target Detection, Tracking, ...and Classification"

senior capstone project advisor

The Citadel, Electrical & Computer Engineering Department, ELEC 421 and ELEC 422
2019-20 -- R. Arnold, A. Bergeron, C. Smith, V. Voskian, R. Weimar -- automatic drink-pouring robot
2018-19 -- M. Collins, M.Corrigan, A. McKenzie, K. Miller -- IEEE SoutheastCon 2019 SHC
2018-19 -- J. Anderson, G. Atwater, A. Shugan, J. Summers -- electronic-scoring cornhole game
2017-18 -- R. Callahan, G. DeCecco, N. Henson, J. Sligh, K. Thomas -- IEEE SoutheastCon 2018 SHC
2017-18 -- C. Braddock, J. Cunningham, A. Sharpe, T. Phucharoen -- IEEE SoutheastCon 2018 SHC
2016-17 -- W. Crosby, T. Deese, M. Gill, W. Pauley, C. Smithey -- "Home Security Monitoring System"
2016-17 -- A. Bracey, J. Clark, K. Hamlin, et. al. -- IEEE SoutheastCon 2017 Student Hardware Competition
2015-16 -- B. Bilbo, G. Evatt, C. Potts, K. Price -- "Port Logistics Robot"
2015-16 -- A. Jordan, B. Shelters, S. Cheshire, S. Bell, T. Brown -- radio-controlled-vehicle jammer
2014-15 -- R. Schroer, D. Keller, et. al. -- IEEE SoutheastCon 2015 Student Hardware Competition
2013-14 -- M. Straniere, P. L. Su, J. S. Bateman, D. S. Jackson -- "The Fluidic Circuit"

committee member, college-wide, The Citadel

Undergraduate Curriculum Committee (college-wide) -- 2017-18, 2018-19, 2019-20 (chairman)
Curriculum & Instruction Committee (college-wide) -- 2015-16, 2016-17
Faculty Awards Committee (college-wide) -- 2014-15, 2015-16
2nd-Year Probationary Review (School of Engineering) -- for N. Washuta and D. Ragan -- 2019

counselor, The Citadel Student Branch of the IEEE
2014-15, 2015-16, 2016-17, 2017-18, 2018-19, 2019-20

award winner
Faculty Excellence in Research, 2017
The Citadel, The Military College of South Carolina
J. Lawton and Emmah S. Ellis Teaching Award, 2017
Department of Electrical and Computer Engineering, The Citadel
U. S. Army Research & Development Achievement, 2012
"Ring-Resonator Technique for Identification of Dielectric Properties of IED Charges and Soils"

instructor, Fundamentals of Engineering Exam Review
"Electromagnetic Physics," Feb. 2018
"Electromagnetic Physics," Mar. 2016
"Electricity & Magnetism," Oct. 2013

facilitator
Citadel Leadership Day
Sophomore Service Project, FIRST Lego League -- Oct. 2014 / 2015 / 2016 / 2017 / 2019
Senior Leadership Integration Seminar, SCANA/SCE&G -- Oct. 2013
Richland County District 2 ALERT
6 visits to the Electrical & Computer Engineering Department -- Fall 2014, Fall 2016
Citadel Pre-Knob Orientations
Department of Electrical & Computer Engineering -- 2013-20

attendee & graduate
Online Teaching Faculty Academy, The Citadel, Spring 2016
Mini-ExCEEd Teaching Workshop, The Citadel, Charleston, SC, Jan. 2014
NATO Advanced Studies Institute, "Unexploded Ordnance Detection and Mitigation," Il Ciocco, Italy, Aug. 2008

session chairman/moderator
SPIE Defense & Commercial Sensing
"Algorithms and Processing I," Radar Sensor Technology XXIV conference, Anaheim, CA, Apr. 2020
"System Development," Radar Sensor Technology XXIII conference, Baltimore, MD, Apr. 2019
"Algorithms and Processing I," Radar Sensor Technology XXII conference, Orlando, FL, Apr. 2018
"Components and Technology," Radar Sensor Technology XXI conference, Anaheim, CA, Apr. 2017
"Indoor and Urban Imaging," Radar Sensor Technology XXI conference, Anaheim, CA, Apr. 2017
"Programs and Systems," Radar Sensor Technology XX conference, Baltimore, MD, Apr. 2016
ASEE Annual Conference & Exposition
"Electromagnetics & Power Education," New Orleans, LA, June 2016
SPIE Defense, Security, & Sensing
"Nonlinear Radar," Radar Sensor Technology XIX conference, Baltimore, MD, Apr. 2015
"Programs and Systems," Radar Sensor Technology XVIII conference, Baltimore, MD, May 2014
"Phenomenology," Radar Sensor Technology XVI conference, Baltimore, MD, Apr. 2012
"Through-the-Wall Sensing," Radar Sensor Technology XVI conference, Baltimore, MD, Apr. 2012
"Through-the-Wall Radar," Radar Sensor Technology XV conference, Orlando, FL, Apr. 2011
"Phenomenology," Radar Sensor Technology XV conference, Orlando, FL, Apr. 2011

technical program committee member
IEEE International Radar Conference, Washington, DC, Apr. 2020
SPIE Defense & Commercial Sensing, Anaheim, CA, Apr. 2020
IEEE SouthEastCon, Raleigh, NC, Mar. 2020
IEEE Radar Conference, Boston, MA, Apr. 2019
SPIE Defense & Commercial Sensing, Baltimore, MD, Apr. 2019
IEEE Radar Conference, Oklahoma City, OK, Apr. 2018
SPIE Defense & Commercial Sensing, Anaheim, CA, Apr. 2017

SPIE Defense & Commercial Sensing, Baltimore, MD, Apr. 2016
IEEE SouthEastCon, Norfolk, VA, Mar. 2016
SPIE Defense, Security, & Sensing, Baltimore, MD, Apr. 2015
SPIE Defense, Security, & Sensing, Baltimore, MD, May 2014
IEEE SouthEastCon, Nashville, TN, Mar. 2011
IEEE SouthEastCon, Charlotte, NC, Mar. 2010

certifications:
IPC Specialist J-STD-001 (Requirements for Soldered Electrical & Electronic Assemblies), # J001-S 18024968
Engineer-in-Training -- passed Fundamentals of Engineering (FE) exam, Boston, MA, Apr. 2004

reviewer, technical publications
MDPI Applied Sciences journal -- July 2018, July 2020
IEEE Wireless Communications Magazine -- June 2020
MDPI Data journal -- May 2020
MDPI Sensors journal -- June 2016, Aug. 2016, Dec. 2017, Mar. 2018, Apr. 2020
IEEE Microwave and Wireless Components Letters -- June 2013, Aug. 2013, Dec. 2019
EuMA International Journal of Microwave and Wireless Technologies -- Dec. 2016, Mar. 2017, Dec. 2019
IEEE Sensors Letters -- Feb. 2017, Mar. 2017, May 2017, Dec. 2017, June 2018, Mar. 2019, Sept. 2019
IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing -- Oct. 2017
IEEE Transactions on Geoscience & Remote Sensing -- June 2017
Ecology and Evolution -- Mar. 2017
IEEE Signal Processing Letters -- Feb. 2017
AEU International Journal of Electronics and Communications -- Oct. 2016
IEEE Sensors journal -- Dec. 2013

reviewer, proposals
Army Research Office grants -- Apr. 2015, Jan. 2020
John Wiley & Sons, Inc. new textbooks -- Dec. 2015, Feb. 2016

memberships:
Institute of Electrical & Electronics Engineers (IEEE)
Student Member, 2004-2009 // Member, 2009-2015 // Senior Member, 2015-present
Tau Beta Pi (TBP) honor society, 2015-present
Standoff Inverse Analysis & Manipulation of Electronic Systems group, N.C. State University, 2006-2009

Invited Talks

G. J. Mazzaro, K. D. Sherbondy, and K. A. Gallagher, "Detection of Passive-Infrared-Triggered Devices by Nonlinear Radar," *45-minute seminar*, U.S. Army Research Laboratory, Adelphi, MD, June 2018.

G. J. Mazzaro, A. J. Sherbondy, K. A. Gallagher, and K. D. Sherbondy, "Hybrid Acoustic-Electromagnetic Radar for Finding and Identifying Electronic Devices," seminar provided to the *Charleston Chapter of Sigma Xi* at The Citadel, Charleston, SC, Apr. 2018.

G. J. Mazzaro, A. J. Sherbondy, K. A. Gallagher, M. R. Judy, and K. D. Sherbondy, "Nonlinear Radar & Acousto-RF Effects," *45-minute seminar*, U.S. Army Research Laboratory, Adelphi, MD, Aug. 2017.

G. J. Mazzaro, A. F. Martone, K. A. Gallagher, and R. M. Narayanan, "Nonlinear Radar for Remotely Finding and Identifying Handheld Electronics," seminar provided to the *Citadel Student Branch of the IEEE*, Charleston, SC, Apr. 2017.

G. J. Mazzaro, A. F. Martone, and K. A. Gallagher, "Nonlinear Radar for Remotely Locating and Identifying Electronic Devices," seminar provided to the *Charleston Chapter of Sigma Xi* at The Citadel, Charleston, SC, Apr. 2015.

G. J. Mazzaro, A. F. Martone, and K. A. Gallagher, "Using Radar to Locate and Identify RF Electronics," seminar provided to the *Coastal South Carolina Section of the IEEE*, Charleston, SC, Dec. 2014.

G. Mazzaro, K. Sherbondy, B. Phelan, and F. Koenig, "Introduction to Stepped-Frequency Radar," *90-minute seminar*, U.S. Army Research Laboratory, Adelphi, MD, June 2013.

G. J. Mazzaro and A. J. Sullivan, "Dielectric Characterization of Materials & Electromagnetic Modeling of UWB GPR for Buried HME Detection," *MSS Tri-Service Radar Symposium, Counter-IED workshop*, Boulder, CO, June 2012.

M. Higgins, G. Mazzaro, A. Martone, D. McNamara, D. Vance, "REDLINE and Sensitive RF Overview," *MSS Tri-Service Radar Symposium, Counter-IED workshop*, Boulder, CO, June 2012.

M. Higgins, M. Berry, G. Mazzaro, and B. Nelson, "The Army Research Laboratory REDLINE Program," *Directed Energy Systems Symposium*, Gaithersburg, MD, Apr. 2012.

G. J. Mazzaro, "Nonlinear Radar Concepts," *RF Signal Processing & Modeling Branch briefing*, U.S. Army Research Laboratory, Adelphi, MD, Jan. 2012.

M. Steer, J. Wilkerson, G. Mazzaro, and J. Wetherington, "Passive Intermodulation Distortion in Microwave Systems," *Fall Meeting of the IEEE Microwave Theory & Techniques Society and Antennas & Propagation Society*, Bergen, Norway, Oct. 2011.

G. J. Mazzaro, K. D. Sherbondy, G. D. Smith, R. W. Harris, and A. J. Sullivan, "Characterization of Dielectric Materials using Ring Resonators," *U.S. Army Research Laboratory Technical Advisory Board laboratory demonstration*, Adelphi, MD, May 2011.

M. Steer, J. Wilkerson, and G. Mazzaro, "Passive Intermodulation Distortion and Managing Co-Site Interference," *14th Annual Landmine & Buried Explosive Object Detection Research Review Meeting*, Washington, DC, Feb. 2011.

G. Mazzaro, K. Sherbondy, and J. Hu, "Portable Ring-Resonator Permittivity Measurement System," *USNC-URSI National Radio Science Meeting*, Boulder, CO, Jan. 2011.

G. J. Mazzaro, "Time-Frequency Effects in Wireless Communication Systems," *RF Signal Processing & Modeling Branch briefing*, U.S. Army Research Laboratory, Adelphi, MD, Oct. 2010.

Publications (93)

Journal Articles (10)

R. M. Narayanan, K. A. Gallagher, G. J. Mazzaro, A. F. Martone, and K. D. Sherbondy, "Hardware Design of a High Dynamic Range Radio Frequency Harmonic Measurement System," *MDPI Instruments*, Vol. 2, No. 3, 16 pages, 2018.

G. J. Mazzaro, A. F. Martone, K. I. Ranney, and R. M. Narayanan, "Nonlinear Radar for Finding RF Electronics: System Design and Recent Advancements," *IEEE Transactions on Microwave Theory & Techniques*, Vol. 65, No. 5, pp. 1716-1726, May 2017.

K. A. Gallagher, R. M. Narayanan, G. J. Mazzaro, A. F. Martone, and K. D. Sherbondy, "Static and Moving Target Imaging using Harmonic Radar," *MDPI Electronics*, Vol. 6, No. 2, 30 pages, 2017.

A. F. Martone, K. A. Gallagher, K. D. Sherbondy, K. I. Ranney, T. V. Dogaru, G. J. Mazzaro, and R. M. Narayanan, "Adaptable Bandwidth for Harmonic Step-Frequency Radar," *International Journal of Antennas and Propagation*, Vol. 2015, Article 808093, 15 pages, 2015.

G. J. Mazzaro, A. F. Martone, and D. M. McNamara, "Detection of RF Electronics by Multitone Harmonic Radar," *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 50, No. 1, pp. 477-490, Jan. 2014.

G. J. Mazzaro, M. B. Steer, and K. G. Gard, "Intermodulation Distortion in Narrowband Amplifier Circuits," *IET Microwaves, Antennas, & Propagation*, Vol. 4, No. 9, pp. 1149-1156, Sept. 2010.

G. J. Mazzaro, K. G. Gard, and M. B. Steer, "Linear Amplification by Time-Multiplexed Spectrum," *IET Circuits, Devices, & Systems*, Vol. 4, No. 5, pp. 392-402, Sept. 2010.

C. S. Saunders, G. J. Mazzaro, and M. B. Steer, "Robust Reduced-Order Modeling of Distributed Linear Networks," *IET Microwaves, Antennas, & Propagation*, Vol. 4, No. 7, pp. 962-973, July 2010.

G. J. Mazzaro, M. B. Steer, and K. G. Gard, "Filter Characterization Using One-Port Pulsed RF Measurements," *IET Microwaves, Antennas, & Propagation*, Vol. 3, No. 2, pp. 303-309, Mar. 2009.

G. J. Mazzaro, M. B. Steer, K. G. Gard, and A. L. Walker, "Response of RF Networks to Transient Waveforms: Interference in Frequency-Hopped Communications," *IEEE Transactions on Microwave Theory & Techniques*, Vol. 56, No. 12, pp. 2808-2814, Dec. 2008.

Conference Proceedings (58)

G. J. Mazzaro, K. A. Gallagher, K. D. Sherbondy, and A. F. Martone, "Nonlinear Radar: A Historical Overview and a Summary of Recent Advancements," *Proceedings of the SPIE*, Vol. 11408, pp. 114080E(1-16), May 2020.

G. Mazzaro, K. Gallagher, and K. Sherbondy, "Nonlinear Junction Detection vs. Electronics: System Design and Improved Linearity," presented at the *IEEE 2020 International Radar Conference*, Washington, DC, Apr. 2020.

G. J. Mazzaro, B. H. Knapp, K. D. Sherbondy, and K. A. Gallagher, "Benchtop Assembly for Measuring Acoustic-Radar Responses of Electronic Targets," presented at *IEEE SoutheastCon 2020*, Raleigh, NC, Mar. 2020.

R. Barsanti, G. Mazzaro, and J. Skinner, "Enhancing an Electrical Engineering Communication Course with an FM Demodulator Project," *Transactions on Techniques in STEM Education*, pp. 2-7, Oct.-Dec. 2019.

G. J. Mazzaro, K. A. Gallagher, and K. D. Sherbondy, "Detection of Passive-Infrared-Triggered RF Devices by UHF Harmonic Radar: Concealed Targets & Polarization Study," *Proceedings of the 65th Annual Meeting of the MSS Tri-Service Radar Symposium*, June 2019.

G. J. Mazzaro and K. D. Sherbondy, "Harmonic Nonlinear Radar: From Benchtop Experimentation to Short-Range Wireless Data Collection," *Proceedings of the SPIE*, Vol. 11003, pp. 110030F(1-11), May 2019.

G. J. Mazzaro, "Filter Selection for Wideband Harmonic Radar," presented at *IEEE SoutheastCon 2019*, Huntsville, AL, Apr. 2019.

R. Barsanti, R. Hayne, and G. Mazzaro, "Hands-On Learning: A Four-Year Laboratory Sequence for Electrical Engineering Students," accepted to *2019 ASEE SE Section Annual Conference*, Raleigh, NC, Mar. 2019.

G. J. Mazzaro, K. A. Gallagher, and K. D. Sherbondy, "Detection of Explosively Formed Penetrators by Acoustic Radar," presented at *MSS Battlespace Acoustic and Seismic Sensing, Magnetic & Electric Field Sensors*, Gaithersburg, MD, Oct. 2018.

G. J. Mazzaro, "Hardware Simulation of Harmonic Radar using a Transverse Electromagnetic Cell," *Proceedings of IEEE SoutheastCon*, St. Petersburg, FL, Apr. 2018.

G. J. Mazzaro, A. J. Sherbondy, M. R. Judy, K. A. Gallagher, and K. D. Sherbondy, "Detection of Radio-Frequency Electronics by Acoustic Modulation of Radar Waves," *Proceedings of the SPIE*, Vol. 10633, pp. 106330V(1-13), May 2018.

K. Ranney, K. Gallagher, G. Mazzaro, and S. Freeman, "A Passive, Synthetic Aperture Device Imager," abstract accepted to *MSS Battlespace Acoustic and Seismic Sensing, Magnetic & Electric Field Sensors*, Springfield, VA, Oct. 2017.

G. J. Mazzaro, A. J. Sherbondy, K. I. Ranney, K. D. Sherbondy, and A. F. Martone, "Linearizing an Intermodulation Radar Transmitter by Filtering Switched Tones," *Proceedings of the SPIE*, Vol. 10188, pp. 101881A(1-16), May 2017.

K. A. Gallagher, G. J. Mazzaro, A. F. Martone, K. D. Sherbondy, and R. M. Narayanan, "Recent Non-Linear Radar Research at the Army Research Laboratory," *Proceedings of the SPIE*, Vol. 10188, pp. 101881B(1-9), May 2017.

G. J. Mazzaro and R. J. Hayne, "Instructional Demos, In-Class Projects, and Hands-On Homework: Active Learning for Electrical Engineering using the Analog Discovery," presented at the *2016 ASEE Annual Conference & Exposition*, New Orleans, LA, June 2016.

A. F. Martone, K. I. Ranney, K. D. Sherbondy, K. A. Gallagher, G. J. Mazzaro, and R. M. Narayanan, "An Overview of Spectrum Sensing for Harmonic Radar," presented at the *IEEE International Symposium on Fundamentals of Electrical Engineering*, Bucharest, Romania, June 2016.

G. J. Mazzaro, S. F. McGowan, K. A. Gallagher, K. D. Sherbondy, A. F. Martone, and R. M. Narayanan, "Phase Responses of Harmonics Reflected from Radio-Frequency Electronics," *Proceedings of the SPIE*, Vol. 9829, pp. 98290O(1-14), Apr. 2016.

K. A. Gallagher, G. J. Mazzaro, A. F. Martone, K. D. Sherbondy, and R. M. Narayanan, "Derivation and Validation of the Nonlinear Radar Range Equation," *Proceedings of the SPIE*, Vol. 9829, pp. 98290P(1-13), Apr. 2016.

K. I. Ranney, G. J. Mazzaro, K. A. Gallagher, A. F. Martone, K. D. Sherbondy, and R. M. Narayanan, "Instantaneous, Stepped-Frequency, Non-Linear Radar Part 2: Experimental Confirmation," *Proceedings of the SPIE*, Vol. 9829, pp. 98291P(1-6), Apr. 2016.

G. J. Mazzaro, A. F. Martone, K. A. Gallagher, R. M. Narayayan, and K. D. Sherbondy, "Maximizing Harmonic-Radar Target Response: Duty Cycle vs. Peak Power," *Proceedings of IEEE SoutheastCon 2016*, Norfolk, VA, Mar. 2016.

K. A. Gallagher, R. M. Narayanan, G. J. Mazzaro, K. I. Ranney, A. F. Martone, and K. D. Sherbondy, "Moving Target Indication with Non-Linear Radar," *Proceedings of the IEEE Radar Conference*, pp. 1428-1433, May 2015.

G. J. Mazzaro, K. A. Gallagher, A. F. Martone, K. D. Sherbondy, and R. M. Narayanan, "Short-Range Harmonic Radar: Chirp Waveform, Electronic Targets," *Proceedings of the SPIE*, Vol. 9461, pp. 946108(1-12), Apr. 2015.

K. A. Gallagher, G. J. Mazzaro, A. F. Martone, K. D. Sherbondy, and R. M. Narayanan, "Filter Selection for a Harmonic Radar," *Proceedings of the SPIE*, Vol. 9461, pp. 94610A(1-11), Apr. 2015.

K. A. Gallagher, G. J. Mazzaro, K. I. Ranney, L. H. Nguyen, K. D. Sherbondy, and R. M. Narayanan, "Nonlinear Synthetic Aperture Radar Imaging Using a Harmonic Radar," *Proceedings of the SPIE*, Vol. 9461, pp. 946109(1-11), Apr. 2015.

K. I. Ranney, K. A. Gallagher, K. D. Sherbondy, A. F. Martone, G. J. Mazzaro, and R. M. Narayanan, "Instantaneous, Stepped-Frequency, Nonlinear Radar," *Proceedings of the SPIE*, Vol. 9461, pp. 946122(1-8), Apr. 2015.

E. R. Eisenach and G. J. Mazzaro, "Evaluation of an Ultra-Wideband Diplexer for Simultaneous UHF and X-Band Operation using Modulated Gaussian Pulses," *Proceedings of IEEE SoutheastCon 2015*, Ft. Lauderdale, FL, Apr. 2015.

G. J. Mazzaro, K. A. Gallagher, A. F. Martone, and R. M. Narayanan, "Stepped-Frequency Nonlinear Radar Simulation," *Proceedings of the SPIE*, Vol. 9077, pp. 90770U(1-10), May 2014.

K. A. Gallagher, G. J. Mazzaro, K. D. Sherbondy, R. M. Narayanan, and A. F. Martone, "Automated Cancellation of Harmonics using Feed-Forward Filter Reflection for Radar Transmitter Linearization," *Proceedings of the SPIE*, Vol. 9077, pp. 907703(1-10), May 2014.

A. Martone, K. I. Ranney, G. J. Mazzaro, and D. M. McNamara, "Spectrum Sensing Techniques for Nonlinear Radar," *Proceedings of the SPIE*, Vol. 9077, pp. 90770D(1-11), May 2014.

K. A. Gallagher, R. M. Narayanan, G. J. Mazzaro, and K. D. Sherbondy, "Linearization of a Harmonic Radar Transmitter by Feed-Forward Filter Reflection," *Proceedings of the IEEE Radar Conference*, pp. 1363-1368, May 2014.

G. J. Mazzaro, A. F. Martone, and M. B. Higgins, "RF Device Detection using Nonlinear Radar," *Proceedings of the 59th Annual Meeting of the MSS Tri-Service Radar Symposium*, June 2013.

G. J. Mazzaro and A. F. Martone, "Multitone Harmonic Radar," *Proceedings of the SPIE*, Vol. 8714, pp. 87140E(1-7), May 2013.

A. F. Martone, K. Ranney, A. Hedden, D. McNamara, and G. Mazzaro, "Cognitive Processing for Nonlinear Radar," *Proceedings of the SPIE*, Vol. 8714, pp. 87140H(1-10), May 2013.

B. R. Phelan, M. A. Ressler, G. J. Mazzaro, K. D. Sherbondy, and R. M. Narayanan, "Design of Spectrally Versatile Forward-Looking Ground-Penetrating Radar for Detection of Concealed Targets," *Proceedings of the SPIE*, Vol. 8714, pp. 87140B(1-10), May 2013.

G. Mazzaro, A. Martone, D. McNamara, and M. Higgins, "Nonlinear Radar Responses of RF Devices to Continuous Waves and Switched Tones," *58th Annual Meeting of the MSS Tri-Service Radar Symposium*, Boulder, CO, June 2012.

A. Martone, G. Mazzaro, D. McNamara, and M. Higgins, "Intermodulation Distortion Signatures for Nonlinear Radar," *58th Annual Meeting of the MSS Tri-Service Radar Symposium*, Boulder, CO, June 2012.

K. Ranney, D. Liao, K. Sherbondy, L. Nguyen, G. Kirose, F. Koenig, G. Mazzaro, G. Smith, and K. Kappra, "Scattering Phenomenology of a Relevant In-Road Target," *58th Annual Meeting of the MSS Tri-Service Radar Symposium*, Boulder, CO, June 2012.

K. Sherbondy, K. Kappra, G. Kirose, F. Koenig, G. Mazzaro, L. Nguyen, K. Ranney, G. Smith, M. Felton, K. Gurton, and C. Tran, "Fusion of Radar and Polarimetric IR for Buried Target Detection," *58th Annual Meeting of the MSS Tri-Service Radar Symposium*, Boulder, CO, June 2012.

G. J. Mazzaro, "In-Situ Permittivity Measurements using Ring Resonators," *Proceedings of the SPIE*, Vol. 8361, pp. 836111(1-14), Apr. 2012.

G. Mazzaro, K. Sherbondy, A. Sullivan, W. Folks, and J. McKenna, "Dielectric Characterization of HME-Based IEDs and In-Theater Soils for Ultra-Wide Band (UWB) Ground Penetrating Radar (GPR) Performance Predictions," *MSS Battlespace Acoustic and Seismic Sensing, Magnetic & Electric Field Sensors*, Washington, DC, Oct. 2011.

A. Sullivan, K. Sherbondy, C. Le, and G. Mazzaro, "RF Signature Characterization of Emplaced Homemade Explosives," *MSS Battlespace Acoustic and Seismic Sensing, Magnetic & Electric Field Sensors*, Washington, DC, Oct. 2011.

G. Mazzaro, K. Sherbondy, G. Smith, and J. Hu, "Portable Ring Resonator Permittivity Measurement System," *57th Annual Meeting of the MSS Tri-Service Radar Symposium*, Monterey, CA, June 2011.

A. Martone, G. Mazzaro, D. McNamara, and M. Higgins, "Nonlinear Radar Stand-Off Techniques for RF Device Detection," *57th Annual Meeting of the MSS Tri-Service Radar Symposium*, Monterey, CA, June 2011.

D. McNamara, E. Burke, D. Vance, C. Fazi, A. Martone, G. Mazzaro, B. Stanton, and M. Higgins, "Active Control of Remote Controlled Improvised Explosive Devices (RCIEDs)," *57th Annual Meeting of the MSS Tri-Service Radar Symposium*, Monterey, CA, June 2011.

G. J. Mazzaro, M. A. Ressler, and G. D. Smith, "Attenuation of Front-End Reflections in an Impulse Radar using High-Speed Switching," *Proceedings of the SPIE*, Vol. 8021, pp. 802121(1-13), Apr. 2011.

K. Ranney, L. Nguyen, F. Koenig, G. Kirose, A. Martone, G. Mazzaro, K. Sherbondy, C. Tran, and K. Kappra, "Side-Looking Image Formation with a Maneuvering Vehicle-Mounted Antenna Array," *Proceedings of the SPIE*, Vol. 8021, pp. 80211W(1-11), Apr. 2011.

G. J. Mazzaro and A. F. Martone, "Switched-Tone Nonlinear Radar for Remotely Characterizing RF Devices," *Government Microcircuit Applications and Critical Technology Conference 2011*, Orlando, FL, Mar. 2011.

G. J. Mazzaro, K. I. Ranney, and A. F. Martone, "Remote Identification of RF Devices by Long-Tail Resonance," *56th Annual Meeting of the MSS Tri-Service Radar Symposium*, Orlando, FL, June 2010.

A. Martone, M. Ressler, G. Mazzaro, C. Fazi, D. McNamara, F. Koenig, and E. Burke, "Nonlinear Radar for RF Device Detection," *56th Annual Meeting of the MSS Tri-Service Radar Symposium*, Orlando, FL, June 2010.

K. Sherbondy, K. Ranney, F. Koenig, L. Nguyen, G. Mazzaro, G. Smith, G. Kirose, C. Tran, T. Martone, and M. Ressler, "SIRE Radar Performance Assessment Against EFPs," *56th Annual Meeting of the MSS Tri-Service Radar Symposium*, Orlando, FL, June 2010.

G. J. Mazzaro and K. I. Ranney, "Characterization of RF Front-Ends by Long-Tail Pulse Response," *Proceedings of the SPIE,* Vol. 7669, pp. 76690X(1-8), Apr. 2010.

G. J. Mazzaro, M. B. Steer, and K. G. Gard, "Time-Frequency Effects in Wireless Communication Systems," *Government Microcircuit Applications and Critical Technology Conference 2010*, Reno, NV, Mar. 2010.

G. J. Mazzaro, K. G. Gard, and M. B. Steer, "Low Distortion Amplification of Multisine Signals Using a Time-Frequency Technique," *IEEE MTT-S International Microwave Symposium Digest*, June 2009, pp. 901-904.

G. Mazzaro, M. Steer, K. Gard, A. Melber, and M. Pollack, "Characterization of Radio-Frequency Front-Ends Using Switched-Tone Probes," *Government Microcircuit Applications and Critical Technology Conference 2009*, Orlando, FL, Mar. 2009.

M. B. Steer, N. M. Kriplani, K. G. Gard, J. Hu, and G. J. Mazzaro, "The Origins and Modeling of Co-Site Interference in Military and Commercial Radios," *Government Microcircuit Applications and Critical Technology Conference 2009*, Orlando, FL, Mar. 2009.

M. B. Steer, G. Mazzaro, J. R. Wilkerson, and K. G. Gard, "Exploiting Device-Circuit-Field Interactions in the Time-Frequency Domain," *Government Microcircuit Applications and Critical Technology Conference 2008*, Las Vegas, NV, Mar. 2008.

G. Mazzaro, M. Steer, K. Gard, K. Ranney, K. Kappra, and A. Walker, "Remote Electronic Device Detection Using Switched-Tone Probes," *Government Microcircuit Applications and Critical Technology Conference 2008*, Las Vegas, NV, Mar. 2008.

M. Steer, G. Mazzaro, J. Wilkerson, K. Gard, and A.Walker, "Time-Frequency Effects in Microwave and Radio Frequency Electronics," *2007 International Conference on Signal Processing and Communication Systems*, Gold Coast, Australia, Dec. 2007.

Technical Reports & others (25)

G. Mazzaro, K. Gallagher, K. Sherbondy, and B. Knapp, "Highly Linear Transceiver for a Portable Nonlinear Junction Detector," *U.S. Army Research Laboratory Technical Report*, No. 8957, May 2020.

G. Mazzaro, K. Gallagher, K. Sherbondy, and J. Owen, "Design of a Reconfigurable Transceiver for a Nonlinear Junction Detector," *U.S. Army Research Laboratory Technical Report*, No. 8849, Nov. 2019.

G. J. Mazzaro, K. A. Gallagher, and K. D. Sherbondy, "Measurement of the Acoustic-Radar Response of Electronics and Metals by Excitation with a Modal Thruster in a Transverse Electromagnetic Cell," *U.S. Army Research Laboratory Technical Report*, No. 8625, Jan. 2019.

G. J. Mazzaro, K. A. Gallagher, and K. D. Sherbondy, "Detection of Passive-Infrared-Triggered RF Devices by UHF Nonlinear Radar: Harmonics vs. Intermodulation," *Journal of DoD Research & Engineering*, Dec. 2018.

K. Ranney, K. Gallagher, G. Mazzaro, and S. Freeman, "Passive, Device-Centric, Synthetic Aperture Radar Imaging," *U.S. Army Research Laboratory Technical Report*, No. 8297, Feb. 2018.

G. J. Mazzaro, A. J. Sherbondy, M. R. Judy, and K. A. Gallagher, "Detection of Metallic and Electronic Radar Targets by Acoustic Modulation of Electromagnetic Waves," *U.S. Army Research Laboratory Technical Note*, No. 8076, July 2017.

G. J. Mazzaro, A. J. Sherbondy, K. I. Ranney, and K. D. Sherbondy, "Conversion of Radio-Frequency Pulses to Continuous-Wave Sinusoids by Fast Switching and Narrowband Filtering," *U.S. Army Research Laboratory Technical Note*, No. 0783, Sept. 2016.

S. F. McGowan, G. J. Mazzaro, K. D. Sherbondy, and R. M. Narayanan, "Harmonic Phase Response of Nonlinear Radar Targets," *U.S. Army Research Laboratory Technical Report*, No. 7513, Oct. 2015.

G. J. Mazzaro, K. I. Ranney, K. A. Gallagher, S. F. McGowan, and A. F. Martone, "Simultaneous-Frequency Nonlinear Radar: Hardware Simulation," *U.S. Army Research Laboratory Technical Note*, No. 0691, Aug. 2015.

G. J. Mazzaro, K. A. Gallagher, A. R. Owens, K. D. Sherbondy, and R. M. Narayanan, "Ultra-Wideband Harmonic Radar for Locating Radio-Frequency Electronics," *U.S. Army Research Laboratory Technical Report*, No. 7256, Mar. 2015.

D. McNamara, D. Haugh, D. Wolf, R. Harris, D. Guy, M. Ressler, A. Harrison, C. Fazi, M. Higgins, and G. Mazzaro, "Whistler Developmental System Version 3.0," *U.S. Army Research Laboratory Technical Report*, No. 6688, Nov. 2013.

G. J. Mazzaro and K. D. Sherbondy, "Combined Linear & Nonlinear Radar: Waveform Generation and Capture," *U.S. Army Research Laboratory Technical Report*, No. 6427, Apr. 2013.

G. J. Mazzaro and J. M. Wetherington, "Intermodulation Distortion Measurements using Analog Cancellation," *U.S. Army Research Laboratory Technical Report*, No. 6370, Mar. 2013.

G. J. Mazzaro, A. F. Martone, and D. W. Vance, "Harmonic and Multitone Radar: Data on Current Threats," *U.S. Army Research Laboratory Technical Report*, No. 6315, Feb. 2013.

A. Martone, D. McNamara, G. Mazzaro, and A. Hedden, "Cognitive Nonlinear Radar," *U.S. Army Research Laboratory Memorandum Report*, No. 0837, Jan. 2013.

G. J. Mazzaro and A. F. Martone, "Harmonic and Multitone Radar: Theory and Experimental Apparatus," *U.S. Army Research Laboratory Technical Report*, No. 6235, Oct. 2012.

J. M. Wetherington and G. J. Mazzaro, "High Dynamic Range Measurement System using Analog Cancellation," *U.S. Army Research Laboratory Technical Report*, No. 6234, Oct. 2012.

G. J. Mazzaro and K. D. Sherbondy, "Permittivity Measurements on Homemade Explosives using Ring Resonators," *U.S. Army Research Laboratory Technical Note*, No. 0482, Apr. 2012.

G. Mazzaro, G. Smith, G. Kirose, and K. Sherbondy, "Effect of Cold Temperature on the Dielectric Constant of Soil," *U.S. Army Research Laboratory Technical Note*, No. 0479, Apr. 2012.

G. Mazzaro, K. Sherbondy, G. Smith, M. Ressler, and R. Harris, "Portable Ring-Resonator Permittivity Measurement System: Design & Operation," *U.S. Army Research Laboratory Technical Report*, No. 5993, Apr. 2012.

G. Mazzaro, M. Ressler, G. Smith, and F. Koenig, "Attenuation of Spurious Impulses from an Ultra-Wideband Radar: A High-Speed Switch for the Synchronous Impulse Reconstruction (SIRE) Frontend," *U.S. Army Research Laboratory Technical Report*, No. 5750, Sept. 2011.

G. J. Mazzaro and K. D. Sherbondy, "Ring-Resonator Permittivity Measurements at ALC, July 2011," *U.S. Army Research Laboratory Technical Note*, No. 0443, Sept. 2011.

B. Stanton, F. Koenig, G. Mazzaro, M. Ressler, K. Sherbondy, and G. Smith, "Ultra Wideband (UWB) Synchronous Impulse Reconstruction (SIRE) Radar Upgrade Assessment Field Experiment," *U.S. Army Research Laboratory Technical Report*, No. 5531, Apr. 2011.

G. J. Mazzaro, "Time-Frequency Effects in Wireless Communication Systems," *Ph.D. Dissertation*, North Carolina State University, Raleigh, NC, Oct. 2009.

G. J. Mazzaro, "Analysis and Simulation of the Effects of Atmospheric Turbulence on Optical Wave Propagation," *M.S. Thesis*, State University of New York, Binghamton, NY, May 2006.