

# Raenita A. Fenner

## Curriculum Vitae

Associate Professor of Engineering  
Loyola University Maryland  
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### APPOINTMENTS

April 2017 - Present Department of Engineering Loyola University Maryland

Associate  
Professor

#### **Administrative Positions:**

- \* Chair, Department of Engineering
- \* Director of the African and African American Studies Minor

**Teaching:** Responsible for teaching fundamental undergraduate electrical and computer engineering courses (4 courses per year).

**Research:** Performs research in applied electromagnetic theory, specifically in the area of free space material characterization.

#### **Select Service:**

- \* Chair-Elect, Faculty Advisory Council, Maryland Higher Education Commission (MHEC)
- \* Chair, Natural and Applied Sciences Division Diversity Equity and Inclusion Committee.
- \* Faculty advisor for the Society of Women Engineers.

#### **Grants:**

- \* R.A.Fenner and P. O'Neill. *Integrating Writing into Engineering Labs: Developing Curriculum, Supporting Faculty, and Creating a Writing Fellows Program*. Engineering Information Foundation. June 1, 2017-August 31, 2018. Total:\$23,687.00
- \* W. Romani and R.A.Fenner. *Stories, Context, and Lived Experiences of the Black Entrepreneur*. The Association of Jesuit Colleges and Universities (AJCU). Summer 2021. Total:\$13,818.00
- \* R. Fenner, P. O'Neill, E. Douglas, K. Douglas. *Collaborative Research: Research Initiation: Defining Engineering Quantitative Literacy*. NSF 20-558 PFE: Research Initiation in Engineering Formation. Award Date: June 13, 2022. Total: \$124,904.00.

July 2011 - Present Department of Engineering Loyola University Maryland

Assistant  
Professor

Clare Boothe Luce Professor

### EDUCATION

2007-2011 Michigan State University East Lansing, MI

Ph.D.  
Electrical  
Engineering

Concentration: *Electromagnetics*

Dissertation: "Error Analysis of Free-Space Material Characterization Methods"

Defense Date: April 29th, 2011

Advisor: Dr. Edward J. Rothwell

2005-2007 Michigan State University East Lansing, MI

Master of  
Science  
Electrical  
Engineering

Concentration: *Electromagnetics*

Thesis: "Bandwidth Extension of a Body-Worn Antenna Vest"

Advisor: Dr. Edward J. Rothwell

*Bachelor of Science*      2001-2005      Morgan State University    Baltimore, MD  
Major: Electrical Engineering  
*Magna Cum Laude* · GPA: 3.75

### **RESEARCH EXPERIENCE**

*Research Assistant*      2007-2011      Michigan State University    East Lansing, MI  
Doctoral Research · Electromagnetics Research Lab · Sponsor: Boeing

- \* Performed Rigorous Error Analysis of Common Free-Space Material Characterization Methods
- \* Researched and Developed Novel Free-Space Material Characterization Methods for Conductor-Backed Media
- \* Proved Ineffectiveness of Multiple Overlay Layers for Free-Space Material Characterization Methods
- \* Performed Measurements Using HP 8510 Network Analyzer to Extract Material Parameters using Free-Space Methods

*Research Assistant*      2005-2007      Michigan State University    East Lansing, MI  
Master's Research · Electromagnetics Research Lab

- \* Explored Various Antenna Designs for Body-Worn Antenna Vest
- \* Simulated and Optimized Antenna Designs in FEKO
- \* Designed and Simulated Self-Structuring Antenna Vest using Genetic Algorithms
- \* Fabricated and Measured Self-Structuring Antenna Vest

### **INDUSTRY EXPERIENCE**

*Intern*      Summer 2006      Southwest Research Institute    San Antonio, TX  
Signal Exploitation and Geolocation Division

- \* Researched Body Worn Antenna Vest for 20-150 MHz Frequency Range
- \* Designed a Solution to the Body Worn Antenna Vest Problem

*Intern*      Summer 2005      Southwest Research Institute    San Antonio, TX  
Signal Exploitation and Geolocation Division

- \* Became Proficient in Electromagnetic Simulator Wipl-D Software
- \* Assisted with Antenna Pattern Measurements

*Co-Op*      Summer 2004      NASA Goddard Space Flight Center    Wallops Island, VA  
Wallops Flight Facility

- \* Assisted with Antenna Pattern Measurements
- \* Learned LabView Software
- \* Performed Thermal Cycle Testing
- \* Designed & Validated PCM/FM Link Margin Analysis

*Intern*      Summer 2003      NASA Goddard Space Flight Center    Greenbelt, MD  
Summer Institute in Electrical & Computer Applications

- \* Designed Waveguide Antennas
- \* Tested Waveguides in the Anechoic Chamber and with Vector Network Analyzer
- \* Worked on Communication Subsystem of the Simulated Satellite Project

## TEACHING EXPERIENCE

- Instructor*      *Present*                      Loyola University Maryland    Baltimore, MD  
 Courses Taught:
- \* EG 331: Linear Circuit Analysis
  - \* EG 031: Linear Circuit Laboratory
  - \* EG 333: Signals and Systems
  - \* EG 432: Electronic Circuits
  - \* EG 487: Electromagnetics
  - \* EG 120: MATLAB for Scientists and Engineers
- Teaching Assistant*      *Spring 2011*                      Michigan State University    East Lansing, MI  
 ECE 407: Electromagnetic Compatibility · Electrical & Computer Engineering Department
- Instructor*      *Summer 2009*                      Michigan State University    East Lansing, MI  
 ECE 305: Electromagnetic Fields and Waves I · Electrical & Computer Engineering Department
- Teaching Assistant*      *Spring 2007*                      Michigan State University    East Lansing, MI  
 ECE 407: Electromagnetic Compatibility · Electrical & Computer Engineering Department
- Teaching Assistant*      *Fall 2006*                          Michigan State University    East Lansing, MI  
 ECE 405: Fields and Waves II · Electrical & Computer Engineering Department

## PUBLICATIONS

- Peer Reviewed Journals & Conference Papers*
1. E. Rothwell, R. Fenner and B. Crowgey, "A Simple Time-Domain Method to Characterize a Conductor-Backed Low-Conductivity Material," *Studies in Applied Electromagnetics and Mechanics (Electromagnetic Nondestructive Evaluation XIII)* vol. 33, pp. 53-60, 2010.
  2. Fenner, R. Rothwell, E.J. , "On the Inadequacy of the overlay method for characterizing a conductor-backed material using free-space measurements," *Antennas and Propagation Society International Symposium (APSURSI), 2010 IEEE* , vol., no., pp.1-4, 11-17 July 2010.
  3. Fenner, R. A., E. J. Rothwell, and L. L. Frasch (2012), A comprehensive analysis of free-space and guided-wave techniques for extracting the permeability and permittivity of materials using reflection-only measurements, *Radio Sci.*, 47, RS1004, doi:10.1029/2011RS004755.
  4. Fenner, R.A., E.J. Rothwell, "Deficiency in the Error Propagation Method for Sensitivity Analysis of Free Space Material Characterization Methods," *Proceedings of the Toulouse Space Show 2012, 15th International Symposium of Antenna Technology and Applied Electromagnetics, Toulouse, France, June 25-29, 2012.*
  5. R. A. Fenner, E. J. Rothwell, and L. L. Frasch, "Application of interval analysis on error analysis of reflection-only material characterization methods," *Progress In Electromagnetics Research*, Vol. 142, 231-241, 2013. <http://www.jpier.org/pier/pier.php?paper=13062806>

6. Fenner, R.A.; Keilson, S., "Free space material characterization using genetic algorithms," *Antenna Technology and Applied Electromagnetics (ANTEM)*, 2014 16th International Symposium on, pp.1,2, 13-16 July 2014, doi: 10.1109/ANTEM.2014.6887668
7. Raenita A. Fenner and Edward J. Rothwell, "Effects of Curved Wavefronts on Conductor-Backed Reflection-Only Free-Space Material Characterization Techniques," *International Scholarly Research Notices*, vol. 2015, Article ID 657254, 9 pages, 2015. doi:10.1155/2015/657254
8. Fenner, R., "Analysis of Free Space Material Characterization using Genetic Algorithms," *Antennas and Propagation Society International Symposium (APSURSI)*, 2015 IEEE ,pp.1-2, 19-24 July 2015.
9. Fenner, R. A., E. J. Rothwell, and L. L. Frasch (2016), The dual polarization method for characterization of dielectric materials, *Journal of Electromagnetic Waves and Applications*, doi:10.1080/09205071.2015.1109005.
10. R. A. Fenner; E. J. Rothwell; L. L. Frasch; J. L. Frasch, "Characterization of Conductor-Backed Dielectric Materials With Genetic Algorithms and Free Space Methods," in *IEEE Microwave and Wireless Components Letters* , vol.PP, no.99, pp.1-3 doi: 10.1109/LMWC.2016.2556682
11. R. A. Fenner, J. L. Frasch and E. J. Rothwell, "Characterization of RF magnetic media with free space methods and genetic algorithms," *2016 10th European Conference on Antennas and Propagation (EuCAP)*, Davos, 2016, pp. 1-3. doi: 10.1109/EuCAP.2016.7481239
12. R. A. Fenner, R. Banks and M. Dorsey, "Analysis of Multiple Objective Cost Functions for Free Space Material Characterization with Genetic Algorithms," 2019 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting, Atlanta, GA, USA, 2019, pp. 345-346, doi: 10.1109/APUSNCURSINRSM.2019.8888619.
13. Raenita A. Fenner and Mili Shah, "A Comprehensive Error Analysis of Free-Space Techniques for Extracting the Permeability and Permittivity of Materials Using Reflection-Only Measurements," *Progress In Electromagnetics Research M*, Vol. 103, 151-159, 2021. doi:10.2528/PIERM21052405 <http://www.jpier.org/PIERM/pier.php?paper=21052405>

*Conference Presentations*

1. William Romani, R. Fenner, and Timothy, S.J. Brown, "Promoting Diversity and Equity Through Stories, Context, and Lived Experiences of the Black Entrepreneur," presented at the AACU 2023 Conference on Diversity, Equity, and Student Success, Virtual, Mar. 09, 2023. Accessed: Mar. 10, 2023. [Online].
2. W.Romani and R.A.Fenner. Global Consortium of Entrepreneurship Centers Conference. Baltimore, MD. September 24, 2021.
3. R.A. Fenner, J.L. Frasch, and E.J. Rothwell. "Free Space Material Characterization with Genetic Algorithms and Multiple Objective Cost Functions," presented at the 2016 IEEE AP-S International Symposium and URSI Radio Science Meeting, Fajardo, PR, 2016.
4. R.A. Fenner, J.M. Tomasic, and K.E. Lenz "A Reconfigurable Antenna with Magnetically-Coupled Switches," IEEE AP-S International Symposium and URSI Radio Science Meeting, Chicago, IL, July 8-13, 2012.
5. R. Fenner and S. Keilson, "Student Journaling and Problem Solving Enhancement" Mid-Atlantic Regional Meeting of the ASEE, Newark, DE, April 20-21, 2012.
6. E.J. Rothwell, R.A. Fenner, and L.L. Frasch, "Error Analysis for the General Extraction Formulation of the Permeability and Permittivity of a Material Layer Using Free-Space, Reflection-Only Measurements", IEEE AP-S International Symposium and URSI Radio Science Meeting, Spokane, WA, 2011.
7. E.J. Rothwell, R.A. Fenner, and L.L. Frasch, "Using Angle and Thickness Refinement in the Two-Polarization Method for Free-Space Material Characterization", National Radio Science Meeting, Boulder, CO, January 5-8, 2011.

8. R.A. Fenner, E.J. Rothwell, and L.L. Frasc, "A General Formulation for Extracting the Permeability and Permittivity of a Material Layer Using Free-space, Reflection-only Measurements", National Radio Science Meeting, Boulder, CO, January 5-8, 2011.
9. R.A. Fenner and E.J. Rothwell, "Effects of Wavefront Curvature on the Two-Polarization Method for Material Characterization", IEEE AP-S International Symposium and URSI Radio Science Meeting, Toronto, ON, July 11-17, 2010.
10. R.A. Fenner and E.J. Rothwell, "Error Analysis of the Two-Polarization Method for Material Characterization Using Interval Analysis", IEEE AP-S International Symposium and URSI Radio Science Meeting, Toronto, ON, July 11-17, 2010.
11. R.A. Fenner and E.J. Rothwell, "Error Analysis of the Two-Polarization Method for Material Characterization", IEEE AP-S International Symposium and URSI Radio Science Meeting, Toronto, ON, July 11-17, 2010.
12. O. Akinlabi, R.Fenner, B. Crowgey, and E.J. Rothwell, "Analysis of a Body-Worn Self-Structuring Antenna Vest", IEEE AP-S International Symposium and URSI Radio Science Meeting, Toronto, ON, July 11-17, 2010.
13. R.A. Fenner, E.J. Rothwell, and L.L. Frasc, "Error Analysis for Several Free-Space Material Characterization Methods", 2009 IEEE AP-S International Symposium and USNC/URSI.
14. R.A. Fenner, O. Akinlabi, and E.J. Rothwell, "The Adaptation of a Body-Worn Antenna Vest to Changes in Human Body Position", Poster at the 2009 Women in Electromagnetics Conference.
15. R.A. Fenner, O. Akinlabi, and E.J. Rothwell, "Body-Worn Antenna Adaptation to Changes to Human Body Position", 2009 IEEE AP-S International Symposium and USNC/URSI.
16. R.A. Fenner and E.J. Rothwell, "Bandwidth Extension of a Body-Worn Antenna Vest", USNC/URSI National Radio Science Meeting, Ottawa, June 2007.

#### **AWARDS & FELLOWSHIPS**

- \* National Technical Association Technical Achiever's Award · June 2016
- \* Morgan State University Founder's Day Award · October 2011
- \* Michigan State University, Alliances for Graduate Education and the Professoriate (AGEP) Scholar Award · 2008, 2009, 2010, 2011
- \* Alfred P. Sloan Scholar Fellowship · 2006 - 2010
- \* GEM Master Fellowship (Sponsor: Southwest Research Institute) · 2005 - 2007
- \* Michigan State University, University Enrichment Fellowship · 2005 - 2010
- \* Morgan State Regents Honor Scholarship Award · 2001 - 2005

#### **PROFESSIONAL MEMBERSHIPS**

- \* Senior Member, The Institute of Electrical and Electronics Engineers (IEEE)
- \* Member, American Society of Engineering Education
- \* Member, Tau Beta Pi, The Engineering Honor Society
- \* Society of Women Engineers

#### **SELECT PROFESSIONAL ACTIVITIES**

- \* Reviewer for the *IEEE Transactions on Microwave Theory and Techniques*

- \* Reviewer for the ***IEEE Transactions on Antennas and Propagation***
- \* Review for ***Measurement***
- \* AWIS Women In STEM Panel, September 22nd 2022
- \* GEM Hunt Panelist and Speaker, March 2023
- \* Fall 2021 Teaching Enhancement Workshop Presentation: Silver Linings from COVID - Teaching Electrical Engineering from Home.
- \* Presenter, Virtual Workshop: Teaching Computation Online with MATLAB . Presentation Title: Simulink in Communication Theory.
- \* 2016 IEEE AP-S International Symposium on Antennas and Propagation and USNC/URSI Radio Science Meeting - TH-A1.3P: Multipoint, Array and Broadband Feeds Session Chair
- \* 2015 IEEE AP-S International Symposium on Antennas and Propagation and USNC/URSI Radio Science Meeting - WE-A2.3P: Measurement of material and radiation properties Session Chair
- \* 2015 IEEE AP-S International Symposium on Antennas and Propagation and USNC/URSI Radio Science Meeting - WE-A2.4P: Measured electromagnetic properties of materials
- \* National Technical Association Athletics Competition Volunteer
- \* Faculty advisor for the Loyola University MD Society of Women Engineers collegiate interest group
- \* Advancing the Careers of Women in Science, Technology, Engineering, and Mathematics at Predominantly Undergraduate Institutions through Professional Networks · Fall 2011 - Present
- \* Judge at Western High School's VEX Robotic Competition · February 25, 2012
- \* Judge at the NAACP ACT-SO Engineering Competition · 2018 and 2021
- \* Faculty advisor for the Loyola University Maryland undergraduate team for the NIH Go Viral Challenge · Spring 2012
- \* Technical liaison and judge at the Roland Park Country School Introduce a Girl to Engineering Day · December 2011
- \* Guest Speaker at Annapolis Middle School Career Day · October 2011
- \* Guest Speaker at the Roland Park Country Inner City Youth Outreach Program · July 2011
- \* Chair of the Baltimore/Washington IEEE Women in Engineering Society (2015 - 2019)
- \* Michigan State University Recruiter and Participant at the NSF Emerging Researchers Conference · Washington, D.C. · February 2011
- \* AGEP· Michigan State University · 2011-2007
- \* Mentor for Prospective Students, Enhance Your Future · 2010, 2009, 2008, 2007
- \* Panel Member · Morgan State University's Science Career Workshop · *How to Survive in Graduate School* · Oct 2010
- \* Presenter · Michigan AGEP Alliance Spring Symposium · *Survey of Self-Structuring Antenna Technology*
- \* Panel Member · Michigan State AGEP · *What You Need to Know About Graduate School* · August 2008
- \* Chalk Talk · Michigan State AGEP Meeting · *Understanding Free-Space Material Characterization* · March 2010
- \* Chalk Talk · Michigan State AGEP Meeting · *Basics of Electromagnetics and Self-Structuring Antennas* · April 2008