

**Kristen M. Donnell Hilgedick (Kristen M. Donnell)**

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<b>EDUCATION</b>	Missouri University of Science and Technology (Missouri S&T) PhD Electrical Engineering Dissertation: <u>Development of Embedded Modulated Scatterer Technique: Single- and Dual-Loaded Scatterers</u>	GPA 3.89/4.0 December 2010
	University of Missouri – Rolla (UMR) MS Electrical Engineering Thesis: <u>Microwave Reflection Properties of Mortar Exposed to Chloride Solutions: Measurements and Modeling</u>	GPA 3.87/4.0 August 2003
	Colorado State University (CSU) BS Electrical Engineering	GPA 3.16/4.0 May 2001
<b>PROFESSIONAL AFFILIATIONS</b>	Senior Member, IEEE; Member, HKN, ASEE, ASNT; Registered as Engineer in Training (E.I.T.) in State of Colorado; Amateur Radio License – KC0BLY	
<b>PROFESSIONAL SERVICE</b>	Member of the Administrative Committee (AdCom) IEEE Instrumentation and Measurement Society <ul style="list-style-type: none"><li>• 2013-2014 Vice President of the Membership Development Committee.</li><li>• Appointed member from 2007-2011, elected to AdCom for 2012-2015 term.</li><li>• Distinguished Lecturer Program Chair and Member of Selection Committees for the Graduate Student Fellowship and Course Development Awards.</li><li>• Proposed and implemented annual Graduate Student and Women in Instrumentation and Measurement Panel Discussions at I<sup>2</sup>MTC.</li><li>• Served as Chapter Chair Liaison during 2010-2012.</li><li>• Developed guidelines for Chapter Funding program, Outstanding Chapter Award, Graduate Student Fellowship Award, and Faculty Course Development Award.</li><li>• Reviewer for the IEEE Transactions on Instrumentation and Measurement, Antennas and Propagation, and Sensors Letters.</li><li>• I<sup>2</sup>MTC Session Chair 2010-12, member of the 2013-14 Technical Program Committee.</li><li>• QNDE 2013 Session Co-Chair, ASNT 2104 Session Co-Chair</li></ul>	01/07-Present
	Guest Editor for 2013 special issue entitled “Microwave and Millimeter-Wave Sensors, Systems and Techniques for Electromagnetic Imaging and Materials Characterization” of the International Journal of Microwave Science and Technology	
<b>EXPERIENCE</b>	Assistant Professor, Electrical and Computer Engineering Missouri University of Science and Technology <ul style="list-style-type: none"><li>• Electronics 1, Electromagnetics, Senior Design Project Advisor</li><li>• Faculty Advisor for Mars Rover Design Team</li></ul>	08/12-Present Rolla, MO
	Assistant Teaching Professor, Electrical and Computer Engineering Missouri University of Science and Technology <ul style="list-style-type: none"><li>• Circuits II, Electromagnetics, Senior Design I/II, Nondestructive Testing.</li><li>• Senior Design Project and Student Design Team Faculty Advisor, Electronics II Lab</li></ul>	01/11-08/12 Rolla, MO
	Post-Doctoral Researcher, Missouri S&T Applied Microwave Nondestructive Testing Laboratory ( <i>amntl</i> ) <ul style="list-style-type: none"><li>• Investigated new applications of Microwave NDT for materials characterization.</li><li>• Mentored undergraduate and graduate students.</li></ul>	08/11-08/12 Rolla, MO

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- Taught measurement and modeling techniques to undergraduate students.
- Contributed to proposal development for potential new research funding.

Graduate Research Assistant and Student Instructor, Missouri S&T 01/06-12/10

- Taught undergraduate circuits and electromagnetics courses. Rolla, MO
- Extensive high frequency measurements of embedded linear scatterers.
- Designed and implemented data processing procedure for embedded sensor testing.
- Developed electromagnetic scattering models for linear scatterers/probes.

Electrical Engineer II, Systems Engineer II 08/03-12/05  
Raytheon Company Tewksbury, MA

- Tested numerous components per component specifications.
- Responsible for System and Subsystem Specification Design and Requirements Management/Traceability.

**AWARDS**

IEEE Instrumentation and Measurement Society 2012 Outstanding Young Engineer, Teaching Commendation for 2012-2013 Academic Year, Outstanding Teaching Award for 2011-2012 Academic Year, Recipient of the ASNT Fellowship Award for the 2002-2003 and 2006-2007 academic years, the Missouri S&T Chancellors Fellowship for 2006-2009, and the Missouri S&T University Transportation Center Graduate Fellowship for 2006.

**Sponsored Research:**

1. 07/13-05/14, *Dept. of Transportation*, Co-Principal Investigator (40%), “NUTC/Structural Health Monitoring and Remote Sensing of Transportation Infrastructure Using Embedded Frequency Selective Surfaces”, \$22,858.
2. 07/13-06/14, *University of Missouri Research Board*, Principal Investigator (100%), “Doppler System for Monitoring Sand Production”, \$37,500.00.
3. 07/13-05/14, *Dept. of Transportation*, Principal Investigator (50%), “NUTC/Integrated Embedded Frequency Selective Surface Sensors for Structural Health Monitoring”, \$25,924.00.
4. 06/13-05/14, *Dept. of Transportation*, Principal Investigator (40%), “NUTC/Novel Integrated Nondestructive Testing Methodology for Detection and Evaluation of Corrosion in Cement-Based Materials”, \$26,052.00.
5. 01/13-06/13, *Texas Research Institute at Austin*, Co-Principal Investigator (40%), “RF Material Property Characterization of Non-Conductive Composites”, \$28,000.
6. 9/12-8/15, *National Science Foundation*, Co-Principal Investigator (40%), “Collaborative Research: Understanding Fundamental Aspects of the Alkali Silica Reaction through Microwave and Acoustic Measurements.” Collaboration with Georgia Institute of Technology (Professors K.E. Kurtis and L. Jacobs), \$199,999.

**Graduate Students:**

1. Naga Jaswanth Vutukury, Jan. 2014-Present, MSEE, “Novel Microwave Technique for Detection of Sand Production in Petroleum Wells”
2. Dustin Pieper, July 2013-Present, MSEE, “Integrated Embedded Frequency Selective Surface Sensors for Structural Health Monitoring”.
3. Ali Foudazi, Aug. 2013-Present, PhD EE, “Development of Active Microwave Thermography for Structural Health Monitoring”.
4. Ashkan Hashemi (co-advised), Jan 2013-Present, PhD EE, “Microwave Characterization and Evaluation of Alkali-Silica Reaction (ASR) Gel in Cement-Based Materials”.
5. Sanjay Tadepally, Jan 2013-July 2013, MSEE (switched advisors), “Novel Microwave Technique for Detection of Sand Production in Petroleum Wells”.
6. Dylan Crocker, Aug 2012-Present, MSEE, “Application of Electrically Invisible Antennas to the Modulated Scatterer Technique”.

*Kristen M. Donnell*

**Senior Design Projects Advised:**

1. “Science Center Demo - Interactive Route 66 Map”, Advisor, Team of 4 Students, Jan-Dec 2013.
2. “Plasma Speaker”, Advisor, Team of 4 students, Aug 2012–May 2013.
3. “Science Center Demo – Puzzle of Electrical Engineering”, Co-advisor, Team of 4 students, Aug 2012-May 2013.
4. “Musical Tesla Coil Demo”, Advisor, Team of 4 Students, Jan-Dec 2012.
5. “One Dimensional Microwave Array”, Co-advisor, Team of 4 students, Jan-Dec 2012.

**Graduate Committee Membership**

1. Matt Kempin, MSEE, August 2013
2. Mojtaba Fallapour, PhD, December 2013

### Refereed Journal Publications:

1. **Donnell, K.M.**, A. McClanahan, and R. Zoughi, "On the Crack Characteristic Signal from an Open-Ended Coaxial Probe", *submitted for publication in the IEEE Transactions on Instrumentation and Measurement*.
2. **Donnell, K.M.**, S. Hatfield, R. Zoughi and K.E. Kurtis, "Wideband Microwave Characterization of Alkali-Silica Reaction (ASR) Gel in Cement-Based Materials", *Materials Letters*, vol. 90, pp. 159-161, Jan 2013.
3. **Donnell, K.M.**, K. E Kurtis, and R. Zoughi, "Demonstration of Microwave Method for Detection of Alkali-Silica Reaction (ASR) Gel in Cement-Based Materials", *Cement and Concrete Research*, vol. 44, pp. 1-7, Feb. 2013, DOI: 10.1016/j.cemconres.2012.10.005.
4. **Donnell, K.M.** and R. Zoughi, "Application of Embedded Dual-Loaded Modulated Scatterer Technique (MST) to Multilayer Structures," *IEEE Transactions on Instrumentation and Measurement*, vol. 61, no. 10, pp. 2809-2816, October 2012.
5. **Donnell, K. M.** and R. Zoughi, "Detection of Corrosion in Reinforcing Steel Bars Using Microwave Dual-Loaded Differential Modulated Scatterer Technique", *IEEE Transactions on Instrumentation and Measurement*, vol. 61, no. 8, pp. 2320 - 2322, August 2012.
6. **Donnell, K. M.**, M. A. Abou-Khousa, M. Belayneh, and R. Zoughi, "Dual-Loaded Modulated Dipole Scatterer as an Embedded Sensor," *IEEE Transactions on Instrumentation and Measurement*, vol. 60, no. 5, pp. 1884-1892, 2011.
7. **Donnell (Muñoz), K.** and R. Zoughi, "Improvement of Probe Response Extraction Using Time Domain Gating for Embedded Modulated Scatterer Technique", *Materials Evaluation*, vol. 66, no. 10, pp. 1084-1090, October 2008
8. **Donnell (Muñoz), K.**, B. Akuthota, E. Gallaher, and R. Zoughi, "Microwave Reflection Properties of Mortar Possessing a Cyclically Ingressed Sodium Chloride Profile", *Materials Evaluation*, vol. 62, no. 10, pp 1049-1056, October 2004. Winner of 2005 American Society for Nondestructive Testing (ASNT) Outstanding Paper Award.
9. Zoughi, R., J. Lai and **K. Donnell (Muñoz)**, "A Brief Review of Microwave Inspection of Stratified Composite Structures: A Comparison Between Plane-Wave and Near-Field Approaches", *Materials Evaluation*, vol. 60, no. 2, pp. 171-177, February 2002.
10. Hughes, D., N. Wang, T. Case, **K. Donnell**, R. Zoughi, R. Austin and M. Novack, "Microwave Nondestructive Detection of Corrosion Under Thin Paint and Primer in Aluminum Panels", *Special Issue of Subsurface Sensing Technologies and Applications: on Advances and Applications in Microwave and Millimeter Wave Nondestructive Evaluation*, vol. 2, no. 4, pp. 435-451, 2001.

### Conference Proceedings and Presentations:

1. Hilgedick, S., J.N. Vutukury, and K.M. Donnell, "Application of Open-Ended Coaxial Probes for Detection of Sand Production from Petroleum Wells", *to appear in the Proceedings of the International Instrumentation and Measurement Technology Conference*, May 12-15, 2014, Montevideo, Uruguay.
2. Foudazi, A., M.T. Ghasr, and K.M. Donnell, "Application of Active Microwave Thermography to Delamination Detection", *to appear in the Proceedings of the International Instrumentation and Measurement Technology Conference*, May 12-15, 2014, Montevideo, Uruguay.
3. Hashemi, A. K.M. Donnell, R. Zoughi, M.L.C. Knapp, and K.E. Kurtis, "Microwave Detection of Carbonation in Mortar Using Dielectric Property Characterization", *to appear in the Proceedings of the International Instrumentation and Measurement Technology Conference*, May 12-15, 2014, Montevideo, Uruguay.

4. Hilgedick, S., J.N. Vutukury, and K.M. Donnell, "Comparison of Microwave Sensing Methods for Monitoring Sand Production in Petroleum Wells", *to be presented at the ASNT 23<sup>rd</sup> Research Symposium*, March 24-27, Minneapolis, MN.
5. Foudazi, A., M. Fallahpour, and K.M. Donnell, "Effect of Material Properties on Active Microwave Thermography", *to be presented at the ASNT 23<sup>rd</sup> Research Symposium*, March 24-27, Minneapolis, MN.
6. Foudazi, A., M. Fallahpour, and K.M. Donnell, "Green's Function for Evaluation of Microwave Power used for Active Microwave Thermography", *to be presented at the ASNT 23<sup>rd</sup> Research Symposium*, March 24-27, Minneapolis, MN.
7. Pieper, D., K.M. Donnell, M.T. Ghasr, and E.C. Kinzel. "Integration of Microwave and Thermographic NDT Methods for Corrosion Detection." *40TH Annual Review of Progress in Qualitative Nondestructive Evaluation: Incorporating the 10th International Conference on Barkhausen Noise and Micromagnetic Testing*, vol. 1581, no. 1, pp. 1560-1567. AIP Publishing, 2014.
8. M.T. Ghasr, K.M. Donnell, and S. Maddela, "Materials Characterization of Corrosion-Resistant Thin Film Coatings", *40th Annual Review of Progress in Quantitative Nondestructive Evaluation Conference*, Baltimore, MD, July 21-26, 2013.
9. Hashemi, A., K.M. Donnell, K.E. Kurtis and R. Zoughi, "Comparison of Temporal Characteristics of Microwave Dielectric Properties of Mortar with and without Alkali-Silica (ASR) Gel at R-, S- and X-bands," *40th Annual Review of Progress in Quantitative Nondestructive Evaluation Conference*, Baltimore, MD, July 21-26, 2013.
10. Hashemi, A., S. Hatfield, K.M. Donnell, K.E. Kurtis and R. Zoughi, "Microwave NDE for Health Monitoring of Concrete Structures Containing Alkali-Silica (ASR) Gel," *40th Annual Review of Progress in Quantitative Nondestructive Evaluation Conference*, Baltimore, MD, July 21-26, 2013.
11. Hashemi, A., K.M. Donnell, K.E. Kurtis and R. Zoughi, "Evaluation of Hydration Activity in Mortar with and without ASR Gel Using Microwave Dielectric Property Characterization," *40th Annual Review of Progress in Quantitative Nondestructive Evaluation Conference*, Baltimore, MD, July 21-26, 2013.
12. Knapp, M., A. Paul, S. Hatfield, K.M. Donnell, R. Zoughi, J.Y. Kim, L. Jacobs, and K.E. Kurtis, "Understanding the Fundamental Aspects of ASR-Induced Expansion: A Multidisciplinary Approach", *4th ACerS/ACBM Cements Division Meeting, Advances in Cement-based Materials: Characterization, Processing, Modeling and Sensing*, University of Illinois, Urbana-Champaign, July 8-10, 2013.
13. Hatfield, S., M.A. Hillstrom, D.N. Schultz, T.M. Werckmann, M.T. Ghasr, and K.M. Donnell, "UWB Microwave Imaging Array for Nondestructive Testing Applications", *Proceedings of the IEEE International Instrumentation and Measurement Technology Conference*, Minneapolis, MN, May 2013.
14. Crocker, D. and K.M. Donnell, "Application of Electrically Invisible Antennas to the Modulated Scatterer Technique", *Proceedings of the IEEE International Instrumentation and Measurement Technology Conference*, Minneapolis, MN, May 2013.
15. Tadepally, S., S.A. Hilgedick, and **K.M. Donnell**, "Novel Microwave Sensing Technique for Monitoring Sand Production in Petroleum Wells", *Presented at the 23rd Research Symposium of the American Society for Nondestructive Testing (ASNT)*, Memphis, TN, March 2013.
16. Bouchard, M, and **K.M. Donnell**, "A New Approach to Student Design (Mars Rover Team)", *ASEE Midwest Section 2012 Annual Conference*, August 2012. Second place, Student Poster Competition.
17. Hatfield, S., D. Schultz, **K.M. Donnell** and M.T. Ghasr, "Design of an Antipodal Vivaldi Antenna for use in a Bi-Static Linear Array", *ASEE Midwest Section 2012 Annual Conference*, August 2012.
18. **Donnell, K. M.** and R. Zoughi, "Application of the Dual-Loaded Modulated Scatterer Technique to Multilayered Material Evaluation", *Proceedings of the IEEE International Instrumentation and Measurement Technology Conference*, pp. 43-46, Binjiang, Hangzhou, China, May 2011.

19. **Donnell, K. M.**, M. A. Abou-Khousa, M. Belayneh, and R. Zoughi, "Theoretical and Experimental Foundation of Dual-Loaded Dipole Scatterer as an Embedded Sensor", *Proceedings of the IEEE International Instrumentation and Measurement Technology Conference*, pp. 1091-1095, Austin, TX, May 2010.
20. **Donnell, K. M.** and R. Zoughi, "Mathematical Modeling of the Probe Response for the Modulated Scatterer Technique," *Proceedings of the 4th International Conference on Electromagnetic Near-Field Characterization & Imaging (ICONIC 2009)*, pp. 9-12, Taipei, Taiwan, 24 – 26 June 2009.
21. Abou-Khousa, M. A., **K. M. Donnell** and R. Zoughi, "Robust Embedded Probe Utilizing Dual-Loaded Modulated Linear Scatterers," *Proceedings of the 4th International Conference on Electromagnetic Near-Field Characterization & Imaging (ICONIC 2009)*, pp. 28-32, Taipei, Taiwan, 24 – 26 June 2009.
22. **Donnell (Muñoz), K. M.**, A. K. Perrey, and R. Zoughi, "Potential Application of the Modulated Scatterer Technique to Multilayered Material Evaluation and Health Monitoring," *Proceedings of the IEEE International Instrumentation and Measurement Technology Conference*, pp. 1643-1644, May 2008.
23. **Donnell (Muñoz), K.** and R. Zoughi, "Application of Swept Frequency Measurements to the Embedded Modulated Scatterer Technique", *Proceedings of the 3rd International Conference on Electromagnetic Near-Field Characterization and Imaging (ICONIC)*, pp. 176-181, St. Louis, MO, 2007. First place, Student Poster Contest
24. Akuthota, B., **K. Donnell (Muñoz)**, E. Gallaher, S. Redington, R. Zoughi, and K.E. Kurtis, "Simulation of Microwave Properties of Mortar Cyclically Exposed to Saltwater," *Proceedings of the 1<sup>st</sup> International Conference on Health Monitoring and Intelligent Infrastructure (SHMII)*, pp. 757-762, Tokyo, Japan, November 13-15, 2003.
25. **Donnell (Muñoz), K.**, and R. Zoughi, "Influence of Cyclical Soaking in Chloride Bath and Drying of Mortar on its Microwave Dielectric Properties: The Forward Model", *Proceedings of the Twenty-ninth Annual Review of Progress in Quantitative Nondestructive Evaluation*, vol. 22A, pp. 470-477, Bellingham, Washington, 2002.
26. **Donnell (Muñoz), K.**, C. Behrens, and R. Zoughi, "Potential Capabilities of Microwave NDE Methods for Interrogation of Thermal Barrier Coatings", *Proceedings for the 11<sup>th</sup> International Symposium on Nondestructive Characterization of Materials*, pp. 309-315, June 24-28, 2002.
27. Case, J, S. Peer, **K. Donnell**, D. Hughes, R. Zoughi and K.E. Kurtis, "Investigation of Microwave Reflection Properties of Mortar Exposed to Wet-Dry Cycles of Tap Water and Chloride Bath," *Proceedings of the Twenty-eighth Annual Review of Progress in Quantitative Nondestructive Evaluation*, vol. 21B, pp. 1269-1276, Brunswick, Maine, July 29-August 3, 2001.
28. Case, J., **K. Donnell**, D. Hughes, R. Zoughi and K.E. Kurtis, "Microwave Analysis of Accelerated Chloride Ingress in Type I/II, III and V Mortar," *Proceedings of the Twenty-eighth Annual Review of Progress in Quantitative Nondestructive Evaluation*, vol. 21, Brunswick, Maine, vol. 21A, pp. 489-505, July 29-August 3, 2001.
29. Wang, N., **K. Donnell**, M. Castle, R. Zoughi and M. Novack, "Microwave Detection of Covered Cracks in Metals," *Proceedings of the Twenty-seventh Annual Review of Progress in Quantitative Nondestructive Evaluation*, vol. 20A, pp. 430-437, Ames, IA, July 17-21, 2000.
30. Hughes, D., N. Wang, T. Case, **K. Donnell**, R. Zoughi, R. Austin and M. Novack, "Detection of Corrosion in Aluminum Panels under Paint and Primer," *Proceedings of the Twenty-seventh Annual Review of Progress in Quantitative Nondestructive Evaluation*, vol. 20A, pp. 460-466, Ames, IA, July 17-21, 2000.

#### Technical Reports:

1. **Donnell, K.M.**, S. Hatfield, J. Bacon and R. Zoughi, "RF Material Property Characterization of Non-Conductive Composites," Final Report, Texas Research Institute at Austin (TRI/Austin), p. 28, May 2013.

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2. **Donnell, K. M.**, "Development of Embedded Modulated Scatterer Technique: Single- and Dual- Loaded Scatterers", A Dissertation, Missouri University of Science and Technology, Rolla, MO, December 2010.
3. **Donnell (Muñoz), K.**, "Microwave Reflection Properties of Mortar Exposed to Chloride Solutions: Measurements and Modeling", A Thesis, University of Missouri-Rolla, Rolla, MO, August 2003.
4. Wang, N., **K. Donnell**, M. Castle and R. Zoughi, "Microwave Detection of Cracks in Painted Metallic Substrates," Final Report, Naval Surface Warfare Center, Carderock Division, Bethesda, MD, p. 82, October 2000.
5. **Donnell, K.**, D. Hughes, T. Case and R. Zoughi, "Near-Field Microwave Nondestructive Evaluation of Refractory Bricks," Final Report, Johns Manville, Littleton, CO, p. 51, September 2000.
6. Wang, N., D. Hughes, T. Case, **K. Donnell** and R. Zoughi, "Feasibility Study of Corrosion Detection Under Paint in Aluminum Panels," Final Report, Texas Research Institute at Austin (TRI-Austin), p. 78, July 2000.
7. Qaddoumi, N., T. Bigelow, E. Ranu, M.D. Frank, **K. Donnell**, R. Smiley and R. Zoughi, "Feasibility Study of Near-Field Microwave NDT Methodology for Rubber Hose Inspection," Navy SBIR (N98-007) Phase I Subcontract Final Report, Texas Research Institute at Austin (TRI/Austin), p. 362, October 1998.

**Invited Talks**

1. Donnell, K.M., Invited Speaker, "*Advances in Microwave Materials Characterization for NDT of Complex Structures*", Center for Nondestructive Evaluation, Iowa State University, Sept. 2013.
2. Donnell, K.M., Invited Speaker, "*Applications of Microwave Nondestructive Testing to Materials Characterization*", School of Civil and Environmental Engineering, Georgia Institute of Technology, Feb. 2013.