

Kristen M. Donnell Hilgedick (Kristen M. Donnell)

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EDUCATION	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
PROFESSIONAL AFFILIATIONS	Senior Member, IEEE; Member, HKN, ASEE, ASNT; Registered as Engineer in Training (E.I.T.) in State of Colorado; Amateur Radio License – KC0BLY	
PROFESSIONAL SERVICE	Member of the Administrative Committee (AdCom) IEEE Instrumentation and Measurement Society	01/07-Present
	<ul style="list-style-type: none">• 2013-2014 Vice President of the Membership Development Committee.• Appointed member from 2007-2011, elected to AdCom for 2012-2015 term.• Distinguished Lecturer Program Chair and Member of Selection Committees for the Graduate Student Fellowship and Course Development Awards.• Proposed and implemented annual Graduate Student and Women in Instrumentation and Measurement Panel Discussions at I²MTC.• Served as Chapter Chair Liaison during 2010-2012.• Developed guidelines for Chapter Funding program, Outstanding Chapter Award, Graduate Student Fellowship Award, and Faculty Course Development Award.• Reviewer for the IEEE Transactions on Instrumentation and Measurement, Antennas and Propagation, and Sensors Letters.• I²MTC Session Chair 2010-12, member of the 2013-14 Technical Program Committee.• QNDE 2013 Session Co-Chair, ASNT 2104 Session Co-Chair	
	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	
EXPERIENCE	Assistant Professor, Electrical and Computer Engineering Missouri University of Science and Technology	08/12-Present Rolla, MO
	<ul style="list-style-type: none">• Electronics 1, Electromagnetics, Senior Design Project Advisor• Faculty Advisor for Mars Rover Design Team	
	Assistant Teaching Professor, Electrical and Computer Engineering Missouri University of Science and Technology	01/11-08/12 Rolla, MO
	<ul style="list-style-type: none">• Circuits II, Electromagnetics, Senior Design I/II, Nondestructive Testing.• Senior Design Project and Student Design Team Faculty Advisor, Electronics II Lab	
	Post-Doctoral Researcher, Missouri S&T Applied Microwave Nondestructive Testing Laboratory (<i>amntl</i>)	08/11-08/12 Rolla, MO
	<ul style="list-style-type: none">• Investigated new applications of Microwave NDT for materials characterization.• Mentored undergraduate and graduate students.	

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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".

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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 23rd 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 23rd 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 23rd 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 1st 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 11th 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.