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EDUCATION

Ph.D. E.E. - Systems (1995): UNIVERSITY OF MICHIGAN, Ann Arbor, MI
 Major Kernel: Signal Processing/Systems; Minor Kernel: Electromagnetics/Remote Sensing
 Dissertation Title: *Forward and Inverse Scattering for Discrete Lossy 1-D and Lossless 2-D Media*
 Advisor: Andrew E. Yagle

MSEE (1988): UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, CA
 Specialization: Signal/Image Processing & Communication Theory

BSEE (1986): UNIVERSITY OF SOUTH ALABAMA, Mobile, AL
 Concentration: Communications, Digital Design & Controls

EXPERIENCE

UNIVERSITY OF VERMONT, Burlington, VT	
<i>Professor of Electrical Engineering</i>	July 2016 – present
<i>Chair of Electrical and Biomedical Engineering</i>	July 2017 – present
<i>Fulbright-ČVUT Distinguished Chair</i>	January 2017 – July 2017
Faculty of Electrical Engineering, České Vysoké Učení Technické v Praze	
<i>Interim Chair of Electrical and Biomedical Engineering</i>	July 2016 – January 2017
<i>Co-Founder of Packetized Energy, Burlington VT</i>	May 2016 – present
<i>Associate Professor of Engineering</i>	April 2008 – June 2016
<i>Program Head of Electrical Engineering</i>	July 2014 – January 2016
<i>Academic Visitor (sabbatical)</i>	August 2012 – January 2013
Department of Engineering Science, University of Oxford	
<i>Interim Associate Director – School of Engineering</i>	August 2009 – July 2012
<i>Resident Scientist (sabbatical)</i>	August 2008 – June 2009
Sierra Nevada Aquatic Research Lab, University of California - Santa Barbara	
<i>Assistant Professor in Electrical Engineering</i>	August 2002 – April 2008

Research and Instruction in the areas of Telecommunications and Signal Processing.
Courses Taught: Signals and Systems, Communication Systems, Digital Communication Systems,
 Wireless Communication Systems, Wireless Sensor Networks, First-Year Design, Communications Lab,
 Estimation Theory, Capstone Design I & II, History of Information, Stochastic Processes

TENNESSEE TECHNOLOGICAL UNIVERSITY, Cookeville, TN	August 1998 – August 2002
<i>Assistant Professor in Electrical and Computer Engineering.</i>	

Research and Instruction in the areas of Telecommunications, Physical Phenomena and Signal Processing.
Courses Taught: Introduction to Telecommunications, Telecommunications Theory, Random Processes in
 Electrical Systems, Wireless Communications, Fiber Optics Lab, Wireless Sensor System Design,
 Introduction to MEMS Technology.

INDEPENDENT CONSULTANT	August 1995 – July 1998
<i>Shinawatra, Thailand.</i> Research in the area of advanced broadband satellite systems.	
<i>Hughes Aircraft Company.</i> Consultation in the areas of communication spacecraft design and testing.	
<i>Binariang Sdn. Bhd., Malaysia.</i> Monitored the build of two high power communication satellites.	

HUGHES AIRCRAFT COMPANY, Los Angeles, CA September 1986 – July 1995
Hughes Information Technology Co.: Acoustic and vibration signal analysis for fault detection and classification in rotating automobile components.
Space and Communications Group: Spacecraft system engineer directly responsible for payloads on numerous commercial communication satellites.

PUBLICATION SUMMARY

Peer-reviewed journal publications: 39 (24 with mentored students)

Peer-reviewed conference papers: 106 (53 with mentored students)

Book chapters: 3

Citations (summary values as of May 22, 2020):

- Google Scholar (GS) h-factor: 19; 1651 citations.
- Citation numbers from Google Scholar provided for articles contributing to h-factor calculation designated by *.

JOURNAL PUBLICATIONS (MENTORED STUDENTS UNDERLINED)

- [XX] S. Chowdhury, J. Frolik and A. Benslimane, *Configuration of tripolar antennas in multihop IoT networks*, in development, IEEE Internet of Things Journal.
- [39] M. Golmohamadi and J. Frolik, *A geometric scattering model for circularly polarized indoor channels*, IEEE Transactions Antennas and Propagation, Vol. 68, No. 3, March 2020.
- [38] S. Chowdhury and J. Frolik, *Coordinating three-branch diversity switching using a hidden Markov model*, IEEE Internet of Things Journal, Vol. 7, No. 1, January 2020.
- [37] M. Golmohamadi, A. Narbudowicz and J. Frolik, *Mitigating indoor channels with quadpolarization diversity*, IEEE Antenna and Wireless Propagation Letters, Vol. 18, No. 6, June 2019.
- [36] M. Golmohamadi and J. Frolik, *A 3D Stokes framework for wireless depolarized channels*, Progress In Electromagnetics Research Letters (PIERL), Vol. 83, 2019.
- [35] J. Frolik, J. Lens, M. Dewoolkar and T. Weller, *Effects of soil characteristics on passive wireless sensor interrogation*, IEEE Sensors Journal, Vol. 18, No. 8, April 2018.
- [34] S. Hamshaw, T. Bryce, J. O’Neil Dunne, D. Rizzo, J. Frolik and M. Dewoolkar, *Quantifying streambank movement and topography using unmanned aircraft system (UAS) photogrammetry with comparison to terrestrial laser scanning (TLS)*, River Research and Applications, July 2017.
- [33] J. Frolik and M. Golmohamadi, *On random and multidimensional channel effects in cluttered environments*, IEEE Antennas and Wireless Propagation Letters, Vol. 16, December 2017. One of nine letters selected for special cluster on “Impact of User-Related Randomness on Antennas and Channels”.
- [32] I. Nassar, J. Wang, T. Weller and J. Frolik, *A high-efficiency, miniaturized sensor node with 3-D machined-substrate antennas for embedded wireless monitoring*, IEEE Sensors Journal, Vol. 15, No. 9, September 2015.
- [31] *Z. Xiao, H. Wen, A. Markham, N. Trigoni, P. Blunsom, and J. Frolik, *Non-line-of-sight identification and mitigation using received signal strength*, IEEE Transactions Wireless Communications, Vol. 14, No. 3, March 2015.
- [30] A. Seier, P. Hines, and J. Frolik, *Data-driven thermal modeling of residential service transformers*, IEEE Transactions Smart Grid: Special Issue on Asset Management in Smart Grid, Vol. 6, No. 2, March 2015.
- [29] J. Frolik, V. Sipal and D. Edwards, *Leveraging depolarization to increase the link reliability for wireless sensors operating in hyper-Rayleigh environments*, IEEE Sensors Journal: Special Issue on Antenna Design and Integration in Smart Sensors, Vol. 14, No. 8, August 2014.

- [28] *P. Rezaei, J. Frolik and P. Hines, *Packetized plug-in electric vehicle charge management*, IEEE Transactions Smart Grid, Vol. 5, No. 2, March 2014. Also presented at the IEEE Power & Energy Society General Meeting, Washington DC, July 27-29, 2014.
- [27] J. Frolik, *A practical metric for fading environments*, IEEE Wireless Communications Letters, Vol. 2, No. 2, April 2013.
- [26] J. Frolik, P. Flikkema, T. Weller, C. Haden, W. Shiroma and R. Franklin, *Leveraging multi-university collaboration to develop portable and adaptable online course content*, ASEE Advances in Engineering Education (online), Vol. 3, No.3, Winter 2013.
- [25] *I. Nassar, T. Weller and J. Frolik, *A compact 3-D harmonic repeater for passive wireless sensing*, IEEE Transactions Microwave Theory and Techniques, Vol. 60, No. 10, October 2012.
- [24] G. Carpenter and J. Frolik, *Error-constrained frequency selection for wireless sensor network beamforming*, IEEE Wireless Communications Letters, Vol. 1, No. 3, June 2012.
- [23] *D. Qian, J. Marshall and J. Frolik, *Control analysis for solar panel dust mitigation using an electric curtain*, Renewable Energy, Vol. 41, December 2011.
- [22] L. Chen and J. Frolik, *Self-aware, distributed consensus building for sensor networks*, ISRN (International Scholarly Research Network) Communications and Networking Journal, Vol. 2011, Article ID: 860936, December 2011.
- [21] *D. Matolak and J. Frolik, *Worse-than-Rayleigh fading: experimental results and theoretical models*, IEEE Communications Magazine, Vol. 49, No. 4, April 2011.
- [20] *L. Chen, G. Carpenter, S. Greenberg, J. Frolik and X. Wang, *An implementation of decentralized consensus building in a sensor network*, IEEE Sensors Journal: Special Issue on Cognitive Sensor Networks, Vol. 11, No. 3, March 2011.
- [19] *J. Frolik, T. Weller, S. DiStasi and J. Cooper, *A compact reverberation chamber for hyper-Rayleigh channel emulation*, IEEE Trans. Antennas and Propagation, Vol. 57, No. 12, December 2009.
- [18] B. Liang, J. Frolik and X. Wang, *Energy-efficient dynamic spatial resolution control for wireless sensor clusters*, Int. Journal of Distributed Sensor Networks, Vol. 5, No. 4, July 2009.
- [17] *L. Bakir and J. Frolik, *Diversity gains in two-ray fading channels*, IEEE Trans. Wireless Communications, Vol. 8, No. 2, February 2009.
- [16] *J. Frolik, *On appropriate models for characterizing hyper-Rayleigh fading*, IEEE Trans. Wireless Communications, Vol. 7, No. 12, December 2008.
- [15] *J. Kay and J. Frolik, *An expedient wireless sensor automaton with system scalability and efficiency benefits*, IEEE Trans. Systems, Man and Cybernetics, Part A, Vol. 38, No. 6, November 2008.
- [14] R. Ketcham, J. Frolik and J. Covell, *Propagation measurement and statistical modeling for wireless sensor systems aboard helicopters*, IEEE Trans. Aerospace and Electronic Systems, Vol. 44, No. 4, October 2008.
- [13] J. Frolik, *Implementation of handheld, RF Test equipment in the classroom and the field*, IEEE Trans. Education, Vol. 50, No. 3, August 2007.
- [12] *J. Frolik, *A case for considering hyper-Rayleigh fading channels*, IEEE Trans. Wireless Communications, Vol. 6, No. 4, April 2007.
- [11] J. Frolik and M. Fortney, *A low-cost wireless platform for first year, interdisciplinary projects*, IEEE Trans. Education, Vol. 49, No. 1, February 2006.
- [10] *J. Frolik and J.B. Zurn, *Evaluation of Tablet PCs for engineering instruction and content development*, ASEE Computers in Education Journal, Vol. 15, No. 3, July-September 2005.
- [9] J.L. Frolik, *On the feasibility of impulse reflection response data from one-dimensional multilayered lossy media*, IEEE Trans. Ant. and Prop., Vol. 51, No.2, February 2003.
- [8] J.L. Frolik and T.M. Weller, *Wireless sensor system design: an approach for a multi-university design course offering*, IEEE Trans. Education, Vol. 45, No. 2, May 2002.
- [7] *J.L. Frolik, M. Abdelrahman and P. Kandasamy, *A confidence based approach to self-validation, synthesis and fusion of quasi-redundant sensors*, IEEE Trans. Instrumentation and Measurement, Vol. 50, No. 6, December 2001.
- [6] J.L. Frolik, *Reconstruction of multilayered lossy media from one-sided plane wave impulse reflection responses: the bistatic case*, IEEE Trans. Geo. & Rem. Sens., Vol. 39, No. 9, September 2001.

- [5] J.L. Frolik and A.E. Yagle, *Forward and inverse scattering for discrete layered lossy and absorbing media*, IEEE Trans. Circuits and Systems-II, Vol. 44, No. 9, September 1997.
- [4] A.E. Yagle and J.L. Frolik, *On the feasibility of impulse reflection response data for the two-dimensional inverse scattering problem*, IEEE Trans. Ant. and Prop., Vol. 44, No. 12, December 1996.
- [3] J.L. Frolik and A.E. Yagle, *A discrete-time formulation for the variable wave speed scattering problem in two dimensions*, Inverse Problems, Vol. 12, No. 6, June 1996.
- [2] J.L. Frolik and A.E. Yagle, *An asymmetric discrete-time approach for the design and analysis of periodic waveguide gratings*, IEEE J. Lightwave Tech., Vol. 13, No. 2, February 1995.
- [1] J.L. Frolik and A.E. Yagle, *Reconstruction of multi-layered lossy dielectrics from plane wave impulse responses at two angles of incidence*, IEEE Trans. Geo. & Rem. Sens., Vol. 33, No. 2, February 1995.

BOOK CHAPTERS

- [3] M. Almassalkhi, L. Duffaut Espinosa, P. Hines, J. Frolik, S. Paudyal, S. Heydari, and M. Amini, *Asynchronous coordination of distributed energy resources with packetized energy management*, Energy Markets and Responsive Grids: Modeling, Control, and Optimization, Springer-Verlag New York, 2018.
- [2] C. Skalka and J. Frolik, *Snowcloud: A complete data gathering system for snow hydrology research*, Real-World Wireless Sensor Networks, Springer International Publishing Switzerland, 2014.
- [1] J. Frolik, T. Weller, P. Flikkema and C. Haden, *Implementing an inverted classroom using Tablet PCs for content development*, The Impact of Tablet PCs and Pen-based Technology on Education: Going Mainstream, Purdue University Press, 2010.

CONFERENCE PAPERS & PRESENTATIONS (MENTORED STUDENTS UNDERLINED)

- [109] T. Laracy and J. Frolik, *A software defined radio interrogator for passive harmonic transponder*. In review. IEEE Wireless & Microwave Technology Conference. Clearwater Beach FL. April 15-17, 2020.
- [108] E. Fennelly and J. Frolik, *Beamforming with a 2.4 GHz Tripolar IoT Antenna*. In review. IEEE Wireless & Microwave Technology Conference. Clearwater Beach FL. April 15-17, 2020.
- [107] R. Ramirez, M. Golmohamadi, J. Jamison, J. Frolik, T. Weller, *Additive manufactured, on-package 2.4 GHz tripolar antenna systems for harsh wireless channels*, In review. IEEE Wireless & Microwave Technology Conference. Clearwater Beach FL. April 15-17, 2020.
- [106] B. Hewgill, R. McGinnis and J. Frolik, *A low-cost modular health monitoring garment*. IEEE Engineering in Medicine and Biology Conference. Montreal QC. June 20-24, 2020.
- [105] A. Doiron, R. McGinnis, J. Bates, J. Uriarte, N. Fiorentino and J. Frolik, *Work in Progress: A vertically-integrated, project-focused approach to undergraduate biomedical engineering education*. ASEE Annual Conference, Montreal QC. June 21-24, 2020.
- [104] S. Chowdhury, L. Hébert-Dufresne and J. Frolik, *Effective implementation of energy aware polarization diversity for IoT networks using eigenvector centrality*. NetSci-X 2020. Tokyo JP. January 20-22, 2020.
- [103] L. Duffaut Espinosa and J. Frolik, *A localized and packetized approach to distributed power inverter management*, IEEE Power and Energy Society General Meeting, Atlanta GA, August 4-8, 2019.
- [102] J. Frolik, *A threshold trade-off study for 3-way switch diversity*, European Conference on Antennas & Propagation, Krakow PL, April 1-5, 2019.
- [101] S. Chowdhury, J. Frolik and A. Benslimane, *Polarization matching for networks utilizing tripolar antenna systems*, 2018 IEEE Global Communications Conference (Globecom), Abu Dhabi UAE, December 9-13, 2018.
- [100] T. Laracy and E. Kravitz (mentored REUs), *Automated 28 GHz channel measurements in multipath environments*, MIT IEEE Undergraduate Research Technology Conference, Cambridge MA, October 5-7, 2018.
- [99] M. Golmohamadi, S. Chowdhury, J. Jamison, E. Kravitz and J. Frolik, *28 GHz channel measurements in high multipath, indoor environments; demonstration with J. Corey*, IEEE International Symposium on Antennas and Propagation, Boston MA, July 8-13, 2018.

- [98] S. Chowdhury, M. Golmohamadi and J. Frolik, *Improving reliability in hybrid mesh networks with tripolar antennas*, IEEE International Symposium on Antennas and Propagation, Boston MA, July 8-13, 2018.
- [97] J. Jamison and J. Frolik, *A software-defined radio approach to multi-link channel characterization*, IEEE Wireless and Microwave Technology Conference (WAMICON), Clearwater FL, April 9-10, 2018.
- [96] S. Chowdhury, J. Jamison and J. Frolik, *Leveraging tripolar antenna diversity to improve link reliability in severe multipath environments*, IEEE Wireless and Microwave Technology Conference (WAMICON), Clearwater FL, April 9-10, 2018.
- [95] L. Duffaut-Espinosa, M. Almassalkhi, P. Hines and J. Frolik, *System properties and validation of packetized energy management for different classes of flexible energy resources*, Power Systems Computation Conference, Dublin IE, June 11-15, 2018.
- [94] L. Duffaut-Espinosa, M. Almassalkhi, P. Hines and J. Frolik, *Aggregate modeling and coordination of diverse energy resources under packetized energy management*, IEEE Conference on Decision and Control, Melbourne AU, December 12-15, 2017.
- [93] J. Jamison and J. Frolik, *Exploring ergodicity over frequency to examine small-scale propagation effects*, IEEE Vehicular Technology Conference, Toronto CA, September 24-27, 2017.
- [92] M. Golmohamadi, S. Chowdhury and J. Frolik, *Markov modeling of spatial variations in multipath*, IEEE International Symposium on Antennas and Propagation, San Diego CA, July 9-14, 2017.
- [91] J. Jamison, B. Hewgill and J. Frolik, *A configurable and repeatable multipath channel emulator*, IEEE International Symposium on Antennas and Propagation, San Diego CA, July 9-14, 2017.
- [90] R. Ramirez, D. Lugo, M. Golmohamadi, T. Weller and J. Frolik, *Additive manufactured tripolar antenna system for link improvement in high multipath environments*, IEEE International Symposium on Antennas and Propagation, San Diego CA, July 9-14, 2017.
- [89] *L. Duffaut Espinosa, M. Almassalkhi, P. Hines, S. Heydari and J. Frolik, *Towards a macromodel for packetized energy management of resistive water heaters*, Conference on Information Sciences and Systems (CISS'17), Baltimore MD, March 22-24, 2017.
- [88] B. Hewgill and J. Jamison (mentored REUs), *Performance of a highly configurable channel emulator*, MIT IEEE Undergraduate Research Technology Conference, Cambridge MA, November 4-6, 2016.
- [87] M. Golmohamadi, R. Ramirez, B. Hewgill, J. Jamison, J. Frolik and T. Weller, *Characterization of a geometrically constrained tripolar antenna under M2M channel conditions*, European Conference on Antennas & Propagation, Paris FR, March 19-24, 2017.
- [86] *M. Almassalkhi, J. Frolik and P. Hines, *Packetized energy management: Asynchronous and anonymous coordination of thermostatically controlled loads*, Invited Session, American Control Conference, Seattle WA, May 24-26, 2017.
- [85] S. Hamshaw, T. Bryce, J. O'Neil Dunne, D. Rizzo, J. Frolik, T. Engel, M. Dewoolkar, *Quantifying streambank erosion using unmanned aerial systems at the site-specific and river network scales*, Geocongress 2017, Orlando FL, March 12-15, 2017.
- [84] R. Ramiro, M. Golmohamadi, J. Frolik and T. Weller, *3D printed on-package tripolar antennas for mitigating harsh channel conditions*, Radio & Wireless Symposium, Phoenix AZ, January 15-18, 2017.
- [83] M. Almassalkhi, J. Frolik and P. Hines, *Packetized Energy Management: Plug-and-play coordination of thermostatically controlled loads*, invited poster presentation, Institute of Mathematics and its Application Workshop on Control at Large Scales: Energy Markets and Responsive Grids, Minneapolis MN, May 9-13, 2016.
- [82] A. Giroux and J. Frolik, *In situ channel modeling for real-time repeater node placement*, 2016 IEEE Wireless and Microwave Technology Conference (WAMICON), Clearwater Beach FL, April 11-13.
- [81] M. Golmohamadi and J. Frolik, *Depolarization in three dimensions: theoretical formulations and empirical results*, 2016 IEEE Wireless and Microwave Technology Conference (WAMICON), Clearwater Beach FL, April 11-13.
- [80] S. Hamshaw, M. Dewoolkar, J. O'Neil-Dunne, D. Rizzo, J. Frolik, K. Underwood, T. Bryce, and A. Waldron, *Quantifying streambank erosion: a comparative study using an unmanned aerial system (UAS) and a terrestrial laser scanner*, 2015 American Geophysical Union (AGU) Fall Meeting, San Francisco CA, December 14-18. (abstract review)

- [79] P. Flikkema, R. Franklin, J. Frolik, C. Haden, A. Ohta, W. Shiroma, S. Thomas and T. Weller, *ENFUSE: Engaging fundamentals and systems engineering in introductory circuits*, ASEE Annual Conference, Seattle WA, June 14 – 17, 2015. (extended abstract review)
- [78] J. Frolik, *Mitigating severe channel effects using tripolar antenna diversity*, European Conference on Antennas & Propagation, Lisbon PO, April 12-17, 2015. (full review)
- [77] J. Frolik and C. Skalka, *In situ monitoring and machine modeling of snowpack evolution in complex terrains*, 2014 American Geophysical Union (AGU) Fall Meeting, San Francisco CA, December 15-19. (abstract review)
- [76] A. Duwel, R. Franklin, J. Frolik, M. Ghosal, M. Grady, R. Henderson, M. Reece, M. Weatherspoon, and T. Weller, *IMS2014 Project "Connects" Undergraduate Students to the Microwave Field*, IEEE Microwave Magazine, November/December 2014.
- [75] P. Flikkema, R. Franklin, J. Frolik, C. Haden, A. Ohta, W. Shiroma, S. Thomas and T. Weller, *A systems-centric, foundational experience in Circuits*, 2014 ASEE Annual Conference, Indianapolis IN, June 15-18. (extended abstract review)
- [74] J. Frolik, *Deciwavelength-scale fade mitigation*, European Conference on Antennas & Propagation, The Hague NL, April 6-11, 2014. (extended abstract review)
- [73] I. Anderson, M. Dewoolkar, J. Frolik, C. Fields, D. Rizzo and D. Huston, *Targeted deployment of scour monitoring sensors for at-risk bridges*, SPIE Smart Structures/NDE Conference, San Diego CA, Mar. 9-13, 2014. (abstract review)
- [72] C. Skalka, I. Brown, and J. Frolik, *The Snowcloud system: Architecture and algorithms for snow hydrology studies*, 2013 American Geophysical Union (AGU) Fall Meeting, San Francisco CA, Dec. 9-13. (abstract review)
- [71] C. Skalka and J. Frolik, *Snowcloud: a complete data gathering system for snow hydrology research*, Fifth Workshop on Real-World Wireless Sensor Networks, Lake Como, Italy, 19-20 September 2013. (full review, 32% acceptance rate for full presentations).
- [70] *Z. Xiao, H. Wen, A. Markham, N. Trigoni, P. Blunsom, and J. Frolik, *Identification and mitigation of non-line-of-sight conditions using received signal strength*, International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob 2013), Lyon, France, October 7-9, 2013. (full review)
- [69] J. Frolik, A. Seier, C. Palombini and A. Lentine, *Dynamic communication control for μ grid agents*, IEEE PES Innovative Smart Grid Technologies (ISGT) Europe Conference, Berlin, Germany, October 14-17, 2012. (full review)
- [68] J. Frolik and P. Hines, *Urgency-driven, plug-in electric vehicle charging*, IEEE PES Innovative Smart Grid Technologies (ISGT) Europe Conference, Berlin, Germany, October 14-17, 2012. (full review)
- [67] L. Chen and J. Frolik, *Active consensus over sensor networks via selective communication*, 2012 IEEE Conference on Sensor, Mesh, and Ad Hoc Communications and Networks (SECON 2012), Seoul, Korea, June 18-21, 2012. L. Chen was a recipient of a NSF student travel grant to present this work. (full review; acceptance ~22%)
- [66] *A. Hilshey, P. Rezaei, P. Hines and J. Frolik, *Electric vehicle charging: Transformer impacts and smart, decentralized solutions*, IEEE Power and Energy System General Meeting, San Diego CA, July 22-26, 2012. (full review) [Citations: 21]
- [65] J. Frolik and P. Hines, *Random access, electric vehicle charge management*, 1st IEEE International Electric Vehicle Conference, Greenville, SC, March 4-8, 2012. (full review)
- [64] T. Weller, J. Wang, J. Frolik, I. Nassar, J. Dewney, R. Davidova, and V. Sakamuri, *A wireless interrogator - passive sensor approach for deeply embedded sensing applications*, IEEE Int. Symposium on Antennas and Propagation, Spokane, WA, July 4-11, 2011. (extended abstract review)
- [63] G. Carpenter, L. Chen, and J. Frolik, *A distributed consensus approach for locating the centroid of WSN nodes, w/demonstration*, 2011 IEEE Conference on Sensor, Mesh, and Ad Hoc Communications and Networks (SECON 2011), Salt Lake City, UT, June 27-30. (abstract review)
- [62] P. Flikkema, C. Haden T. Weller, and J. Frolik, *Wireless-integrated embedded real-time control*, 2011 ASEE Annual Conference, Vancouver BC, June 26-29.
- [61] T. Weller, W. Shiroma, R. Franklin, C. Haden, P. Flikkema and J. Frolik, *The portability of systems-centric content to existing sub-discipline courses*, 2011 ASEE Annual Conference, Vancouver BC, June 26-29.

- [60] M. Walker, C. Moeser, C. Skalka and J. Frolik, *Application of a wireless sensor network for distributed snow water equivalence estimation*, proceedings of the 2011 Western Snow Conference. (full review)
- [59] V. Sakamuri and J. Frolik, *Design of a 2.4 GHz interrogator for a rectenna-based, wireless sensor system*, 2011 Wireless and Microwave Technology Conference (WAMICON 2011), Clearwater, FL, April 18-19. (extended abstract review)
- [58] J. Frolik, P. Flikkema, T. Weller, W. Shiroma and C. Haden, *MUSE – Multi-University Systems Education*, w/poster, NSF AAAS CCLI/TUES PI Meeting, Washington DC, January 66-28, 2011.
- [57] M. Casari, A. Vize, B. Holmén, and J. Frolik, *A portable ultrafine particle sizer (PUPS) for in-situ engine exhaust monitoring*, 29th American Association for Aerosol Research Conference (AAAR), Portland OR, Oct. 25-29, 2010. (abstract review)
- [56] P. Flikkema, R. Franklin, J. Frolik, C. Haden, W. Shiroma, and T. Weller, *MUSE – Multi-University Systems Education Mini-Workshop*, FIE 2010, Washington DC, October 27-30.
- [55] J. Frolik, T. Weller, P. Flikkema, and C. Haden, *Implementing an inverted classroom using Tablet PCs for content development*, WIPTE 2010 - Workshop on the Impact of Pen-based Technology on Education, Blacksburg VA, October 25-26.
- [54] C. Skalka, J. Frolik; M. Walker and C. Moeser, *Development of a distributed in situ instrument for snowpack monitoring*, 2009 American Geophysical Union (AGU) Fall Meeting, San Francisco CA, Dec. 14-18. (abstract review)
- [53] P. Flikkema, T. Weller, J. Frolik and C. Haden, *Experiential learning of complex engineered systems in the context of wireless sensor networks*, 2010 ASEE Annual Conference, Louisville KY, June 20-23.
- [52] J. Frolik and C. Skalka, *'Scaling down' remote sensing technologies for in situ monitoring of snowpacks*, 2009 American Geophysical Union (AGU) Fall Meeting, San Francisco CA, Dec. 14-18. (abstract review)
- [51] M. Casari, A. Vize, B. Holmén, and J. Frolik, *A portable ultrafine particulate sizer for in-situ engine exhaust monitoring*, 28th American Assoc. Aerosol Research Conference (AAAR), Minneapolis MN, Oct. 26-30, 2009. (abstract review)
- [50] *C. Haden, P. Flikkema, T. Weller, J. Frolik, W. Verrei-Berenback and W. Shiroma, *Assessment of a hybrid, online/in-class course developed at multiple universities*, 2009 ASEE Annual Conference, Austin, TX, June 14-17.
- [49] J. Cooper, S. DiStasi, T. Weller and J. Frolik, *An electrically reconfigurable reverberation chamber for the emulation of severe multipath channels*, 2009 Wireless and Microwave Technology Conference (WAMICON 2009), Clearwater, FL, April 20-21, 2009. (extended abstract review)
- [48] J. Frolik, C. Skalka and B. Wemple, *An Investigation of new snow water equivalence sensing modalities*, American Geophysical Union (AGU) Fall Meeting, San Francisco, December 15-19 2008. (abstract review)
- [47] J. Frolik, T. Weller, P. Flikkema and W. Shiroma, *Work in Progress: MUSE - Multi-University Systems Education*, FIE 2008, Saratoga Springs NY, October 22-25.
- [46] A. Chidanandan, P. Ferro, J. Frolik, M. Hirotni, K. Schmidt, D. Walter, J. Williams, *Panel Session - Pen-based Computing in the Engineering and Science Classroom: Implementation Scenarios from Three Institutions*, FIE 2008, Saratoga Springs NY, October 22-25.
- [45] C. Skalka, J. Frolik, B. Wemple and T. Neuman, *A distributed in situ measurement systems for snowwater equivalence*, International Snow Science Workshop (ISSW), Whistler CAN, Sept. 21-27, 2008. (full review)
- [44] C. Chen and J. Frolik, *Improved footprint modeling for wireless sensor networks*, IEEE Int. Symposium on Antennas and Propagation, San Diego, CA, July 5-12, 2008. (extended abstract review)
- [43] S. DiStasi, S. Melais, R. Ketcham, B. Zivonovic, J. Cooper, J. Frolik and T. Weller, *A compact, reconfigurable chamber for emulating severe multipath fading*, IEEE Int. Symposium on Antennas and Propagation, San Diego, CA, July 5-12, 2008. (extended abstract review)
- [42] J. Frolik, *Integration of Tablet PCs into collaborative learning environments*, 2007 ASEE Annual Conference: Computers in Education Division, Honolulu HI, June 24-27.
- [41] J. Frolik, F. Sansoz, D. Rizzo and A. Sadek, *A multidisciplinary curricular effort incorporating wireless sensors*, 2007 ASEE Annual Conference: Multidisciplinary Engineering Division, Honolulu HI, June 24-27.

- [40] S. DiStasi, J. Galbreath, R. Ketcham and J. Frolik, *Wireless sensors, sensing wireless (WSSW) for the characterization of multipath fading*, Sixth International Conference on Information Processing in Sensor Networks (IPSN07), w/demonstration, April 25-27, 2007, Cambridge, MA.
- [39] R. Ketcham and J. Frolik, *A low-complexity, compact antenna for mitigating frequency-selective fading*, Sixth International Conference on Information Processing in Sensor Networks (IPSN07), w/demonstration, April 25-27, 2007, Cambridge, MA.
- [38] X. Sean Wang and J. Frolik, *EnArchi: A robust and manageable approach for dynamic large-scale sensor networks*, 2006 AGU Fall Meeting, San Francisco CA, December 11-15.
- [37] R. Ketcham, J. Frolik, B. Zivanovic, S. Melais, and T. Weller, *Effectiveness of simple diversity methods in mitigating hyper-Rayleigh fading environments*, 2006 IEEE Wireless and Microwave Conference, Clearwater FL, December 4-5.
- [36] J. Kay and J. Frolik, *Derandomization of channel access in wireless sensor networks using simple automata*, International Conference on Autonomic and Autonomous Systems (ICAS06), Silicon Valley, CA July 19-21, 2006.
- [35] J. Galbreath and J. Frolik, *Channel allocation strategies for wireless sensors statically deployed in multipath environments*, Fifth International Conference on Information Processing in Sensor Networks (IPSN06), special track on Sensor Platform, Tools and Design Methods for Networked Embedded Systems (SPOTS), April 19-21, 2006, Nashville, TN.
- [34] B. Capsuto and J. Frolik, *A system to monitor signal fade due to weather phenomena for outdoor sensor systems*, Fifth International Conference on Information Processing in Sensor Networks (IPSN06), demonstration for special track on Sensor Platform, Tools and Design Methods for Networked Embedded Systems (SPOTS), April 19-21, 2006, Nashville, TN.
- [33] R. Ketcham and J. Frolik, *Demonstration of high bandwidth sensor acquisition utilizing a mesh network topology*, Fifth International Conference on Information Processing in Sensor Networks (IPSN06), demonstration for special track on Sensor Platform, Tools and Design Methods for Networked Embedded Systems (SPOTS), April 19-21, 2006, Nashville, TN.
- [32] B. Liang, J. Frolik and X. Wang, *A predictive QoS strategy for wireless sensor networks*, 1st International Workshop on Resource Provisioning and Management in Sensor Networks (RPSMN05), Washington DC, November 7-10, 2005.
- [31] J. Frolik, *Laboratory-enhancement of digital and wireless communications courses*, invited submittal, 2005 ASEE Annual Conference, Portland, OR, June 12-15.
- [30] J. Frolik and T. Keller, *Wireless Sensor Networks: An interdisciplinary topic for freshman design*, 2005 ASEE Annual Conference, Portland, OR, June 12-15.
- [29] D. Kaminsky, R. Ketcham, D. Pechenick, J. Klein, F. Flynn, J. Thompson-Figueroa, S. Lang, C. Irvin, J. Bates and J. Frolik, *Imaging Lung Tissue Strain by Elastography Using Computerized Tomography*, 2005 International Conference of the American Thoracic Society (ATS), San Diego, May 20-25.
- [28] M. Fortney and J. Frolik, *Adaptation of a low-cost wireless sensor for freshman and outreach programs*, 2005 ASEE New England Section Conference, Fairfield, CT, April 8-9.
- [27] C. Fitzhugh, J. Frolik, J. Covell, R. Ketcham and T. Meyer, *2.4 GHz multipath environments in airframes*, 2005 Wireless and Microwave Technology Conference (WAMICON 2005), Clearwater, FL, April 7-8, 2005.
- [26] J. Frolik, *A Comprehensive, Laboratory-Enhanced Communications Curriculum*, poster presentation at NSF EEC Grantees meeting, Washington DC, February 17-18, 2005 and the Wireless and Microwave Technology Conferences, Clearwater, FL, April 15-16, 2005 & April 7-8, 2005.
- [25] J. Frolik, *Implementation of Tablet PCs in engineering laboratory and design environments*, poster presentation, HP Higher Ed Technology for Teaching Recipient Workshop, Monterey, CA, Nov. 4-5, 2004.
- [24] *J. Kay and J. Frolik, *Quality of Service analysis and control for wireless sensor networks*, 1st IEEE International Conference on Mobile Ad-hoc and Sensor Systems (MASS 2004), Ft. Lauderdale, FL., Oct. 25-27, 2004. [Citations: 80]
- [23] A. Fredman, J. Frolik and B. Garra, *Lung strain profiles using computed tomography elastography*, 2004 IEEE Engineering in Medicine and Biology Conference (EMBS04), San Francisco, Sept. 1-5, 2004.
- [22] J. Frolik, *A Comprehensive, Laboratory-Enhanced Communications Curriculum*, invited paper, 2004 ASEE Annual Conference, Salt Lake City, UT, June 20-23, 2004.

- [21] J. Frolik and J.B. Zurn, *Evaluation of Tablet PCs for engineering instruction and content development*, 2004 ASEE Annual Conference, Salt Lake City, UT, June 20-23, 2004.
- [20] P. Flikkema and J. Frolik, *From Circuit to Network: Engineering Across Layers and Disciplines in Wireless Sensor Networks*, invited presentation at the 2004 Wireless and Microwave Technology Conference, Clearwater, FL, April 15-16, 2004.
- [19] *J. Frolik, *QoS control for random access wireless sensor networks*, 2004 Wireless Communications and Networking Conference (WCNC04), Atlanta, March 21-25, 2004. [Citations: 88]
- [18] L. Yeary, G. Cunningham, N. Panduga, J. Frolik, C. Darvennes, K. Walsh, M. Crain, R. Cohn and S. Harfenist, *Design, analysis, and testing of electrostatically actuated micromembranes*, 2003 ASME International Congress and Exposition, Washington D.C., November 16-21, 2003.
- [17] *A. Fanimokun and J. Frolik, *Effects of natural propagation environments on wireless sensor network coverage area*, 2003 Southeastern Symposium on System Theory (SSST03), Morgantown, WV, March 16-18, 2003. [Citations: 86]
- [16] J. Howell and J. Frolik, *An Internet-based, inverse-GPS system for monitoring and tracking mobile aquatic sensors*, IEEE Sensors 2002, Orlando, FL, June 12-13.
- [15] J. Frolik, J. Biernacki, G. Cunningham and S. Mahajan, *An introductory multidisciplinary, design course in MEMS*, 2002 ASEE Annual Conference, Montreal, June 16-19.
- [14] B. George, J. Knight and J. Frolik, *A nine-position, electrostatic microstage*, IEEE SECON 2002, Columbia, SC, April 5-7.
- [13] A. Mahatvaraj, N. Vora, J. Bush, G. Cunningham, J. Biernacki and J. Frolik, *Surface micro-machined mirrors using simple floating and fixed hinge designs for three-layer process*, 2001 ASME Congress - MEMS Symposium, New York, November 11-16.
- [12] J. Frolik and T. Weller, *An internet-based approach to multi-university course offerings*, 2001 ASEE-Southeastern Section Meeting, Charleston, April 2001.
- [11] M. Lou, M. Abdelrahman and J. Frolik, *Fusion of sensors with multisampling rates using wavelet transforms*, 2001 American Control Conference, Arlington, VA, June 25-27.
- [10] J.L. Frolik and M. Abdelrahman, *Synthesis of quasi-redundant sensor data: a probabilistic approach*, 2000 American Control Conference, Chicago, June 28-30, 2000.
- [9] P.V. Chaganti, S. Orth, J. Frolik and M. Abdelrahman, *Fuzzy rules for sensor self-validation and confidence measure*, 2000 American Control Conference, Chicago, June 28-30, 2000. [Citations: 12 (GS)]
- [8] M. Abdelrahman, P. Kandasamy and J. Frolik, *A methodology for fusion of redundant sensors*, 2000 American Control Conference, Chicago, June 28-30, 2000. [Citations: 12 (GS)]
- [7] H. Zhu and J.L. Frolik, *A hybrid hardware/software receiver architecture for wireless sensor systems*, 2000 Southeastern Symposium on System Theory, Tallahassee, Florida, March 5-7, 2000.
- [6] V. Vijayakumar and J.L. Frolik, *A convenient methodology for the hardware implementation for fusion of quasi-redundant sensors*, 2000 Southeastern Symposium on System Theory, Tallahassee, Florida, March 5-7, 2000.
- [5] J.L. Frolik, *Time-domain techniques for reconstructing lossy layered media from one-sided scattering*, 1999 AP-S International Symposium, Orlando, July 11-16, 1999.
- [4] J.L. Frolik, *Applying Monte Carlo methods to neural network development*, 31st Southeastern Symposium on System Theory (SSST 99), Auburn University, March 21-23, 1999.
- [3] J.L. Frolik, *Reconstruction of multi-layered lossy dielectrics from one-sided oblique TE and TM plane wave impulse responses*, IGARSS 98, Seattle, July 6-10, 1998.
- [2] J.L. Frolik and A.E. Yagle, *On the feasibility of impulse reflection responses of 1-D absorbing discrete layered electromagnetic media*, PIERS 1995, Seattle, July 24-28, 1995.
- [1] J.L. Frolik, *Optimal pre-processing of spectral vibration data for defect detection and classification using neural networks*, © Copyright 1994, Hughes Aircraft Company.

ARRANGED CONFERENCE SESSIONS

- [2] J. Frolik, P. Flikkema, and D. Rizzo, *Overcoming the challenges of multi-X collaborations*, panel session, Association for Environmental Studies and Sciences (AESS) Annual Conference, Burlington VT, June 23-26, 2011
- [1] P. Flikkema and J. Frolik, *Overcoming the challenges of multi-institutional TUES projects*, PI breakout session, NSF AAAS CCLI/TUES PI Meeting, Washington DC, January 66-28, 2011.

INVITED TALKS

- [17] *Internet of Things: Promises and Pitfalls*, US Embassy, American Center, Prague, Czech Republic, March 13, 2017.
- [16] *Channel characterization and the management of wireless sensors (and other distributed things)*, Czech Technical University, January 17, 2017.
- [15] *A packetized approach to electric vehicle charging*, National Renewable Energy Laboratory (NREL), webinar, May 12, 2015.
- [14] *Understanding and managing the impacts of PEVs on the electric grid*, IEEE Green Mount Section PES Meeting, Burlington VT, February 19, 2015.
- [13] w/ P. Hines, *A packetized, decentralized approach to EV charge management*, 4th Annual Electric Vehicles Virtual Summit, June 12, 2014.
- [12] *hyper-Rayleigh fading or “when the worst-case isn’t bad enough”*, Department of Computer Science and Technology, University of Bedfordshire (UK), December 10, 2012.
- [11] *A life (worse than) of Rayleigh*, Department of Engineering Science, Oxford University (UK), September 20, 2012.
- [10] *Wireless sensor networks: lessons for the smart grid?*, Sandia National Laboratory, Albuquerque NM, July 14, 2011.
- [9] w/ P. Flikkema, *Overcoming the challenges of multi-institutional TUES projects*, NSF AAAS CCLI/TUES PI Meeting, Washington DC, January 27, 2011.
- [8] *MUSE: A technology-enhanced learning paradigm for 21st Century engineering education*, IEEE Wireless and Microwave Technology Conference, Melbourne FL, April 13, 2010.
- [7] *in situ monitoring of snowpacks (and other harsh environments) using wireless sensor networks*, Jones Seminar on Science Technology and Society, Dartmouth, October 23, 2009.
- [6] *Understanding snowpacks: new sensors for old problems*, Sierra Nevada Aquatic Research Lab (UCSB) Lecture Series, Mammoth Lakes, CA, May 19, 2009.
- [5] *Wireless strategies for harsh environments*, invited presentation, Center for Wireless and Microwave Information Systems, University of South Florida, October 20, 2008.
- [4] *Connecting the physical and virtual worlds*, Vermont 3.0 Tech Jam, Burlington, VT, January 26, 2008.
- [3] *Sensor network and wireless research for harsh environments*, SAMSI: Statistical and Applied Mathematical Sciences Institute, Research Triangle Park (NC), January 14, 2008.
- [2] *Sensor network and wireless research for harsh environments*, Johns Hopkins University, May 21, 2007.
- [1] w/ P. Flikkema, *From circuit to network: Engineering across layers and disciplines in wireless sensor networks*, 2004 Wireless and Microwave Technology Conference, Clearwater, FL, April 16, 2004.

FUNDING FOR RESEARCH AND ENGINEERING EDUCATION

Research

- PI: *GOALI: Collaborative Research: Integrated Antenna System Design for High Clutter and High Bandwidth Channels Using Advanced Propagation Models* (\$8k), REU Supplement, NSF, Grant No. ECCS-1508907 (08/18-08/19).
- PI, *STTR Phase I: Distributed and Scalable Coordination of Solar Photovoltaic and Battery Storage Systems* (\$86.6k), NSF, subaward from Packetized Energy (7/17-7/18).
- PI: *Measurement, Modeling and Mitigation of Wireless Channels Within and About Spacecraft* (~\$28k), GRA recipient: J. Jamison, NASA/Vermont Space Grant Consortium (09/16-06/18).
- Co-PI (M. Almassalkhi – PI): *Packetized Energy Management: Coordinating Transmission and Distribution* (\$1.6M), ARPA-E (6/16-5/19).
- PI: *GOALI: Collaborative Research: Integrated Antenna System Design for High Clutter and High Bandwidth Channels Using Advanced Propagation Models* (\$8k), REU Supplement, NSF, Grant No. ECCS-1508907 (06/16-05/17).
- Co-PI (P. Hines - PI): *PEM Demonstration System* (\$29.6k), UVM Innovations (02/16-12/16).
- PI: *GOALI: Collaborative Research: Integrated Antenna System Design for High Clutter and High Bandwidth Channels Using Advanced Propagation Models* (\$225.6k of \$528.4), NSF, Grant No. ECCS-1508907 (09/15-08/18), Collaborator: Univ. of South Florida.

- PI: *Intelligent Mobile Mesh Networking for Robust Communications During Autonomous Exploration* (\$29.5k), GRA recipient: A. Giroux, NASA/Vermont Space Grant Consortium (07/15-05/16).
- Co-PI (M. Dewoolkar, PI): *System-Wide Rapid Quantification of Streambank Erosion* (\$78.7k), State of Vermont (04/15-03/17).
- PI (w/ J. Bongard, CS): *Position Awareness and Control for Heterogeneous Robotic Swarms* (\$32.5k), GRA recipient: W. Baker, NASA/Vermont Space Grant Consortium (06/14-08/15).
- Mentor: *Terrestrial Laser Scanning to Sustain Rural Unpaved Roads* (\$5k), recipient: H. Anderson UVM Transportation Research Center (8/13-5/14).
- PI (w/ J. Bongard, CS): *Swarm Intelligence: Adaptive Multi-Agent Robotics* (\$22.3k), GRA recipient: W. Baker, NASA/Vermont Space Grant Consortium (06/13-08/14).
- PI: *MRI: Acquisition of a 3D Terrestrial Laser Scanner for the Temporal-Morphological Study of Manmade and Natural Structures* (\$162k + \$69.5k match), NSF & UVM (9/12-8/13), Grant No. CMMI-1229045.
- Senior Person (PI – J. Marshall): IGERT: Smart Grids - Technology, Human Behavior and Policy (\$1.8M), NSF (08/12-07/17), Grant No. DGE- 1144388.
- Co-PI (w/ M. Dewoolkar - PI, D. Rizzo and D. Huston): *Prediction and Mitigation of Scour for Vermont Bridges* (\$310k), Vermont Agency of Transportation & UVM Transportation Research Center (01/12-12/14).
- Co-PI (w/ P. Hines - PI and J. Marshall): *Electric Vehicles and Their Impact on the Electric Power Distribution System* (\$202k), USDoT/RITA UVM/Spire (06/12-05/13).
- PI (w/ J. Bongard, CS): *Evolving Flight Control Algorithms for Rotating-Wing, Autonomous MAVs* (\$32.5k), GRA recipient: G. Carpenter, NASA/Vermont Space Grant Consortium (05/11-06/12).
- Science-PI (w/ W. Lakin (PI), Lyndon State College and Vermont Tech. College): *The Vermont Frozen Landscape Monitoring Project* (\$185k), NASA EPSCoR – CDC [Consortium Development Competition] (09/10 – 04/12).
- Co-PI (w/ C. Skalka, CS): *Complementing Static In Situ Sensing with Mobile Gateway Resources for Improved Environmental Monitoring* (\$38.9k), GRA recipient: S. Greenberg, NASA/Vermont Space Grant Consortium (05/10-06/11).
- Co-PI (w/ W. Lakin (PI), Norwich Univ. and Vermont Tech. College): *2009 Consortium Development Competition* (\$345k), NASA EPSCoR (10/09 – 5/11).
- PI: *GOALI: Collaborative Research: Passive, Diamagnetic Inertial Sensing Integrated with High-Sensitivity Telemetry* (\$136k of \$405.7k), NSF (9/09-8/12), Grant No. ECCS-0925728, Collaborators: M. Dewoolkar (UVM) and J. Wang and T. Weller (Univ. South Florida).
- PI: *Developing a Symbiotic Sensing System with Wireless Sensor Networks and MAVs* (\$30k), GRA recipient: G. Carpenter, NASA/Vermont Space Grant Consortium (05/09-06/10).
- Co-PI (w/ W. Lakin (PI), J. Marshall (ME): Science-PI, D. Hitt (ME), and J. Wu (Physics)): *Active Surface Technologies for Dust Mitigation in Martian and Lunar Environments* (\$750k), NASA (9/08 - 9/11).
- PI (w/ X. Wang, CS), *Building dynamic, complex and resilient sensor networks with simple autonomous agents* (\$30k), Sponsoring Organization: Vermont EPSCoR, recipient: L. Chen (9/08-8/09).
- Co-PI (w/ B. Holmén (EnvE, PI), D. Huston (ME), R. Jenkins (ME), L. Gregory (CDAE), T. Macias (Soc) and T. Streeter (Soc)): *Signature Project # 2: Emissions and Performance of Alternative Vehicles in Northern Climates* (Year 1: \$262k direct of \$1.1M 4-year total), UVM National University Transportation Center (9/07 – 9/11).
- PI (w/ C. Skalka, CS; B. Wemple, Geography and T. Neumann, Geology): *An in situ, snow water equivalent monitoring system with improved temporal and spatial resolution* (\$30k), NASA/Vermont Space Grant Consortium (6/07 - 9/08).
- Co-PI (w/ X. Wang, CS): *The use of autonomous agents in dynamic, complex and robust sensor networks* (\$15k), Sponsoring Organization: Vermont EPSCoR, recipient: B. Liang (1/08-6/08).
- Co-PI (w/ X. Wang, CS): *A wireless sensor network research testbed* (\$11.5k), Sponsoring Organization: CEMS Next Generation Initiative, (2007).
- PI: *Wireless sensor networks for aircraft support systems* (\$157.9k), Sponsoring Organization: Goodrich Fuel and Utility Systems (1/06-12/07).
- PI: *Channel characterization for aerospace wireless sensor networks* (\$65k), Sponsoring Organization: Goodrich Fuel and Utility Systems (6/04-12/05).

- PI: Vermont EPSCoR Equipment Grant (\$19k) for a 6 GHz portable spectrum analyzer with tracking generator (2005).
- Co-PI (w/ X. Wang, CS): *Wireless sensor network optimization with application QoS requirements* (\$25k), Sponsoring Organization: Vermont EPSCoR, recipient: B. Liang (6/04-5/04).
- PI: *A low-cost linear-response wireless temperature sensor for extreme environments* (\$15.6k), Sponsoring Organization: Vermont EPSCoR, recipient: M. Fortney (9/04-5/05).
- PI: *Collaborative signal processing for wireless sensor networks* (\$18.75k), Sponsoring Organization: Vermont EPSCoR, recipient: L. Mayer (9/03-5/04).
- Faculty sponsor for UVM's Undergraduate Research Endeavors Competitive Awards (URECA!).
 - Project: *Determining water content in snow-packs through gamma radiation measurements*, recipient: C. Tardie (\$4k - 2011).
 - Project: *Integrating RFID and mobile robotic hardware in a swarm scheme*, recipient: G. Carpenter (\$4k - 2007).
 - Project: *Integrating Radio Frequency Identification and Wireless Sensor Network Technologies*, recipient: H. Taylor (\$4k - 2006).
 - Project: *Wireless Node Tracking Using the Low Power, Highly Robust ZigBee Standard*, recipient: R. Ketcham (\$3k - 2005).
 - Project: *A study of wireless sensor network routing protocols*, recipient: B. Capsuto (\$4k - 2004).
 - Project: *An investigation of propagation characteristics for outdoor campus environments for common wireless frequency bands*, recipient: J. Murch (\$4k - 2003). This latter work was also supported by a national Sigma Xi GIAR award.
- Faculty sponsor for McNair Scholars Program (\$3.3k) for underrepresented undergraduate students: *Defining application constraints for wireless sensor networks* (2005, H. Taylor) and *Implementation of a testbed for wireless sensor network research* (2004, C. Luyinduladio).
- Co-PI: *TTU MEMS Initiative 2000 (\$125k)*; Sponsoring Organizations: TTU College of Engineering, Centers for Water Resources, Electric Power and Manufacturing, ORNL and Intellisense, Inc.
- PI: *A wireless sensor system for monitoring aquatic specie behavior and environment* (\$20k), TTU Faculty Research Grant, TTU Center for Water Resources (8/00-5/02).
- Faculty Investigator: *Intelligent Integrated Industrial Process Sensing and Control (I3PSC) System Applied to and Demonstrated on Cupola Furnaces (\$35.3k of \$964k)*; Sponsoring Agency: DOE, TTU Center for Manufacturing Research (1/99-12/01).
- PI: *Remote Monitoring and Classification of Bioelectric Signals as a Measure of Water Toxicity* (\$25k); Sponsoring Agency: TTU Center for Water Resources (1/99 - 8/00).
- Co-PI, *Novel techniques for pattern classification*, Hughes Aircraft IR&D Funding (1994).

Engineering Education

- Co-PI (A. Tinkler – PI): *Expansion and Assessment of UVM K-12 STEM Programs* (\$45.4k), STEM-ED UVM, 2016.
- PI: *UVM Capstone Design Project* (\$13.9k), MITRE, 2015.
- PI: *UVM Capstone Design Project* (\$20k), MITRE, 2014.
- Advisor: *GreenSpeed 4 - A Series/Parallel Hybrid Racecar* (\$35k), Alternative Energy Racing Organization (AERO), UVM Clean Energy Fund, 2014.
- PI: *UVM Capstone Design Project* (\$20k), MITRE, 2013.
- Recipient: *Students for a Smarter Planet Award* (\$3k), IBM, 2013.
- PI: *Collaborative Research: A Systems-Centric Foundation for Electrical and Computer Engineering Education* (\$50k of \$150k), NSF (10/12-9/14), Grant No. DUE-1140450. Collaborators: Univ. of South Florida, Univ. of Minnesota, Univ. of Hawaii and Northern Arizona Univ.
- PI: *UVM Capstone Design Project* (\$20k), MITRE, 2012.
- Advisor: *CleanSpeed - A Zero Emission Race Car* (\$38.2k), Alternative Energy Racing Organization (AERO), UVM Clean Energy Fund, 2012.
- PI: *Technology Investments for Engineering Design* (\$25k), UVM Technology Innovation Fund (TIF), 2012.
- Co-PI (P. Hines – PI): *Solar Power and Smart Grid Technology for UVM* (\$27k), UVM Clean Energy Fund, 2010.

- PI: *MUSE: A model for undergraduate learning of complex-engineered systems* (\$159k of \$500k), NSF (9/07-8/10), Grant No. DUE-0717326, Collaborators: T. Weller (Univ. South Florida), P. Flikkema (Northern Arizona Univ.) and W. Shiroma (Univ. Hawaii)
- PI: *A curriculum development laboratory for sensor system courses* (\$10k), UVM Center for Teaching and Learning/College of Engineering and Mathematical Sciences (6/06-12/07).
- Co-PI (J. Kraushaar - PI): *Educational Value and Validity - Student Adaptation to Tablet PC Technology in Business and Engineering Curriculums* (\$100k), Microsoft Corp. (6/06-5/08).
- PI: *Integration of service-learning into a first-year engineering design course* (\$3k), UVM Community-University Partnerships and College of Engineering and Mathematical Sciences (12/05-12/06).
- PI: *Implementation of Tablet PCs in engineering laboratory and design environments* (\$69.6k), HP Technology for Teaching Grant (5/04-4/06).
- PI: *A comprehensive, laboratory-enhanced signals and communications curriculum* (\$115k), NSF and UVM (8/03-8/05), Grant No. DUE-0310150
- PI: *Evaluation of Table PCs for engineering course content development and for senior design environments* (\$3.7k), UVM Center for Teaching and Learning (7/03-8/04).
- Co-PI: *A hands on design course for electrical and computer engineering and mechanical engineering freshman: EE/ME 1* (\$6.7k), UVM Center for Teaching and Learning (7/03-8/05).
- Coordinator: *Digital Communications Test Bench* (\$72k), Contributors: Bell South, private donors, Dept. ECE and College of Engineering, December 2001. (TTU)
- Coordinator: *Cellular Communications Test Bench*, Contributor: Ericsson, February 2002. (TTU)
- PI: *Communication system simulation software for undergraduate education* (\$52k), Elanix, Inc., May 2000. (TTU)
- Selected Participant: *Science & Engineering Education Scholars Program*, Sponsor: NSF (EEC-9633800), University of Wisconsin-Madison, July 1999.

PATENTS AND APPLICATIONS

- [11] *Packetized energy management control systems and methods of using the same*, w/ P. Hines and M. Almassalkhi, University of Vermont, US non-provisional application 16/421,171; (Filed: May 23, 2019).
- [10] *3D tripolar antenna and method of manufacture*, w/M. Golmohamadi, and T. Weller and R. Ramirez, University of South Florida, US non-provisional application 16/247,236; (Filed: January 2019).
- [9] *Systems and methods for randomized, packet-based power management of conditionally-controlled loads and bi-directional distributed energy storage systems*, w/ P. Hines and M. Almassalkhi, University of Vermont, US non-provisional application 15/712,089; PCT application: PCT/US17/52828 (Filed: September 2017).
- [8] *Systems and methods for random access charge management using charge packetization*, w/ P. Hines, University of Vermont, US Patent 10,256,631 (Issued: April 9, 2019).
- [7] *Portable ultrafine particle sizer (PUPS) apparatus*, w/ A. Vize, M. Casari, and B. Holmén, University of Vermont, US Patent 9,410,878 (Issued: August 9, 2016).
- [6] *Compact repeaters for wireless sensing*, w/ T. Weller and I. Nassar, University of South Florida, US Patent No. 9,093,741 (Issued: July 28, 2015).
- [5] *Portable ultrafine particle sizer (PUPS) apparatus*, w/ A. Vize, M. Casari, and B. Holmén, University of Vermont, US Patent No. 8,739,602 (Issued: June 3, 2014).
- [4] *A distributive, non-destructive real-time approach to snowpack monitoring*, w/ C. Skalka, University of Vermont, US Patent No. 8,552,396 (Issued: October 8, 2013). Appeared in NASA Technical Briefs on December 1, 2012.
- [3] *Method of making a decision on the status of a mechanical system using input and response data acquired in situ*, US Patent No. 7,831,403 (Issued: November 9, 2010).
- [2] *Zero-order energy smart antenna and repeater*, w/ Tom Weller, University of South Florida (USF). US Patent No. 7,720,437 (Issued: May 18, 2010).
- [1] *Method of making a decision on the status of a mechanical system using input and response data acquired in situ*, US Patent No. 7,395,167 (Issued: July 1, 2008).

GRADUATE STUDENTS

Current Students

- [1] S. Chowdhury, *Optimized antenna configuration in mesh networks deployed in cluttered environments*, PhD EE, Expected completion: May 2020
- [2] T. Laracy, *Software defined interrogator for passive sensors*, Accelerated MSEE, Expected completion: May 2020
- [3] E. Fennelly, *Software defined adaptive antenna arrays*, Accelerated MSEE, Expected completion: May 2020
- [4] B. Hewgill, *Wearable integrated health monitoring*, Accelerated MSEE, Expected completion: May 2020

Former PhD Students

- [3] M. Golmohamadi, *Multi-polarized channel characterization*, PhD EE, May 2019, Employed at Green Mountain Semiconductor.
- [2] L. Chen, *Realizing distributed consensus building in wireless sensor networks*, PhD EE dissertation, October 2012.
- [1] J. Kay, *Energy and channel efficient control of wireless sensor network clusters*, PhD EE dissertation, UVM, March 2007. Employed at Goodrich Aerospace.

Former MS Students

- [28] J. Jamison, *Leveraging Software-Defined Radio for a Scalable Wide-band Wireless Channel Measurement System*, MSEE, October 2018. Employed at Johns Hopkins Applied Physics Laboratory.
- [27] C. Bliss, *Quality of Service metrics for Packetized Energy Management*, MSEE project, October 2016. Employed at United Technologies.
- [26] A. Giroux, *Real-time strategies for the deployment of wireless repeaters in uncharacterized environments*, MSEE, October 2016. Employed at Packetized Energy.
- [25] L. Garralda Iriarte, *A disposable device for measuring lung impedance in mechanically ventilated patients*, Public University of Navarre, Spain (co-advised with J. Bates), May 2016.
- [24] W. Baker, *Robot localization obtained by using inertial measurements, computer vision, and wireless ranging*, MSEE, October 2015, Employed at Oceaneering - Space Systems.
- [23] A. Seier, *Empirical thermal modeling of 25 kVA service transformers and an approach to load management*, MSEE, January 2014. Employed at Plotly.
- [22] G. Carpenter, *Towards the development WSN/MAV coupled sensing system*, MSEE thesis, October 2012. Employed at MicroStrain.
- [21] M. Casari, *System design of a portable ultrafine particulate sizer for in-situ engine exhaust monitoring*, MSEE thesis, UVM, October 2012. Employed at ARA.
- [20] V. Sakamuri, *A 2.4 GHz interrogator for a rectenna-based wireless sensor*, MSEE thesis, UVM, May 2012. Employed at IBM.
- [19] A. Vize, *Design, fabrication and characterization of a corona ionizer for in-situ engine exhaust monitoring*, MSEE thesis, UVM, May 2012. Employed at IBM.
- [18] D. Qian, *Efficiency analysis of solar panel dust mitigation using an electric curtain*, MSME thesis, UVM (co-advised with J. Marshall), October 2011.
- [17] K. Clark, *Evolution of sensor control strategies for over-deployed wireless sensor networks*, MSCS project, UVM (co-advised with X. Wang), May 2009. Employed w/ State of Vermont.
- [16] S. DiStasi, *In situ measurement and emulation of severe multipath environments*, MSEE thesis, UVM, October 2008. Employed at MicroStrain.
- [15] C. Chen, *Footprint molding and connectivity analysis for wireless sensor networks*, MSEE thesis, UVM, October 2008. Employed at TechExcel.
- [14] R. Ketcham, *Characterization and mitigation of hyper-Rayleigh fading*, MSEE thesis, UVM, October 2007. Employed at MicroStrain.
- [13] M. Fortney, *A low-cost, linear response wireless temperature sensor for extreme environments*, MSEE thesis, UVM, March 2007. Employed at UVM.
- [12] B. Capsuto, *Characterization and impact of radio signal variation for statically deployed wireless sensors*, MSEE thesis, UVM, October 2006. Employed at OSIssoft.
- [11] C. Fitzhugh, *Multipath characterization of enclosed environments*, MSEE thesis, UVM, March 2006. Employed at EWA Government Systems Inc.

<i>Capstone II</i> (ME 186/EE188 – Sr. required)			3.7/3.6 ⁺ (3.6)							
Semester Total	2/1	1 [%]	2	2 ^{&*}	1 [*]	2 [*]	1 [*]	1 [*]	1 [*]	1 [*]

Notes: On sabbatical Fall 12; # 50% Faculty / 50% Interim Associate Director appointment; + co-taught with faculty from ME. Evaluations from ME/EE students, respectively; % second EE 2XX course cancelled due to low enrollments. & One course taught for Honors College. * Serving at EE Program Head or Interim Department Chair or Department Chair (1 course release)

OTHER COURSES TAUGHT AT UVM

- EE 187/188 – *Capstone Design I/II* (FA'11/SP'12)
- EE 001/ME 001 – *First Year Design Experience* (SP'04, SP'05, SP'06, SP'07) – co-developed course
- EE 171 – *Signals and Systems* (FA'02)
- EE 174 – *Communication Systems* (SP'03, SP'04, SP'05, SP'06, SP'07, SP'08, SP'10, SP'12) – revised course
- HCOL 185 – *Information Through the Ages* (FA'14) – specially developed Honors College course
- EE 186 – *Telecommunications Laboratory* (SP'03, SP'04, FA'04, FA'05) – developed course
- EE 195 – *Wireless Embedded Systems* (FA'03) – special topic course
- EE 273 – *Digital Communication Systems* (FA'03, FA'05) – developed course
- EE 278 – *Wireless Communication Systems* (SP'03, FA'04) – developed course
- EE 295b – *Wireless Sensor Networks* (FA'06, FA'11) – special topic course

COURSES TAUGHT AT TTU

- ECE 3710 – *Intro to Telecommunications*
- ECE 3760 – *Telecommunications Laboratory*
- ECE 3910 – *Random Processes for Electrical Engineering*
- ECE 4720 – *Telecommunication System Design*
- ECE 4950/5950 – *Introduction to MEMS* – co-taught

CAPSTONE DESIGN MENTORING

- [17] Snow Agenda – Wireless Snow Gun Monitoring System [Chair's Discretionary Fund] (2018-2019)
- [16] Next Generation Wind Sensor for Wind Resource Assessment [Renewable NRG Systems] (2015-2016)
- [15] Scour Monitoring System [Vermont Department of Transportation] (2015)
- [14] A LiPo Battery System for a Hybrid Racecar [UVM Clean Energy Fund/AERO] (2014-2015)
- [13] Green Outlet [UVM Clean Energy Fund] (2014-2015)
- [12] Autonomous Flying Robot [MITRE] (2013-2104)
- [11] An Upgraded Drive Train for a Zero Emissions Surveying Vehicle [NASA] (2013)
- [10] Situation Awareness via Automated Following Quadrotors [MITRE] (2012-2013)
- [9] A Portable System for Field Testing of Wireless Structural Health Sensors [NSF] (2012)
- [8] A Zero Emissions Vehicle for Greenland Scientific Surveying [NASA] (2011-2012)
- [7] AERO Electronic Shifter: Safe control of a hybrid transaxle [AERO] (2010-2011)
- [6] AERO Driver Interface: User interface for hybrid race-car [AERO] (2009-2010)
- [5] Mars Electric Dust Curtain: Electric dust curtain demonstration unit [NASA] (2009-2010)
- [4] SnowMAN 2.0 - An improved wireless platform for SWE monitoring (co-advised w/ C. Skalka) [NASA/VSGC] (2008-2009)
- [3] SnowMAN - A wireless sensor network for determining snow water equivalent [NASA/VSGC] (2007-08)
- [2] Regenerative braking and control subsystem [AERO] (2007-2008)
- [1] Tracking and prediction for snow plow routes [Burlington Department of Public Works] (2007-2008)

AWARDS

- IEEE Green Mountain Section Faculty of the Year Award: *Leading the Development of a new Biomedical Engineering Program at UVM* (2016)

- IEEE Region 1: 3D - Outstanding Teaching in an IEEE area of interest (University or College) Award: *For outstanding contributions to the undergraduate university education of electrical and biomedical engineering students* (2015)
- IEEE Green Mountain Section Faculty of the Year Award: *Seminal Improvements to the State of the Art of Multi-Disciplinary Engineering Education* (2011)
- IEEE Green Mountain Section Innovation Award: *Leadership and Innovation in Support of IEEE Students* (2007)
- ASEE Southeastern Section New Teacher Award (2002)
- Co-recipient: TTU's L.E. Sissom Innovation and Creativity Award (2002): *The Interdisciplinary Development of Academic and Research Programs in MEMS*
- TTU's L.E. Sissom Innovation and Creativity Award (2000): *An Internet-Based Multi-University Collaborative Design Course*
- Hughes Aircraft Co. Fellowship for Doctoral Study (1991-94)

PROFESSIONAL ACTIVITIES

- IEEE: Senior Member (2011), Member (1995), Student Member (1985)
- TPC Member for Vehicular Technology Conference Fall 2017
- Working Group Member: NIST 5G mmWave Channel Model Alliance (2015-2017)
- IEEE International Microwave Symposium Steering Committee (IMS 2014) involved with the IMS Project Connect experience for underrepresented students.
- TPC Member for Radio and Wireless Symposium (RWS 2008)
- TPC Member for International Sensors Conference (Sensors 2007)
- TPC Member for International Conference on Distributed Computer Systems (ICDCS 2007)
- TPC Member for the Wireless and Microwave Technology Conference (WAMICON 2005, 2006, 2009, 2010); Session Chair (2004-2006), Tutorial co-chair (2006)
- Board of Advisors (2001-date), Wireless and Microwave (WAMI) Center, University of South Florida
- TPC Member for International Conference of Sensor Networks (SENET 2005)
- TPC Member for the International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP 2005)
- Journal Reviewer for IEEE Transactions on Vehicular Technology, IEEE Transactions on Wireless Communications, IEEE Communications Magazine, IEEE Transactions on Mobile Computing, IEEE Transactions on Systems, Man and Cybernetics – Part A, IEEE Transactions on Education, IEEE Transactions on Industrial Electronics, IEEE Transactions on Instrumentation and Measurement, IEEE Antennas and Wireless Propagation Letters, IEEE Transactions on Aerospace and Electronic Systems, IEEE Transactions on Communications, ASEE Advances in Engineering Education, Elsevier Computers and Industrial Engineering, International Journal of Sensor Networks, IEEE Sensors Journal, IEEE Wireless Communications Letters, IEEE Transactions on Smart Grid, IEEE Communication Letters, IET Journal of Engineering.
- Conference Reviewer for American Society for Engineering Education, Frontiers in Education, American Controls Conference, Conference on Decision and Control, European Workshop on Wireless Sensor Networks, GlobeCom, ICC Wireless Communications Symposium, International Conference on Distributed Computing Systems, International Conference on Systems and Networks Communications, IEEE Sensors, IASTED Wireless Sensor Networks, IEEE Wireless Communications and Networking Conference, IEEE International Geoscience and Remote Sensing Society Conference.
- Proposal Reviewer for Vermont EPSCoR Pilot, Vermont EPSCoR SBIR, NASA Post-Doc Fellowship, ORAU Junior Faculty Fellowship, NASA EPSCoR, NSF DUE-CCLI, NSF ECCS, NSF EEC, NSF DUE-STEP, NSF EAR-IF, NSF CyberSEES.

OTHER

- Founding faculty advisor to the Alternative Energy Racing Organizations (AERO) at UVM (2006-2016)
- Radio interviews America Weekend and Vermont Public Radio (2014)
- Featured in Vermont EPSCoR's *Emerging Science* series: Season 1, Episode 4 (*Remote Wireless Sensing*) and Season 4, Episode 1 (*Out of this World*)
- MS and PhD committee member for twelve (12) students since Fall 2007

- IEEE Student Branch faculty advisor at UVM (2002-2009)
- IEEE Green Mountain Section Student Activities Coordinator (2004-2009)
- HKN faculty advisor at TTU (1999-2002)
- Cycling club faculty advisor at TTU (2002)