

# John Donnal

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## Employment

### United States Naval Academy

Assistant Professor Aug 2016 – present  
Weapons, Robotics, and Control Engineering  
105 Maryland Ave / Annapolis, MD 21402 / (410)-293-6109

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## Education

### Massachusetts Institute of Technology

Doctoral Program in Electrical Engineering 2016  
Degree of Electrical Engineer 2015  
M.S. in Electrical Engineering 2013

### University of Maryland University College

M.S. in Information Assurance 2009

### Princeton University

B.S.E in Electrical Engineering 2007  
Magna Cum Laude

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## Honors and Awards

IEEE Instrumentation and Measurement Society: Best Sensor Application 2016  
Department of Energy Cleantech University Prize (\$100K) 2016  
MIT Clean Energy Prize (\$100K) 2016  
Martin Family Society Fellow 2013  
US Army Meritorious Service Medal: Operation Iraqi Freedom 2009  
Tau Beta Pi: Engineering Honor Society 2006

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## Patents

*Energy Apps.* Donnal, J.; Paris, J.; Leeb, S. Provisional Patent Application No.: 62/242618. Filing Date: October 16, 2015.

*Non-Intrusive Monitoring.* Leeb, S.; Paris, J.; Donnal, J.; Moon, J.; Schantz, C. Patent Application No.: US 20140320125 A1. Publication Date: October 30, 2014.

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## Military Assignments

Tactical Signal Battalion Network Operations Officer 2010-2011  
*Fort Bragg, NC*  
Director of Network Plans and Projects for the Iraqi Theater of Operations 2009-2010  
*Camp Liberty, Iraq*  
Heavy Expeditionary Signal Platoon Leader 2007-2009  
*Fort Bragg, NC*

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## Co-Supervised Students

- Patrick Wang, Ph.D. Candidate Electrical and Computer Engineering      Dec 2018 – present  
Thesis topic: *Resonant high frequency DC/DC power converters*  
Co-Advisors: Dr. Arijit Banerjee
- Daisy Green, M.S. Candidate Electrical Engineering      Feb 2018 – present  
Thesis topic: *Framework for Non-Intrusive Monitoring for Shipboard Environments*  
Co-Advisors: Dr. Steven B. Leeb, Dr. Pete Lindahl
- Joseph Zatarski, M.S. Candidate Electrical and Computer Engineering      Sep 2018 – June 2019  
Thesis topic: *Resonant high frequency DC/DC power converters*  
Co-Advisors: Dr. Arijit Banerjee
- Andre Aboulian, M.S., Electrical Engineering      June 2016 – Feb 2018  
Thesis: *Sensor and network development for nonintrusive load monitoring*  
Co-Advisors: Dr. Steven B. Leeb, Dr. Pete Lindahl
- LT Greg Bredariol, M.S., Mechanical Engineering      July 2015 – June 2016  
Thesis: *Automated energy management using nonintrusive load monitors*  
Co-Advisors: Dr. Steven B. Leeb, Dr. Pete Lindahl
- David Lawrence, M.S. Electrical Engineering      Sep 2014 – Feb 2016  
Thesis: *Hardware and software architecture for non-contact NILM*  
Co-Advisors: Dr. Steven B. Leeb
- LT Ryan Zachar, Naval Engineer, M.S. Engineering & Management      Sep 2013 – June 2015  
Thesis: *Naval applications of enhanced temperature, vibration and power monitoring*  
Co-Advisors: Dr. Steven B. Leeb, Dr Pete Lindahl
- LT William Cotta, M.S. Mechanical Engineering      Sep 2013 – June 2015  
Thesis: *Machinery diagnostics and characterization through electrical sensing*  
Co-Advisors: Dr. Steven B. Leeb, Dr. Pete Lindahl
- MAJ Mark Gillman, M.S. Electrical Engineering      Sep 2012 – June 2014  
Thesis: *Interpreting Human Activity from Electrical Consumption Data through NILM*  
Co-Advisors: Dr. Steven B. Leeb

## Publications

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### Journals

- Deeter, T., Green, D., Kidwell, S., Kane, T, **Donnal, J.**, Vasquez, K., Sievenpiper, B., and Leeb, S. "Behavioral Modeling for Microgrid Simulation," in *IEEE Access*, vol. 9, pp. 35633-35645, 2021.
- P. A. Lindahl et al., "Nonintrusive Load Monitoring of Variable Speed Drive Cooling Systems," in *IEEE Access*, vol. 8, pp. 211451-211463, 2020.
- Shabshab S.C. *et al.*, "Demand Smoothing in Military Microgrids Through Coordinated Direct Load Control," in *IEEE Transactions on Smart Grid*, vol. 11, no. 3, pp. 1917-1927, May 2020
- Green, D., Shaw, S., Lindahl, P., Kane, T., **Donnal, J.** and Leeb, S. "A MultiScale Framework for Nonintrusive Load Identification," in *IEEE Transactions on Industrial Informatics*, vol. 16, no. 2, pp. 992-1002, Feb. 2020.
- Donnal, J.** "Wattsworth: An Open-Source Platform for Decentralized Sensor Networks," in *IEEE Internet of Things Journal*, vol. 7, no. 1, pp. 189-196, Jan. 2020.
- Peeters, C., Leclère, Q., Antoni, J., Lindahl, P., **Donnal, J.**, Leeb, S., & Helsen, J. "Review and comparison of tachless instantaneous speed estimation methods on experimental vibration data." in *Mechanical Systems and Signal Processing*, 129, 407-436, August 2019.
- Abouljian, A. *et al.*, "NILM Dashboard: A Power System Monitor for Electromechanical Equipment Diagnostics," in *IEEE Transactions on Industrial Informatics* , vol. 15, no. 3, pp. 1405-1414, March 2019.
- Lindahl, P., Green, D., Bredariol, G., Abouljian A., **Donnal, J.** and Leeb, S. "Shipboard Fault Detection Through Nonintrusive Load Monitoring: A Case Study," in *IEEE Sensors Journal*, vol. 18, no. 21, pp. 8986-8995, 1 Nov.1, 2018.
- Donnal, J.** "Joule: A Real Time Framework for Decentralized Sensor Networks," in *IEEE Internet of Things Journal*. vol. 5, no. 5, pp. 3615-3623, Oct. 2018.
- Abouljian, A., **Donnal, J.** and Leeb, S. "Autonomous Calibration of Non-Contact Power Monitors," in *IEEE Sensors Journal*, vol. 18, no. 13, pp. 5376-5385, July. 1, 2018.
- Donnal, J.**, Lindahl, P., Lawrence, D., Zachar, R., and Leeb, S, "Untangling Non-Contact Power Monitoring Puzzles," in *IEEE Sensors Journal*, vol. 17, no. 11, pp. 3542-3550, June, 1 2017.
- Lawrence, D.; **Donnal, J.**; Leeb, S.; He, Y., "Non-contact Measurement of Line Voltage," in *IEEE Sensors Journal* , vol. 16, no. 24, pp. 8990-8997, Dec, 15 2016.
- Donnal, J.**; Paris, J.; Leeb, S., "Energy Applications for an Energy Box," in *IEEE Internet of Things Journal* , 2016 , vol. 3, no. 5, pp. 787-795, Oct. 2016.
- Lawrence, D., **Donnal, J.**, and Leeb S., "Current and Voltage Reconstruction From Non-Contact Field Measurements," in *IEEE Sensors Journal*, vol. 16, no. 15, pp. 6095-6103, Aug. 1, 2016.
- Zachar, R.; Lindahl, P.; **Donnal, J.**; Cotta, W.; Schantz, C.; Leeb, S., "Utilizing Spin-Down Transients for Vibration-Based Diagnostics of Resiliently Mounted Machines," in *IEEE Transactions on Instrumentation and Measurement* , vol. 65, no. 7, pp. 1641-1650, July 2016

- Orji, U.A.; Schantz, C.; Gerhard, K.; **Donnal, J.**; Moon, J.; Sievenpiper, B.; Leeb, S.; Thomas, K., "Retrofittable Machine Condition and Structural Excitation Monitoring from the Terminal Box," in *IEEE Sensors Journal*, vol. 16, no. 5, pp. 1224-1232, March 1, 2016.
- Orji, U.A.; Remscrim, Z.; Schantz, C.; **Donnal, J.**; Paris, J.; Gillman, M.; Surakitbovorn, K.; Leeb, S.B.; Kirtley, J.L., "Non-intrusive induction motor speed detection," in *Electric Power Applications, IET*, vol.9, no.5, pp.388-396, 5 2015
- Schantz, C.; **Donnal, J.**; Sennett, B.; Gillman, M.; Muller, S.; Leeb, S., "Water Nonintrusive Load Monitoring," in *Sensors Journal, IEEE*, vol.15, no.4, pp.2177-2185, April 2015
- Donnal, J.**; Leeb, S.B., "Noncontact Power Meter," in *Sensors Journal, IEEE*, vol.15, no.2, pp.1161-1169, Feb. 2015
- Paris, J.; **Donnal, J.**; Remscrim, Z.; Leeb, S.B.; Shaw, S.R., "The Sinefit Spectral Envelope Preprocessor," *Sensors Journal, IEEE*, vol.14, no.12, pp.4385,4394, Dec. 2014
- Paris, J.; **Donnal, J.**; Cox, R.; Leeb, S., "Hunting Cyclic Energy Wasters," *Smart Grid, IEEE Transactions on*, vol.5, no.6, pp.2777,2786, Nov. 2014
- Paris, J.; **Donnal, J.**; Leeb, S.B., "NilmDB: The Non-Intrusive Load Monitor Database," *Smart Grid, IEEE Transactions on*, vol.5, no.5, pp.2459,2467, Sept. 2014
- Gillman, M.D.; **Donnal, J.**; Paris, J.; Leeb, S.B.; El Sayed, M.A.H.; Wertz, K.; Schertz, S., "Energy Accountability Using Nonintrusive Load Monitoring," *Sensors Journal, IEEE*, vol.14, no.6, pp.1923,1931, June 2014

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## Conferences

- Davis, L., **Donnal, J.** and Kutzer, M. "Tracking Additive Manufacturing Using Machine Vision," 2020 IEEE 10th International Conference Nanomaterials: Applications & Properties (NAP), 2020, pp. 02SAMA22-1-02SAMA22-5
- Donnal, J.**, McDowell, R., and Kutzer, M. "Decentralized IoT with Wattsworth," 2020 IEEE 6th World Forum on Internet of Things (WF-IoT), New Orleans, LA, USA, 2020, pp. 1-6
- Kutzer, M., Sinsley, G., McDowell, R., **Donnal, J.** "Toward Detecting Cyber-Physical Attacks in Additive Manufacturing Using Multi-View Visual Odometry" MSEC 2020. University of Cincinnati, Cincinnati OH Sep 3, 2020.
- Kidwell, S. et al. "Characterization of Shipboard Microgrid Loads on a Controlled System," ASNE Advanced Machinery Technology Symposium, Aug 27-28 2020.
- Wang, P., Zatarski, J., Banerjee, A., and **Donnal, J.** "Condition Monitoring of SiC MOSFETs Utilizing Gate Leakage Current," 2020 IEEE Applied Power Electronics Conference and Exposition (APEC), New Orleans, LA, USA, 2020, pp. 1837-1843
- Green, D., Lindahl, P., Leeb, S., Kane, T., Kidwell, S. and **Donnal, J.**, "Dashboard: Nonintrusive Electromechanical Fault Detection and Diagnostics," IEEE AUTOTESTCON, National Harbor, MD, USA, 2019,
- Kane, T. et al. "Non-Intrusive Monitoring for Shipboard Log Generation" ASNE Intelligent Ship Symposium (ISS), University of Pennsylvania, April 9-10 2019
- Donnal, J.**, Frontera, P., Broussard, R., Bush, M., Snyder, M. "Applied Research Aboard the USNA YP Fleet" ASNE Technology Systems, and Ships (TSS), Washington DC, June 18-20 2018

- Kane, T. et al. "NILM: Smarter Shipboard Monitoring for the Modern Fleet" ASNE Advanced Machinery Technology Symposium, Philadelphia PA, March 28-29 2018
- Donnal, J.**, Schantz, C., Moon, J., Lindahl, P., Leeb, S. "Stethoscopes for Nonintrusive Monitoring" 2017 IEEE Sensors Applications Symposium (SAS), Glassboro, NJ, USA, 2017, pp. 1-6.
- Nation, J., Aboulhian, A., Green, D., Lindahl, P., **Donnal, J.**, Leeb, S. "Nonintrusive Monitoring for Shipboard Fault Detection" 2017 IEEE Sensors Applications Symposium (SAS), Glassboro, NJ, USA, 2017, pp. 1-5.
- Lindahl, P., Lt. G. Bredariol, **Donnal, J.**, Leeb, S. "Non-contact Sensors and Nonintrusive Load Monitoring (NILM) Aboard the USCGC SPENCER." 2016 IEEE AUTOTESTCON, Anaheim, CA, 2016, pp. 1-10.
- Moon, J., Lindahl, P., **Donnal, J.**, Lt. R. Zachar, Schantz, C., Lt. W. Cotta, Leeb, S. "A Nonintrusive Magnetically Self-powered Vibration Sensor for Automated Condition Monitoring of Electromechanical Machines." 2016 IEEE AUTOTESTCON, Anaheim, CA, 2016, pp. 1-7.
- Lt G. Bredariol (USCG), **Donnal, J.**, Lindahl, P., Leeb, S. "Automatic Watchstander Through NILM Monitoring." ASNE Day 2016. March, 2016.
- Donnal, J.**; Leeb, S.B., "WattsWorth: Monitor electric power anywhere," Applied Power Electronics Conference and Exposition (APEC), 2014 Twenty-Ninth Annual IEEE , vol., no., pp.2223,2230, 16-20 March 2014
- Gillman, M.; Singleton, W.; Wilson, R.; Cotta, W.; **Donnal, J.**; Paris, J.; Leeb, S. "Accounting for Every Kilowatt". Defense AT&L. Defense Acquisition Univ Ft. Belvoir VA. Oct. 2014
- Schantz, C.; Sennet, B.; **Donnal, J.**; Leeb, S.; Gillman, M. "Non-Intrusive Load Monitoring for Water (WaterNILM)". *Urban Water II*. Ed. S. Mambretti, C.A. Brebbia. Vol. 139. 2014
- Schantz, C.; **Donnal, J.**; Leeb, S.; Marimuth, P. N.; Habib, S. "WaterWOLF: Water Watch on Load Flow". *Urban Water II*. Ed. S. Mambretti, C.A. Brebbia. Vol. 139. 2014
- Moon, J.; **Donnal, J.**; Paris, J.; Leeb, S., "VAMPIRE: A magnetically self-powered sensor node capable of wireless transmission," Applied Power Electronics Conference and Exposition (APEC), 2013 Twenty-Eighth Annual IEEE , vol., no., pp.3151,3159, 17-21 March 2013
- Donnal, J.**; Schantz, C.; Orji, U., et. al. "VAMPIRE: Accessing a Life-Blood of Information for Maintenance and Damage Assessment," *American Society of Naval Engineers Day*, February 2012

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## Invited Papers

- Lindahl, P., Bredariol, G., **Donnal, J.** and Leeb, S. "Noncontact electrical system monitoring on a U.S. Coast Guard cutter," in *IEEE Instrumentation & Measurement Magazine*, vol. 20, no. 4, pp. 11-20, August 2017.
- Green, D., Kane, T., Kidwell, S., Lindahl, P., **Donnal, J.**, and Leeb, S. "NILM dashboard: Actionable feedback for condition-based maintenance," in *IEEE Instrumentation & Measurement Magazine*, vol. 23, no. 5, pp. 3-10, Aug. 2020