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Engineering & Scientific Consulting

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Professional Profile

Dr. Kuykendal's expertise is in electrical and electronic systems, including advanced driver assistance systems (ADAS), automotive electronics, consumer electronics, electric vehicles (EVs) and other battery powered devices. She specializes in evaluating the safety of electrical system designs including failure analysis investigations and product liability issues.

Dr. Kuykendal has expertise in the evaluation of ADAS technologies including efficacy under diverse environmental conditions, variability in design implementation and sensor utilization, and performance across a wide variety of scenarios. Her evaluations are supported by rigorous design analyses in addition to extensive performance and simulated-failure testing.

Dr. Kuykendal’s experience includes system analyses of automatic emergency braking, electronically controlled throttle actuation, forward collision warning, electric vehicle batteries, adaptive cruise control, airbag control systems, and numerous other embedded systems with application in both traditional, ADAS-equipped, and autonomous vehicles.

At Exponent, Dr. Kuykendal focuses on the analysis of complex control systems, large-scale and small-scale lithium-ion batteries coupled with their charging and protection circuitry, device construction quality, and complete system functionality and performance. Dr. Kuykendal works extensively on evaluating the safety of consumer and automotive electronics by performing component and system-level design reviews coupled with electrical testing and on-site inspections. She regularly performs failure analyses and fire investigations relating to home, automotive, and industrial claims.

Additionally, Dr. Kuykendal has expertise with high-throughput testing of products for accelerated aging of electrical systems and components. She has expertise in the evaluation of medical devices for FDA compliance, magnetic resonance imaging compatibility, and insurance code application. She is proficient in performing due diligence investigations for assessing biomedical technology and intellectual property, including market and technology research into current wearable technologies.

Dr. Kuykendal received her Ph.D. in Bioengineering from the Georgia Institute of Technology School of Electrical and Computer Engineering in which she developed high-throughput closed-loop analysis techniques for evaluating the efficacy of electrical stimulation on neural tissue. Her work encompassed hardware design, software development, real-time video analysis of neural activation, and closed-loop system control.

Academic Credentials & Professional Honors

Ph.D., Bioengineering, Georgia Institute of Technology, 2014

M.S., Electrical and Computer Engineering, Georgia Institute of Technology, 2008

B.S., Computer Engineering, Missouri University of Science and Technology, 2005

B.S., Electrical Engineering, Missouri University of Science and Technology, 2005

National Science Foundation Graduate Research Fellow (NSF GRFP), Recipient 2006

National Science Foundation IGERT Fellow, 2006-2008

Licenses and Certifications

Functional Safety Practitioner (Automotive ISO 26262)

Certified Fire and Explosion Investigator (CFEI)

Certified Vehicle Fire Investigator (CVFI)

Professional Affiliations

Institute of Electrical and Electronics Engineers (IEEE)

Society of Automotive Engineers (SAE)

Society of Women Engineers (SWE)

Languages

Spanish

Publications

Scally, S., Paradiso, M., Koszegi, G., Easter, C., Kuykendal, M., et al., “Advanced Driver Assistance System (ADAS) Performance Variability with Partial Overlap Targets,” SAE Technical Paper 2024-01-2038, 2024, doi:10.4271/2024-01-2038.

Faenza, N., Spray, R., and Kuykendal, M., "Understanding the Fundamental Mechanisms of Battery Thermal Runaway Propagation and Mitigation," SAE Technical Paper 2023-01-1515, 2023.

Kuykendal, M., Kingsley, D., Tin Whiskers and Automotive Electronics, IEEE ISPCE 2019, San Jose, CA, May, 2019.

Kuykendal, M., Lele, S., A Hazard-Based Approach to Product Safety Assessment, IEEE SPCE 2019, Austin, TX, November, 2019.

Kuykendal ML, DeWeerth SP, Grover MA. Optimization of stimulation parameters for targeted activation of multiple neurons using closed-loop search methods. Processes 2017; 5(4):81. doi:10.3390/pr5040081.

Kuykendal ML, Guvanasen GS, Potter SM, Grover MA, DeWeerth SP. Closed-Loop Characterization of Neuronal Activation Using Electrical Stimulation and Optical Imaging. Processes 2017, 5(2):30. doi:10.3390/pr5020030

Kuykendal ML, Potter SM, Grover, DeWeerth SP. Targeted Stimulation Using Differences in Activation

Probability across the Strength-Duration Space. Processes 2017; 5(2):14. doi:10.3390/pr5020014

Pinnangudi B, Kuykendal M, Bhadra S. Smart Grid Energy Storage. Chapter 4 in: The Power Grid: Smart, Secure, Green and Reliable 1st Edition, D'Andrade B (ed), 2017.

Guvanasen GS, Mancini ML, Calhoun WA, Rajaraman S, DeWeerth SP. Polydimethylsiloxane Microstencils Molded on 3-D-Printed Templates. Journal of Microelectromechanical Systems 2014 Oct; 23(5):1045-1053.

Presentations

Kuykendal, M., Kingsley, D., Tin Whiskers and Automotive Electronics, ISPCE 2019, San Jose, CA, May, 2019.

Kuykendal, M., Lele, S., A Hazard-Based Approach to Product Safety Assessment, SPCE 2019, Austin, TX, November, 2019.

Martens, J., Kuykendal, M., Bracher, D., Arora, A. Functional Safety That Your Boss Will Understand. 2019 Association of Equipment Manufacturers Product Safety & Compliance Seminar, Des Moines, IA, May 1, 2019.

Kuykendal ML, Guvanasen GS, Grover MA, Potter SM, DeWeerth SP. Automated closed-loop extracellular electrical stimulation and optical recording for increasing the selectivity of the stimulus-evoked response within a neuronal population. Poster presented at: Biomedical Engineering Society Annual Meeting, Atlanta, GA, October 24-27, 2012.

Kuykendal ML, Guvanasen GS, Grover MA, Potter SM, DeWeerth SP. Closed-loop multisite extracellular electrical stimulation and optical recording for measuring and controlling the evoked response of a neuronal population. Poster presented at: Neuroscience 2011, Washington, D.C., November 12-16, 2011.

Kuykendal ML, Guvanasen GS, Grover MA, Potter SM, DeWeerth SP. Closed-loop targeted electrical stimulation for excitation of selective neuronal populations. Biomedical Engineering Society Annual Meeting, Austin, TX, October 6-9, 2010.

Kuykendal ML, Guvanasen GS, Grover MA, Potter SM, DeWeerth SP. Real-time characterization of neuronal response for selective stimulation. Poster presented at 7th International Meeting on Substrate-Integrated Microelectrode Arrays, Reutlingen, Germany, June 29-July 2, 2010.

Kuykendal ML, Ross JD, Potter SM, DeWeerth SP. Real-time characterization of neural excitability by multisite extracellular stimulation. Poster presented at Neuroscience, Washington, D.C., November 15-19, 2008.

Kuykendal ML, Ross JD, Potter SM, DeWeerth SP. Real-time characterization of multisite extracellular stimulation. Short talk presented at Biomedical Engineering Society Annual Meeting, St. Louis, MO, October 2-4, 2008.

Kuykendal ML, Ross JD, DeWeerth SP. The spatial quantification of evoked neural responses to excitatory and inhibitory stimulus waveforms. Poster session presented at IGERT Project Meeting, Arlington, VA, May 18-20, 2008.