

Roy J. Lycke

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Education

Doctorate of Philosophy
Purdue University
Biomedical Engineering

2012 - May 2019
West Lafayette, IN

Masters of Science
Iowa State University
Computer Engineering

2011 - 2012
Ames, IA

Bachelors of Science
Iowa State University
Computer Engineering

2006 - 2011
Ames, IA

Research Interests

Brain-machine Interfaces, Neuroprostheses, Sensory Repair and Analysis, Neural Coding and Plasticity, Image Segmentation, MRI Analysis, Mechanical Modeling and Simulation

Research Experience

Graduate Research Assistant
Purdue University
School of Mechanical Engineering

August 2014 - Present
West Lafayette, IN
Advisor: Dr. Eric Nauman

Performed intra-lab and interdisciplinary, cross-college research projects investigating: traumatic brain injury, cellular mechanics, tissue & organ structure, athletic injury prevention, electrode design, and brain biomechanics. Developed novel software for analyzing and segmenting MRI brain scans, MicroCT tissue samples, and histological slices. Analyzed micro and macro biological systems utilizing finite element software. Mentored undergraduate and graduate researchers, performed cadaver dissections, developed course materials, invented sensed sports equipment, and rapid prototyped braces for Purdue Men's Basketball team.

Graduate Research Assistant
Purdue University
School of Biomedical Engineering

August 2012 – August 2014
West Lafayette, IN
Advisor: Dr. Kevin Otto

Designed and conducted in vivo animal studies investigating novel neural implants, their performance, and subsequent immune response. Developed new surgical techniques for device implementation and programs for analyzing recorded brain activity. Mentored undergraduate research students, designed research plans & experiments, and managed laboratory assets.

Graduate Research Assistant

Iowa State University
Department of Computer & Electrical Engineering

August 2010 – August 2012

Ames, IA
Advisor: Santosh Pandey

Conducted research on *C. elegans*, investigating response and efficacy to novel drug treatments. Designed novel microfluidic systems and fabricated devices for testing cellular cultures and micro-organisms in collaborative research.

Teaching Interests

Biomedical Engineering, Computer Engineering, Applied Physiology, Neuroscience, Neural Implants

Teaching Experience

College Course Design

Purdue University

Fall 2018

West Lafayette

Developed lecture material and laboratory curriculum for teaching programming, circuit design, and implementation of varied electronic components in a multi-computer system.

Volunteer Teaching Assistant

GK-12 Volunteer Program

Purdue University

Fall 2015

West Lafayette, IN

Taught regional middle school students basic sciences and collaborated with teaching staff to improve existing lessons. Developed lessons and exploratory lab that was taught and implemented for future years.

SURF Mentor

Summer Undergraduate Research Fellowship Program

Purdue University

Summer 2014

West Lafayette, IN

Advised undergraduate researcher, instructing and teaching experimental techniques, research methods, and study design.

Professional Organizations

Tau Beta Pi (Engineering Honor Society)

Eta Kappa Nu (Electrical Engineering Honor Society)

Member Since 2008

Member Since 2009

Awards

Robert B. Truitt Fellowship	Awarded 2017
Fearnot-Laufman-Greatbatch Award	Awarded 2014
NSF Graduate Fellowship Award	Awarded 2011

Publications

Lycke, R., Nauman, E. Neural Electrode Material properties and Geometry affect Brain Deformation in Response to Micromotion: A Computational Study. (Manuscript in Preparation)

Lycke, R., Lee, T., McIver, K., Bucherl, S., Lee, P., Talavage, T., Nauman, E. Subject Specific Calculation of Center of Mass Acceleration due to Impact via Automated Head Segmentation. (Manuscript in Preparation)

Zhai, X., Nauman, E., Nie Y., Liao H., Lycke, R., Chen, W. Mechanical response of human muscle at intermediate strain rates. *Journal of Biomechanical Engineering*. (In Review)

Lycke, R., Walls, M., Calve, S. Computational modeling of developing cartilage using experimentally determined geometries and compressive moduli. *Journal of Biomechanical Engineering*. (In Review)

Lee, T., Lycke, R., Auger, J., Music, J., Dziekan, M., Newman, S., Talavage, T., Nauman, E. Head Acceleration Event Metrics in Youth Athletes More Dependent on Sport than Level of Play. *Journal of Applied Biomechanics*. (In Review)

Lycke, R., Kurfman, J., Nauman, E. (July 2018). A Model relating the Mechanical Properties of Neural Electrode Design and Chronic Neural Immune Response. World Congress of Biomechanics 2018 Conference. Dublin, Ireland.

Lin, J., Phillips, E., Riggins, T., Sangha, G., Chakraborty, S., Lee, J., Lycke, R., Hernandez, C., Soepriatna, A., Thorne, B., Yrineo, A., Goergen, C. (2015). Imaging of Small Animal Peripheral Artery Disease Models: Recent Advancements and Translational Potential. *International Journal of Molecular Sciences*, 16(5), 11131–11177. doi:10.3390/ijms160511131

Lycke RJ, Schendel A, Williams JC, Otto. K. (2014). In vivo evaluation of a μ ECoG array for chronic stimulation. *Proc. of 36th Ann Conf EMBS*, 1294–1297. doi:10.1109/EMBC.2014.6943835

Lycke, R., Parashar, A., & Pandey, S. (2013). Microfluidics-enabled method to identify modes of *Caenorhabditis elegans* paralysis in four anthelmintics. *Biomicrofluidics*, 7(6).

Pandey, S. (2011). Decision-making by nematodes in complex microfluidic mazes. *Advances in Bioscience and Biotechnology*, 02(06), 409–415. doi:10.4236/abb.2011.26060

Parashar, A., Lycke, R., Carr, J. A., & Pandey, S. (2011). Amplitude-modulated sinusoidal microchannels for observing adaptability in *C. elegans* locomotion. *Biomicrofluidics*, 5(2).