

**Jordan John Williams**  
Assistant Professor  
Department of Biomedical Engineering  
Department of Neurosurgery  
Marquette University and the Medical College of Wisconsin  
Phone: (414) 288-7569 (Marquette)  
E-mail: jordan.j.williams@marquette.edu

---

**Career Objectives** To lead a cutting-edge academic research lab focused on: 1) developing viral-mediated peripheral optogenetic techniques and gene therapies to alleviate motor, sensory, and autonomic dysfunction due to conditions such as spinal cord injury, and 2) utilizing multi-scale neural recording to investigate the neural plasticity and network changes that occur during motor and brain-machine interface skill acquisition.

---

**Research Interests** Functional optical neuromuscular stimulation using virally mediated peripheral optogenetics in rodents and non-human primates  
Spreading depolarizations in the spinal cord following injury and their role in secondary injury  
Immune response to viral peripheral optogenetic gene therapy  
Screening of AAV libraries for utility in gene therapy aimed at spinal cord injury and motor diseases  
Tissue clearing and whole sample imaging of optogenetic expression in peripheral nerves and spinal cord  
Adaptive difficulty training algorithms and neural correlates of skill acquisition using brain-computer interfaces  
Characterization of active control and idle states during brain-computer interface operation  
Multi-scale neural signal correlations and differences related to state-dependent BCI decoding  
Epidural electrocorticography applications to motor neurophysiology and brain-computer interfaces

---

**Education** Ph.D. Biomedical Engineering, December 2013,  
*Washington University, Saint Louis, MO USA*  
Dissertation: "ECoG correlates of visuomotor transformation, neural plasticity, and application to a force-based brain-computer interface"  
Thesis Advisor: Daniel Moran, PhD  
  
M.D., December 2013, *Washington University, Saint Louis, MO USA*  
  
B.S. Electrical Engineering, Engineering Physics (*summa cum laude*)  
May 2005, *South Dakota State University, Brookings, SD USA*

**Academic  
Positions**

Assistant Professor, Departments of Biomedical Engineering  
and Neurosurgery  
Marquette University and the Medical College of Wisconsin  
August 2019 – Present

Postdoctoral Scholar, Systems Neuroscience Institute  
University of Pittsburgh, December 2013 – August 2019  
Primary Mentor (2013 – 2019): Dr. Andrew B. Schwartz, Dept. of  
Neurobiology, University of Pittsburgh  
Co-Mentor (2016 – Present): Dr. Alberto L. Vazquez, Depts. of  
Radiology and Bioengineering, University of Pittsburgh  
Co-Mentor (2019 – Present): Dr. Leah Byrne, Dept. of  
Ophthalmology, University of Pittsburgh  
Postdoctoral Career Development Mentoring Team:  
Dr. Peter L. Strick, Neurobiology, University of Pittsburgh  
Dr. Douglas J. Weber, Bioengineering, University of  
Pittsburgh/DARPA

---

**Grants and  
Fellowships**

Morton Cure Paralysis Fund Award: 2021  
National Institute of Neurological Disorders and Stroke NRSA  
Postdoctoral Fellowship Award (F32): 2015-2018  
National Institute of Neurological Disorders and Stroke  
NRSA Fellowship Award: 2011-2012  
National Science Foundation IGERT Program Fellowship  
(Cognitive, Computational, and Systems Neuroscience  
Pathway): 2008-2010  
Washington University in St. Louis Medical Scientist Training  
Program Fellowship: 2005-2013

---

**Honors  
and Awards**

Ripple Neuro Promising Young Investigator Award: 2019  
Phi Kappa Phi Fellowship Award: 2005  
SDSU College of Engineering Dean's List: 10 semesters (2000-  
2005)  
National Dean's List: 10 semesters (2000-2005)  
Elks National Most Valuable Student Scholarship: 2000-2004  
Barry M. Goldwater National Scholarship: 2004-2005  
Tau Beta Pi Campbell Scholarship - National engineering honor  
society scholarship: 2004-2005  
National Dean's List Scholarship: 2004-2005

---

**Professional  
Activities**

Professional Memberships:  
Biomedical Engineering Society (BMES)  
Institute of Electrical and Electronics Engineers (IEEE)  
Society for Neuroscience (SfN)

Brain Computer Interface Society (BCI Society)  
Engineering in Medicine and Biology Society (EMBS)  
Phi Kappa Phi (National academic honor society)  
Eta Kappa Nu (Electrical engineering honor society)  
Tau Beta Pi (National engineering honor society)

Guest Associate Editor – Frontiers in Neural Technology  
Review Editor – Frontiers in Brain Imaging Methods

Ad-hoc Reviewer:

Journal of Neural Engineering  
Nature Scientific Reports  
Journal of Visualized Experiments  
Science Robotics  
Neural Regeneration Research

Department Service:

Marquette University / MCW:  
BME Research Committee since August 2019 (Chair: Dr. Amit Joshi)  
Zablocki VA Hospital  
Safety Committee since May 2020 (Chair: Dr. Caron Dean-Bernhoft)

---

**Teaching**

**BIEN 3310 – Control Systems for Biomedical Engineering (MU), Spring 2020 – Present**

**BIEN 6200 – Biomedical Signal Processing (MU) – Fall 2021**

**Advanced Neurophysiology (Pitt), Spring Semester 2017**

**Surgical Suturing Techniques Workshop (Pitt), Fall 2017.**

---

**Publications**

E.M. Moravec, A.S. Pavlenko, **J.J. Williams** (2021). Variable timeline of optogenetic expression in rodent peripheral nerves following intramuscular virus injection. *Proceedings of the 10<sup>th</sup> International IEEE EMBS Conference on Neural Engineering*.

**J.J. Williams**, A.M. Watson, A.L. Vazquez, A.B. Schwartz (2019). Viral-mediated optical stimulation of peripheral motor nerves in non-human primates. *Frontiers in Neuroscience*. July;13. doi: <https://doi.org/10.3389/fnins.2019.00759>

**J.J. Williams**, A.B. Schwartz, A.L. Vazquez (2019). Prolonged functional optical sensitivity in non-human primate motor nerves following Cyclosporine-based immunosuppression and rAAV2-

retro mediated expression of Chr2. *Proceedings of the 9th International IEEE EMBS Conference on Neural Engineering*. doi:10.1109/NER.2019.8716978.

N.J. Michelson, A.L. Vazquez, J.R. Eles, J.W. Salatino, E.K. Purcell, **J.J. Williams**, X.T. Cui, T.D. Kozai (2018). Multi-scale, multi-modal analysis uncovers complex relationship at the brain tissue-implant neural interface: New Emphasis on the Biological Interface. *Journal of Neural Engineering*, April;15(3). doi: <https://doi.org/10.1088/1741-2552/aa9dae>

**J.J. Williams\***, A.G. Rouse\*, J.J. Wheeler, D.W. Moran (2016) Spatial co-adaptation of cortical control columns in a micro-ECoG brain-computer interface. *Journal of Neural Engineering*. Sept;13(5). doi:1741-2552/13/5/056018. (\* Co-first authors)

**J.J. Williams**, R.N. Tien, Y. Inoue, A.B. Schwartz (2016) Idle State Classification using Spiking Activity and Local Field Potentials in a Brain Computer Interface. *Proceedings of the 38<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society*. doi: 10.1109/EMBC.2016.7591012.

**J.J. Williams**, R.N. Tien, Y. Inoue, A.B. Schwartz (2016) Detecting and utilizing the idle state in an intracortical brain-computer interface. *Proceedings of the International BCI Meeting 2016*. May 30-June 3, 2016, Pacific Grove, California. doi: 10.3217/978-3-85125-467-9-62.

**J.J. Williams**, A.G. Rouse, J.J. S. Thongpang, J.C. Williams, D.W. Moran (2013) Differentiating closed-loop cortical intention from rest: Building an asynchronous electrocorticographic BCI. *Journal of Neural Engineering*. Aug;10(4). doi:1741-2552/10/4/046001.

A.G. Rouse, **J.J. Williams**, J.J. Wheeler, D.W. Moran (2013) Cortical adaptation to a chronic micro-electrocorticographic brain computer interface. *Journal of Neuroscience*. Jan 23;33(4):1326-30.

**J.J. Williams** (2013) ECoG correlates of visuomotor transformation, neural plasticity, and application to a force-based brain-computer interface. Ph.D. dissertation, Washington University in St. Louis. ProQuest Publications.

T.M. Pearce, **J.J. Williams**, S.P. Kruzel, M.J. Gidden, J.C. Williams (2005) Dynamic control of extracellular environment in in vitro neural recording systems. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. Jun;13(2):207-12.

**Manuscripts**

**J.J. Williams**, R.N. Tien, Y. Inoue, A.B. Schwartz (2021) Optimizing dynamic brain-computer interface difficulty toward standardized training and improved skill acquisition. Manuscript in preparation.

**J.J. Williams**, A.L. Vazquez (2021). Optogenetically driven electromyographic response characteristics and modulation strategies for peripheral motor stimulation. Manuscript in preparation.

J.J. Wheeler, **J.J. Williams**, K.J. Otto, J.C. Williams, D.W. Moran (2021) Time-varying electrical characteristics of micro- to milli-scale platinum, iridium oxide, and PEDOT electrodes in chronic epidural cortical implants. Under review.

---

**Oral Presentations**

**J.J. Williams** (2021) Viral peripheral optogenetics for motor rehabilitation. Wisconsin Institute for Translational Neuroengineering (WITNE) Summer Seminar Series. July 20, 2021(Virtual).

**J.J. Williams** (2020) Advancing Neural Prosthetics: From Brain-Machine toward Brain-Muscle Interfaces. *University of Illinois College of Medicine Rockford, Department of Biomedical Sciences invited seminar.* February 12, 2020, Rockford, IL.

**J.J. Williams** (2019). Career Choices as an M.D./Ph.D. *Medical College of Wisconsin Medical Scientist Training Program Retreat.* November 8-9, 2019, Lake Geneva, WI.

**J.J. Williams**, A.L. Vazquez, A.B. Schwartz (2019) Prolonged functional optical sensitivity in non-human primate motor nerves following Cyclosporine-based immunosuppression and rAAV2-retro mediated expression of ChR2. (Selected poster for Ignite session podium presentation) *Proceedings of the 9th International IEEE EMBS Conference on Neural Engineering.* March 21, 2019.

**J.J. Williams**, A.L. Vazquez, A.M. Watson, A.B. Schwartz (2018) Viral-mediated optogenetic stimulation of peripheral motor activity in macaques. (Selected poster for podium presentation) *Gordon Research Conference on Neuroelectronic Interfaces.* March 25-30, Galveston, TX.

**J.J. Williams**, A.L. Vazquez, A.B. Schwartz (2017) Peripheral motor optogenetics toward restoration of volitional control of native musculature. *Center for the Neural Basis of Cognition Postdoc Seminar Series.* October 12, 2017, Pittsburgh, PA.

**J.J. Williams**, R.N. Tien, Y. Inoue, A.B. Schwartz (2015)  
Engineered Learning toward improved brain-machine interface and  
rehabilitation training. *Society for Neuroscience Abstracts*  
(Nanosymposium Presentation). October 17-21, Chicago, IL.

---

**Abstracts**

E.M. Moravec, A.S. Pavlenko, **J.J. Williams** (2021) Response  
characteristics of hybrid optogenetic and electrical stimulation in rat  
peripheral motor nerves. *Society for Neuroscience Abstracts*, November  
8-11, (virtual).

**J.J. Williams**, A.B. Schwartz, A.L. Vazquez (2019) Optogenetically  
driven electromyographic response characteristics and modulation  
strategies for peripheral motor stimulation. *Society for Neuroscience  
Abstracts*, October 19-23, Chicago, IL.

**J.J. Williams**, A.L. Vazquez, A.M. Watson, A.B. Schwartz (2018)  
Viral-mediated optogenetic stimulation of peripheral motor activity  
in macaques. *Gordon Research Conference on Neuroelectronic Interfaces*.  
March 25-30, Galveston, TX.

**J.J. Williams**, A.L. Vazquez, A.M. Watson, A.B. Schwartz (2017)  
Peripheral optogenetic stimulation of motor function in non-human  
primates toward restoration of volitional motor control in a brain-  
machine interface. *Society for Neuroscience Abstracts*, November 11-15,  
Washington, D.C.

**J.J. Williams**, A.L. Vazquez, C. Wirblich, M.J. Schnell, A.B.  
Schwartz (2016) Virus, opsin, and immunomodulation approaches  
for optogenetic control of peripheral motor function. *Society for  
Neuroscience Abstracts*, November 12-16, San Diego, California.

**J.J. Williams**, R.N. Tien, A.B. Schwartz (2014) Psychophysical,  
neural, and learning curve metrics toward optimizing training with a  
Brain-Computer Interface. *Society for Neuroscience Abstracts*,  
November 15-19, Washington, D.C.

**J.J. Williams**, A.G. Rouse, J.J. Wheeler, J.C. Williams, D.W.  
Moran (2011) Decoding attention in a micro-ECoG based brain  
computer interface system. *Society for Neuroscience Abstracts*,  
November 12-16, Washington, D.C.

**J.J. Williams**, A.G. Rouse, J.J. Wheeler, J.C. Williams, D.W. Moran  
(2010) Evaluation of impedance, signal quality, and neural plasticity  
characteristics in a chronic micro-ECoG device. *Society for  
Neuroscience Abstracts*, November 13-17, San Diego, California.

**J.J. Williams**, A.G. Rouse, J.C. Williams, D.W. Moran (2009)  
 $\mu$ ECoG correlates of physical and end-effector movement  
characteristics in a joystick dissociation task. *Society for Neuroscience  
Abstracts*, October 17-21, Chicago, Illinois.

**November 2021**