GRADUATE PROGRAM IN NEUROSCIENCE

NEUROENGINEERING GROUP

DREXEL UNIVERSITY
Graduate School of
Biomedical Sciences and Professional Studies
College of Medicine

OUR MISSION

To use mathematical, physical science, computational and engineering principles to understand the nervous system's circuit operation and development and to build novel devices to interface with this circuitry for research and therapy.

ABOUT US

The Neuroscience program Neuroengineering Group is part of Drexel Neuroengineering, a cross-campus joint effort of the Drexel University School of Biomedical Engineering (BME), Science and Health Systems and the College of Medicine.

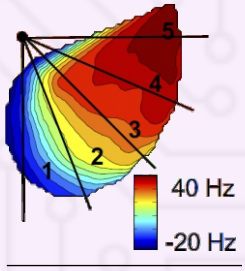
Our faculty seek to educate the next generation of interdisciplinary brain scientists and bioengineers by mentoring students with a shared common language and similar quantitative bases and frameworks, even though each one originates from different disciplines of expertise.

For fuller details of the cross-campus neuroengineering resources and collaborations, visit:

https://biomed.drexel.edu/neuroengineering/

Our neuro affiliated faculty:

- Jessica Ausborn, PhD
- Vikas Bhandawat, PhD (BME)
- Marie-Pascale Côté, PhD
- Simon Danner, PhD
- Kimberly Dougherty, PhD
- Simon Giszter, PhD
- Sergey Markin, PhD
- Catherine von Reyn, PhD (BME)
- Ilya Rybak, PhD
- Natalia Shevtsova, PhD
- Dong Wang, PhD

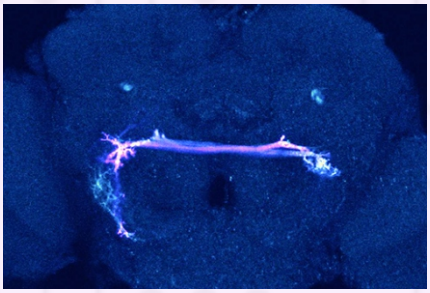


Spindle firing rate differences between two muscles recorded in frog wipe reflex, then used in a neuromechanical model

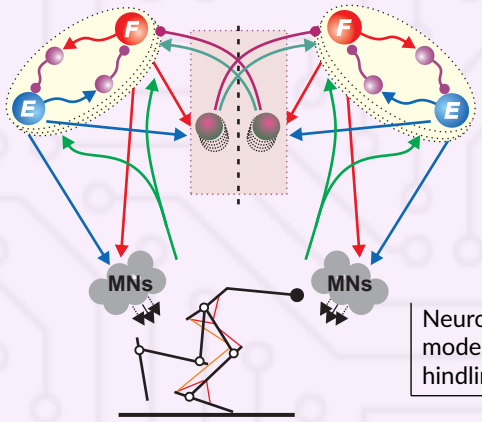
OUR RESEARCH

The overarching goal of our research is to obtain a deeper understanding of the structure and function of neuronal circuitry supporting motor behaviors and sensory processing, and of its adaptation and plasticity. Natural outcomes of this understanding will be improved treatment, improved rehab therapy, novel prosthetics and assistive devices to overcome deficits due to neurological diseases and stroke.

The core neuroengineering faculty are developing new approaches to study movement control, neural circuits and tools to facilitate and assess injury and recovery in the nervous system.



Giant commissural interneurons in the brain of the fruit fly *Drosophila melanogaster*



Neuro-biomechanical model of mouse hindlimb locomotion

Our research interests include:

- Comparative neuroengineering (Ausborn, Bhandawat, Dougherty, Giszter, von Reyn)
- Computational neuroengineering (Ausborn, Bhandawat, Danner, Giszter, Markin, von Reyn, Rybak, Shevtsova)
- Human neuroengineering (Danner)
- Neural circuit engineering (Ausborn, Danner, Dougherty, Giszter, von Reyn, Rybak, Shevtsova, Wang)
- Neuromechanics (Bhandawat, Côté, Danner, Giszter, Markin, Rybak)
- Systems neuroengineering (Ausborn, Bhandawat, Côté, Dougherty, Giszter, von Reyn, Rybak, Shevtsova, Wang)
- Translational neuroengineering (Côté, Danner, Giszter)

In addition, neuroengineering graduate students have also forged homes in the other areas of the Neuroscience program using their unique skills.

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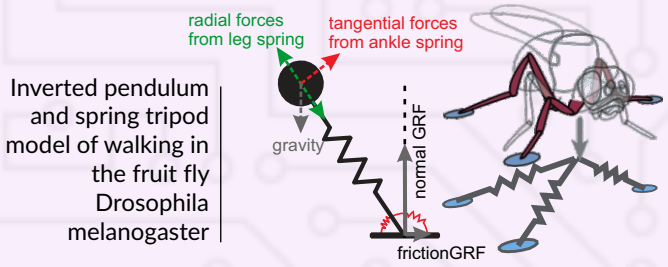
OUR NEUROENGINEERING APPROACH

Neuroengineering students have the opportunity to work with faculty across a wide range of neuroscience research areas, with an emphasis on quantitative skill sets, computational approaches and engineering tools.

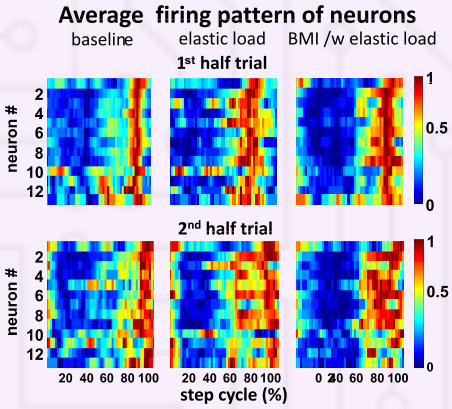
Becoming a member of our teams will expose you to a whole toolset of different approaches, such as:

biomechanical modeling | biomechanics | brain-machine interfaces | computational modeling of neurons and networks | genetic circuit manipulations | image and video processing | in vivo and in vitro whole-cell patch clamp recordings | microscopy | muscle and nerve recordings | neural circuit mapping | opto- and chemogenetics | quantitative measurement of behavior | robot rehabilitation | tool development

Highly flexible precisely braided microelectrode



Inverted pendulum and spring tripod model of walking in the fruit fly Drosophila melanogaster



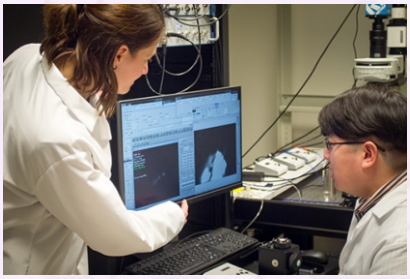
Cortical activity in brain-machine-interface tasks in rats

OUTLOOK FOR OUR TRAINEES

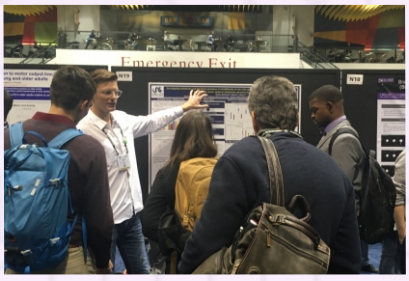
Neuroengineering is an effective launching pad for an array of careers, including a wide variety of academic disciplines as well as roles in industry such as robotics, prosthetics, machine learning, brain-machine interfaces and data science. Neuroengineering is for anyone who is interested in understanding how brains work and the multifaceted applications this understanding brings.

Our graduates are postdoctoral fellows or faculty at Cedars-Sinai; Georgia State University; University of Texas, Houston and Dallas; Feinberg School of Medicine; Children's Hospital of Pennsylvania; NIH Institute on Aging; City University of New York and others, or have successful careers outside of academia, including at the FBI, the Air Force Research Laboratory, Intel Corporation or Luc Pharmaceutical.

Students have the opportunity to work in interdisciplinary teams, attend international conferences, and network with leaders in science, medicine, government and industry.



Our graduate students work closely with faculty members from diverse disciplines



Students regularly present and discuss their research at national and international conferences

Get in Touch

Program Director:
Peter Baas, PhD
pwb22@drexel.edu

Program Administrator:
Ipatia Daigle
ied26@drexel.edu

Chair of PhD Admission Committee:
Jessica Barson, PhD
jrb455@drexel.edu

Chair of MS Admission Committee:
Marie-Pascale Côté, PhD
mc849@drexel.edu