

Amir R. Peimani

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LINKS



INTERESTS

- DEEP LEARNING & NEURAL NETWORKS, GNN, LSTM
- WAVELET ANALYSIS & NETWORK CONNECTIVITY
- GRAPH SIGNAL PROCESSING

TEACHING

U of Toronto, TA

DEEP LEARNING & NEURAL NETWORKS BY JIMMY BA
2022-2023

DATA SCIENCE FOR BIOENGINEERS
2023

THEORY OF COMPUTATION
2022-2023

BIG DATA SCIENCE
2019-2020

COMP. SCIENCE & PYTHON
2019-2023

Northeastern U, TA

PREDICTIVE ANALYTICS, PYTHON, PROBABILITY, & STATS
2022-2023

BIG DATA & DBMS
2022

PROGRAMMING

Python • SQL • C/C++ • R
LaTeX • JavaScript • Unit scripting

Libraries & Packages:

NumPy • Pandas • Matplotlib
Seaborn • Scikit-Learn • SymPy
SciPy • NetworkX • TensorFlow
Keras • PyTorch • OpenCV
CUDA • MapReduce • Hive
Spark • PySpark • Hadoop

Tools & Utilities

Git • VSCode • Tableau

RECENT AWARDS

Mitacs Accelerate Fellowship
\$75,000, 2020-2022

Doctoral Completion Award
\$10,000, Fall 2022

Wildcat Graduate Scholarship
\$10,000, Fall 2020

RELEVANT EXPERIENCES

Graduate Research Assistant | UHN, U OF TORONTO

Sep 2018 - Sep 2023

- Studied neural network connectivity alterations & seizure propagation in amygdala kindled rats using graph neural networks, wavelet phase coherence, & granger causality. The study revealed a shift in network centrality from the basolateral amygdala to the ipsilateral parietal cortex, & used machine learning algorithms to identify strengthened cortico-brainstem connections during seizure episodes.
- Explored Postictal Generalized EEG Suppression (PGES) episodes in kindled seizures via multimodal integration of LFP data & behavioral seizure videos by employing dynamic attention mechanisms & structured graph neural networks to understand intricate PGES dynamics
- Investigated the time course & semiology of brainstem seizure invasion in a kindling model. The study utilized in vivo LFP, behavioral videos, graph signal processing, and machine learning techniques to analyze seizure propagation pathways & identify unique synchronization patterns correlated with increased seizure severity in behavioral manifestation.

Mitacs Accelerate Intern | MITACS, NEUREKA.AI, U OF TORONTO

Jan 2020 - Jan 2022

- Developed epilepsy rat models, recorded brain signals & vital signs. Explored optimizing a wireless BCI for precise, high-speed recording of brain signals.
- Applied multimodal deep learning with hierarchical attention mechanisms to investigate the causal effects of brainstem seizures on respiration & differential physiological impacts.

SELECTED PUBLICATIONS

A.R. Peimani, et al., **Neural Network Connectivity & Seizure Propagation Patterns to Brainstem Alter in Kindled Seizures**
JOURNAL OF NEUROSCIENCE, 2023; [UNDER PREP]

A.R. Peimani, et al., **Neural Network Dynamics in Kindled Seizures**
SOCIETY FOR NEUROSCIENCE (SFN), 2023; DC, USA

A.R. Peimani, et al., **Time Course and Semiology of Brainstem Seizure Invasion in Amygdala Rapid Kindling Model**
77TH AES ANNUAL MEETING, 2023; FL, USA

A.R. Peimani, et al., **Multimodal Deep Learning with Hierarchical Attention Mechanisms Suggests Differential Effects of Brainstem Seizures on Respiration in a Rat Model**
NEURIPS WORKSHOP ON CRL, 2023; LA, USA; [UNDER PREP]

A.R. Peimani, et al., **Dynamic Attention & Graph Networks Reveal Brainstem Seizure Involvement on PGES Spatio-Temporal Patterns**
MACHINE LEARNING FOR HEALTH (ML4H), 2023; LA, USA; [UNDER PREP]

EDUCATION

2018-2024 University of Toronto, Canada

2015-2017 York University, Canada

2011-2015 Isfahan University of Technology, Iran

PhD, Biomedical Eng. GPA: A

MASc, Mechanical Eng. GPA: A

BASc, Mechanical Eng. GPA: A