Ariel K. Feldman

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INTERESTS

I am passionate about advancing our understanding of neural systems and developing innovative technologies that close the gap between the brain and external devices.

EDUCATION

CARNEGIE MELLON UNIVERSITY, Pittsburgh, PA, USA   2020-Present
Ph.D. Candidate in Neural Computation

RICE UNIVERSITY, Houston, TX, USA   2016-2020
B.A. in Computer Science
B.A. in Cognitive Sciences
Minor in Neuroscience

RESEARCH EXPERIENCE

CARNEGIE MELLON UNIVERSITY, Pittsburgh, PA, USA   2020-Present
Advisor: Douglas J. Weber
- Collaborating with Synchron to assess and enhance signal quality on the Stentrode.
- Initiated collaboration with Allegheny Health Network's epilepsy unit to investigate multi-region activity.
- Co-designed transnasal brain stimulation technology, leading to a patent submission.
- Applied information theory to analyze grid cell encoding, demonstrating the utility of Partial Information Decomposition in understanding distributed coding in the brain.

RICE UNIVERSITY, Houston, TX, USA   2016-2020
Advisors: Caleb Kemere & Jacob T. Robinson
- Fabricated micro-drive arrays, performed implants and designed experiments to study sharp-wave ripple complexes in the rodent hippocampus via recording and stimulation.
- Applied motion tracking analyses and designed experiments to test a novel stimulation device.

CORNELL UNIVERSITY, Ithaca, NY, USA   2019
Advisors: Mert Sabuncu & Jesse Goldberg
- Developed a pipeline to capture and analyze markerless motion data of budgerigars for behavior identification during interactions.

AWARDS

Henry L. Hillman Presidential Fellowship	2023
Carnegie Prize in Mind & Brain Sciences PhD Fellowship	2021
R.K. Mellon Presidential Fellowship	2020
Cornell NeuroNex REU Fellow	2019
Rice Undergraduate Research Scholars Program	2018

PEER-REVIEWED PUBLICATIONS

IN PREPARATION

1. Amanda Merkley, **Ariel K. Feldman**, Dorian M. Kusyk, Alex C. Whiting, Pulkit Grover, "Characterizing high-order interactions during conflict processing in patients with epilepsy".
2. **Ariel K. Feldman**, Kriti Kacker, Lois Yun, Nikole Chetty, James Bennett, Peter E. Yoo, David Lacomis, Noam Y. Harel, Raul G. Nogueira, Nicholas L. Opie, Jennifer L. Collinger, Thomas J. Oxley, David F. Putrino, Douglas J. Weber, "A comparative analysis of spatial filtering on the Stentrode".

SUBMITTED

1. Kriti Kacker, Nikole Chetty, **Ariel K. Feldman**, James Bennett, Peter E. Yoo, David Lacomis, Noam Y. Harel, Raul G. Nogueira, Shahram Majidi, Nicholas L. Opie, Jennifer L. Collinger, Thomas J. Oxley, David F. Putrino, Douglas J. Weber, "Spectral features of endovascular ECoG signals recorded from a Stentrode in the human motor cortex". *Journal of Neural Engineering*, **2024**.

ACCEPTED

1. **Ariel K. Feldman**, Praveen Venkatesh, Douglas J. Weber, Pulkit Grover, "Information-theoretic tools to understand distributed source coding in neuroscience". Special Issue on "Data, Physics, and Life Through the Lens of Information Theory", *IEEE Journal on Selected Areas in Information Theory*, **2024**.

PUBLISHED

1. Amanda Singer, Shayok Dutta, Eric Lewis, Ziying Chen, Joshua C. Chen, Nishant Verma, Benjamin Avants, **Ariel K. Feldman**, John O'Malley, Michael Beierlein, Caleb Kemere, Jacob T. Robinson, "Magnetoelectric materials for miniature, wireless neural stimulation at therapeutic frequencies". *Neuron*, **2020**.

PATENTS

PENDING

1. Mats Forssell, Pulkit Grover, Chaitanya Goswami, Boyle Cheng, Yuxin Gao, Yuhyun Lee, Vishal Jain, **Ariel K. Feldman**, Neil Mehta, "Method for Non-Invasive or Minimally-Invasive Stimulation of Deep Brain Targets", **2024**.

PODIUM PRESENTATIONS

1. **Ariel K. Feldman**, Praveen Venkatesh, Douglas J. Weber, Pulkit Grover, "An Information Theoretic Analysis of Grid Cells", *Rice Neuroengineering Initiative Conference,* Houston, TX, USA, May **2022**.
2. **Ariel K. Feldman**, Eugene Kim, Mert Sabuncu, Jesse Goldberg, "Building a Basis for Budgie Behavior", *Cornell NeuroNex*, Ithaca, NY, USA, August **2019**.
3. **Ariel K. Feldman**, Shayok Dutta, Etienne R. Ackermann, Caleb Kemere, "Development of the RELevator for exploring 3 Dimensional spatial representations of rodent hippocampal place cells", *Gulf Coast Undergraduate Research Symposium*, Houston, TX, USA, November **2017**.

POSTER PRESENTATIONS

1. **Ariel K. Feldman**, Kriti Kacker, Lois Yun, Nikole Chetty, James Bennet, Peter E. Yoo, Noam Y. Harel, Jennifer L. Collinger, Nicholas L. Opie, David Lacomis, Thomas J. Oxley, David F. Putrino, Douglas J. Weber, "Preserving motor related features across frequency bands through spatial filtering on the Stentrode", *NSF BRAIN IUCRC,* West Virginia University, Morgantown, WV, USA, August **2024**.
2. **Ariel K. Feldman**, Nikhil Verma, Marc Powell, Erynn Sorensen, Erick Carranza, Luigi Borda, George F. Wittenberg, Elvira Pirondini, Marco Capogrosso, Pulkit Grover and Douglas J. Weber, "Towards closed loop spinal cord stimulation for upper-limb motor control",
3. **Ariel K. Feldman**, Praveen Venkatesh, Douglas J. Weber, Pulkit Grover, "A Partial Information Decomposition Analysis of grid cell encoding", *Society for Neuroscience*, San Diego, CA, USA, November **2022**.
4. Shayok Dutta, **Ariel K. Feldman**, and Caleb T. Kemere, "Selective Disruption of Hippocampal Sharp-Wave Ripples Leads to Impaired Object-Place Recognition Memory". *Society for Neuroscience*. Chicago, IL, USA, October **2019**.
5. Shayok Dutta, **Ariel K. Feldman**, and Caleb T. Kemere, "Selective Disruption of Hippocampal Sharp-Wave Ripples Leads to Impaired Object-Place Recognition Memory". *UT Austin Conference on Learning and Memory*. Austin, TX, USA, April **2019**.
6. **Ariel K. Feldman**, Shayok Dutta, and Caleb T. Kemere, "A Machine Learning Approach to Predicting Occurrence of Sharp-Wave Ripple Complexes". *Rice Undergraduate Research Symposium*. Houston, TX, USA, April **2019**.

OTHER PUBLIC SPEAKING

- **Ariel K. Feldman**, "Hand, Foot and Mind", *TEDx: RiceU*, Houston, TX, USA, May **2017**.

TEACHING EXPERIENCE

GRADUATE TEACHING

CARNEGIE MELLON UNIVERSITY, Pittsburgh, PA, USA
Teaching Assistant, Fall 2022
- Neural Engineering Laboratory course (42-783)
- Graded homework assignments.
- Provided in-lab hardware & software technical support for students.

UNDERGRADUATE TEACHING

RICE UNIVERSITY, Pittsburgh, PA, USA
Academic Fellow, Mar. 2018 – May 2020
- Selected on behalf of the Rice University Office of Academic Advising based on proven academic achievement and demonstrated willingness to help fellow students.
- Offered on-call aid in Computer Science, Neuroscience and paper writing (historical/STEM research) through weekly office hours, one-on-one tutoring, review sessions for classes in my fields, and planned academic outreach events to engage students.

Laboratory Assistant, Spring 2020
- Fundamentals of Computer Engineering course (ELEC 220)

- Assisted Professor in the Practice Ray Simar in conducting labs and transferring content online via Zoom during the COVID-19 Pandemic.
- Regarded by Rice University as an example for other courses involving computational and hardware components to move online in the future.

Teaching Assistant, Fall 2019
- Computational Thinking course (COMP 140)
- Led review sessions, created exam review material, graded exams and projects, and held weekly office hours to assist students in mastery of material.

Teaching Assistant, Fall 2018
- Fundamentals of Cellular and Molecular Neuroscience course (NEUR 385/585)
- Led review sessions, created exam review material, and held weekly office hours to assist students in mastery of material.

ADDITIONAL TEACHING

RICE UNIVERSITY, Houston, TX, USA
Laboratory Assistant, Spring 2021
- Fundamentals of Computer Engineering course (ELEC 220)
- After graduating from Rice, I was asked to return virtually to assist in running this course, and train new laboratory assistants on conducting hybrid-style hardware-based courses.

COURSE DEVELOPMENT

MantisEDU, New Orleans, LA, USA
Course Instructor, Winter 2021
- Partnered with MantisEDU to make a nationally available course for low-income middle & high school students.

RICE UNIVERSITY, Houston, TX, USA
Course Instructor, Summer 2020
- Created "Internet of Things (IOT) with Machine Learning and Python" as a week-long course for Rice Center for Engineering Leadership's ELITE Tech Camp.
- Managed a team of undergraduate students and coordinated with an industry partner for hardware.

Taught two cohorts of middle and high school aged students per week throughout the summer.

STUDENT MENTORSHIP

CARNEGIE MELLON UNIVERSITY, Pittsburgh, PA, USA
- Lois Yun
- Shruthi Sudheendra
- Leo Hasher
- Miguel Martinez

RICE UNIVERSITY, Houston, TX, USA
- Elisabeth Torres-Schulte

LEADERSHIP

Carnegie Mellon Neuroscience Institute Student Organization, Pittsburgh, PA

Vice President of Finance, 2021-2022

- Proposed and managed budgets with the administration.
- Planned events for graduate students in the Neuroscience Institute.

Rice Neuroscience Society, Houston, TX

Internal Vice President, 2018-2019

- Coordinated campus-wide events to engage with students in neuroscience.
- Planned outreach events, including the Brain Bee, for the Houston community to engage with neuroscience.

SKILLS

PROGRAMMING LANGUAGES: Python, C/C++, Java, MATLAB, R

TECHNICAL SKILLS: Arduino, Raspberry Pi, EAI Tactors, micro-drive array fabrication

SOFT SKILLS: Mentorship, public speaking, technical writing

RESEARCH & DEVELOPMENT SKILLS: Clinical research collaboration, neural signal processing, experimental neuroscience, electrophysiology, rodent neurosurgery