

Ewina Tsam Kiu Pun

Ph.D. in Biomedical Engineering & Sc.M. in Computer Science

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Education

- 2018 – 2024 **Ph.D. in Biomedical Engineering**, Brown University.
GPA: 4.00 – Advisor: Prof. Leigh Hochberg
Topic: *Towards Stable & Reliable Intracortical Brain-Computer Interfaces for Long-term Independent Use.*
- 2022 – 2024 **Sc.M. in Computer Science (AI/ML track)**, Brown University.
GPA: 4.00 – Advisor: Prof. Stephen Bach
Topic: *Long-term Effective Neural Decoding with Meta-Learning.*
- 2017 – 2018 **M.S. in Biomedical Engineering**, University of Southern California.
GPA: 3.81 – Advisor: Prof. Maryam Shanechi
Topic: *Adaptive Subspace Identification Algorithm for Dynamic Tracking.*
- 2014 – 2018 **B.S. in Electrical Engineering**, University of Southern California.
GPA: 3.78 – Advisor: Prof. Ellis Meng
Topic: *A Biocompatible Impedance-based Microbubble Pressure Transducer to Treat Hydrocephalus.*

Technical Skills

- Programming Python, MATLAB, PyTorch, Tensorflow, scikit-learn, Pandas, Git, wandb, neptune, Redis, bash, Linux, Simulink, C++, Adobe Illustrator.
- Analytic Skills Machine learning, deep learning, weakly-supervised learning, continual learning, statistical inference, system identification, control design, time-series data analysis, signal processing, behavioral experimental design, data curation, data visualization, computer vision, MLOps.

Industry Experience

- Summer 2024 **Forest Neurotech**, *ML Software Engineer Intern*, Palo Alto, CA.
- Designed a motion filtering and correction algorithm using computer vision toolkit to stabilize functional ultrasound imaging, which improved the precision and reliability by more than 60%.
 - Accelerated data analysis time from days to less than 5 minutes by automating the image pre-processing pipeline, and migrated team onto a MLOps platform to enable real-time visualization during recording sessions.
 - Revamped the data infrastructure using the BIDS standard format, which simplified the process of data sharing with external stakeholders.
- Summer 2016 **Abbott Vascular**, *Engineering Intern*, Temecula, CA.
- Supported quality control of finished goods (Absorb GT1™ bioresorbable vascular scaffolds and catheter tubes).
 - Proposed a \$20,000+ cost savings project and streamlined equipment testing and replacement across European and American sites.

Academic Research

- 2018 – 2024 **BrainGate Clinical Trial Consortium**, *Graduate Researcher*, Providence, RI.
- *Thesis Advisor: Prof. Leigh Hochberg*
 - Designed the next-gen intracortical brain-computer interfaces (iBCIs) to restore communication for people with paraplegia with a multi-disciplinary team of 50+ across 4 clinical sites.
 - Developed, deployed and tested a real-time monitoring algorithm of distribution shifts in *in vivo* neuro-physiological multi-electrode arrays recordings from clinical trial participants.
 - Extended cursor control stability with an LSTM from daily recalibration to 3-month continuous use without any recalibration, enabling independent use of iBCI for clinical trial participants.
 - >80% classification accuracy of neural representation of 7 classes of daily activities from a 24h continuous neural recording such as sleeping, eating and iBCI control.
 - Decoded 10+ hand gestures as action commands for personal iBCI use on a desktop computer.
 - Analyzed and curated years worth of clinical neural and behavioral health data.
 - Mentored undergrads; built and launched a new internal website to facilitate knowledge transfer.
 - Migrated team to use GitHub for better code management and version control.

- 2023 – 2024 **BATS machine learning research group**, *Graduate Researcher*, Providence, RI.
- Developed a novel meta-learning decoding approach that enables rapid learning of new tasks within a day, significantly reducing the need of recalibration and minimizing adaptation time from 5 mins to 20 seconds (presented at Society for Neuroscience in *Chicago, IL*).
- 2017 – 2018 **USC Shanechi Lab**, *Undergraduate Researcher*, Los Angeles, CA.
- Implemented an adaptive subspace identification algorithm to enable online tracking and predicting neural dynamics for closed-loop BCI control.

Teaching

- Summer 2021 **Neuromatch Academy**, *Teaching Assistant*, Virtual.
- Taught computational neuroscience to a group of 10 graduate students and led discussions.
 - Guided two final research projects using the Allen Institute 2-photon dataset.
- 2019 **Brown University Dept. of Neuroscience**, *Teaching Assistant*, Providence, RI.
- Redesigned course material for Statistical Neuroscience (taught by Prof. Wilson Truccolo), including a full set of homework assignments and solutions in Python.

Honors and Awards

- 2021 – 2023 T32 training program supported by NIH NIMH (T32-MH115895) for Interactionist Cognitive Neuroscience (2 years; full-ride: **\$194,500**)
- 2019 – 2021 Croucher Foundation scholarship for HK doctoral students (2 years; full-ride: **\$199,000**)
- 2017 USC Undergraduate Symposium for Scholarly and Creative Work - Interdisciplinary award (one awardee in all life sciences: **\$1,000**)
- 2015 – 2017 USC Provost's Undergraduate Research Fellowship: **\$1,000/semester**
- 2016 USC Academic Achievement Awards: **\$5,000/semester**
- 2014 – 2018 USC Presidential Scholarship and Hong Kong Schools Alumni Federation Scholarship Foundation (4-year; full-ride: **\$241,100**)

Selected publications

[more on Google Scholar](#)

- 2024 **Measuring instability in multi-day human intracortical neural recordings towards stable, long-term brain-computer interfaces.**
T. K. Pun, M. Khoshnevis, T. Hosman, G. H. Wilson, A. Kapitonava, F. Kamdar, J. M. Henderson, J. D. Simeral, C. E. Vargas-Irwin, M. T. Harrison, L. R. Hochberg.
Nature Communications Biology. 7, Article no. 1363.
- 2024 **Gesture encoding in human left precentral gyrus neuronal ensembles.**
C. Vargas-Irwin, T. Hosman, J. T. Gusman, T. K. Pun, J. D. Simeral, T. Singer-Clark, A. Kapitonava, C. Nicolas, N. P. Shah, D. Avansino, F. Kamdar, Z. Williams, J. M. Henderson, L. Hochberg. *In review*.
- 2023 **Long-term unsupervised recalibration of cursor BCIs.**
G. H. Wilson, E. A. Stein, F. Kamdar, D. T. Avansino, T. K. Pun, R. Gross, T. Hosman, T. Singer-Clark, A. Kapitonava, L. R. Hochberg, J. D. Simeral, K. V. Shenoy, S. Druckmann, J. M. Henderson, F. R. Willett. *In review*.
- 2023 **Months-long high-performance fixed LSTM decoder for cursor control in human intracortical brain-computer interfaces** ([paper](#))
T. K. Pun*, T. Hosman*, A. Kapitonava, J. D. Simeral, L. R. Hochberg. *equal work
IEEE/EMBS Conference on Neural Engineering (NER). pp. 1-5.
- 2017 S. M. R. Arnold, T. K. Pun, T. J. Denisart, F. J. Valero-Cuevas. Shapechanger: Environments for Transfer Learning. SoCal Robotics Symposium. *Los Angeles, CA*.

Selected Community Services

- 2022 – 2024 **Brown Neurotech Journal Club**, *Founder and Organizer*, Providence, RI.
- 2022 – 2023 **BrainPost**, *Invited writer*, remote.
- 2021 – 2023 **Brown BME and Biotech Graduate Advisory Board**, *Program Cohesion Committee*, Providence, RI.