# Pin Kwang (PK) **Tan**

5TH-YEAR PHD CANDIDATE @ UT AUSTIN

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## Summary

PhD candidate with 6+ years designing, building, and validating BCI systems in non-human primates. Proven expertise in analyzing large-scale electrophysiology (>300 channels), engineering integrated hardware/software platforms (light-based cortical read-write), and developing advanced neural decoding models (Python, PyTorch incl. STGNN/Transformers). Seeking to apply experience in high-bandwidth neural interfaces and real-time decoding to develop clinically-focused BCI therapies for restoring brain function.

## Education

**University of Texas at Austin** — *Austin, TX*

PH.D., NEUROSCIENCE (GPA: 3.99) — *Jan 2021 - Jun 2026*

**National University of Singapore** — *Singapore, SG*

B.S. (HONS) LIFE SCIENCES (*summa cum laude*) — *Aug 2014 - Aug 2018*

## Work Experience

**UT Austin** — *Austin, TX*

PH.D. CANDIDATE (PI: DR. EYAL SEIDEMANN) — *Jan 2021 - Jun 2026*

- Engineered next-generation of all-optical, simultaneous read-write BCI platform, demonstrating hardware/software system design for simultaneous cortical column interrogation in awake behaving macaques
- Optimized system protocols (viral delivery, read-write) and implemented high-precision pipeline for submilimeter optogenetic targeting in V1
- Achieved world-first demonstration causally linking single-column V1 stimulation to feature-specific visual perception in a behavioral task
- Quantified network effects of targeted stimulation on the recruitment of functionally related, non-stimulated columns, correlating findings with visually-guided behavior
- Developing PyTorch-based STGNN encoder and Transformer decoder models for real-time, closed-loop neural decoding and control, applicable to high-bandwidth BCI systems

**The N.1 Institute of Health** — *Singapore, SG*

RESEARCH ASSISTANT (PI: DRS. CAMILO LIBEDINSKY, SHIH-CHENG YEN) — *Jan 2019 - Dec 2020*

- Executed quantitative analysis of single-unit electrophysiology from large-scale, multi-electrode array recordings (Microprobes FMA, >300 channels; Plexon OmniPlex, 40kHz) in primate dorsolateral prefrontal cortex (dlPFC) during a working memory task
- Processed electrophysiological datasets, performing spike detection/sorting and precise alignment with behavioral/eye-tracking data (EyeLink)
- Developed and utilized MATLAB analysis pipelines for quantifying neural response properties to derive functional parcellation of the dlPFC (e.g., selectivity during visual/working memory periods, response latency)
- Applied statistical analyses (ANOVA, robust linear regression) and dimensionality reduction (PCA) to identify and validate functional parcellations along the anterior-posterior axis

**Singapore Institute for Neurotechnology (SINAPSE)** — *Singapore, SG*

SUMMER RESEARCH INTERN (PI: DR. CAMILO LIBEDINSKY) — *May 2019 - Aug 2020*

- Analyzed stability and reliability of decoding algorithms for primate motor cortex (M1) signals driving a BMI-controlled motorized wheelchair
- Quantified BMI performance by analyzing decoding accuracy and stability (inter- and intra-day) of single-unit dynamics of primate M1.
- Assessed neural code stability and dynamics, understanding code stability and identifying features impacting decoder performance.

## Publication

2025 **Fast neural population dynamics in primate V1 captured by a genetically encoded voltage indicator** — *Preprint*
J. Zhou, Y. Chen, M. Whitmire, **P. K. Tan**, J. Wu, A. V., J. Robinson, W. Geisler, V. Pieribone, E. Seidemann

2023 **Distinct lateral prefrontal regions are organized in an anterior-posterior functional gradient** — *J Neuro*
**P. K. Tan**, C. Tang, R. Herikstad, A. Pillay, C. Libedinsky

2019 **Distinct genetic signatures of cortical and subcortical regions associated with human memory** — *eNeuro*
**P. K. Tan**, E. Ananyev, P. J. Hsieh

## Honors & Awards

2023 **Institute of Neuroscience** Professional Development Award — *Austin, TX*

2023 **Institute of Neuroscience** Outstanding Poster Award — *Austin, TX*

2017 **Agency for Science, Technology and Research, Singapore** Chairman's Honors List — *Singapore, SG*

2015 **Agency for Science, Technology and Research, Singapore (A*STAR)** A*STAR Undergraduate Scholarship — *Singapore, SG*

## Professional activities

2020 **Mentorship: Charmaine Ter Li Min (NUS, senior)** Final year project. Formulation of research questions, primate ephys data analyses and troubleshooting (working memory), poster presentation — *Singapore, SG*

2019 **Mentorship: Kate Pearce (MIT, Junior)** Summer internship. Formulation of research question, primate ephys data analyses and troubleshooting (working memory) and troubleshooting, data presentation — *Singapore, SG*