# TRUNG LE

tle45@uw.edu · (832) 762-8865
www.linkedin.com/in/trung-le · trungle93.github.io

## EDUCATION

**University of Washington** — Seattle, WA
PhD in Electrical and Computer Engineering — 2020 - expected 2025
Advised by Professor Eli Shlizerman
Focus areas: Deep Learning, Computational Neuroscience

**University of California, Los Angeles** — Los Angeles, CA
MS in Electrical and Computer Engineering — 2018 – 2020

**Texas A&M University** — College Station, TX
BS in Electrical Engineering – Summa Cum Laude — 2015 - 2017

## RESEARCH EXPERIENCE

**Research Assistant** — Fall 2020 - present
*NeuroAI Lab, University of Washington* — Seattle, WA
Advised by Prof. Eli Shlizerman

- Developed a self-supervised learning framework to infer neuronal time-invariant representation from functional activities via fitting a transformer-based dynamical model to neuronal activities. Model achieved state-of-the-art performance on predicting class and subclass transcriptomic identity, and showed robust generalization across different sessions, animals and stimuli. *(accepted at NeurIPS 2023)*.
- Co-developed a graph neural network model to forecast future neural activity, leveraging additive and multiplicative message-passing operations analogous to the interactions in neuronal systems. Model achieved state-of-the-art performance on predicting future neural population dynamics and yielded interpretable spatial interactions among the neurons. *(accepted at NeurIPS 2023)*.
- Developed a Spatiotemporal Transformer architecture leveraging contrastive learning and Bayesian hyperparameter optimization to model firing dynamics of neural population across time and space. Model achieved state-of-the-art performance on capturing neural dynamics across brain regions and behavior task structures, and provides interpretability on how the neural population performs computation. (*accepted at NeurIPS 2022)*.
- Co-developed an active learning method for skeleton-based action recognition, which leverages the self-organization of the latent space in unsupervised training and a novel uncertainty evaluation mechanism to sparsely select optimal samples for annotation. The model outperforms state-of-the-art methods on skeleton-based action recognition in challenging scenarios with limited labeling budget. *(accepted in IEEE TNNLS)*.

**Research Assistant** — Fall 2019 - Spring 2020
*AI in Imaging and Neuroscience Lab, University of California, Los Angeles* — Los Angeles, CA
Advised by Prof. Fabien Scalzo, Prof. John Stern, Prof. Richard Staba

- Developed a U-Net-based model with connectome-specific convolution operations for fMRI-iEEG cross-modality learning, assisting epilepsy presurgical assessment by leveraging non-invasive fMRI to infer functional connectivity captured by invasive intracranial EEG.

**Summer Research Fellow** Summer 2017
*Chase Lab, Carnegie Mellon University* Pittsburgh, PA
Advised by Prof. Steven Chase

- Analyzed long-term electrophysiological data from motor cortex of monkeys doing a brain-computer interface task. Assessed anatomical connections based on firing patterns and evaluated the structure of biological neural networks via Monte Carlo simulation. Results helped gauge biological plausibility of models explaining animal's motor learning skills.

**Undergraduate Research Assistant** Summer 2016 - Fall 2017
*Texas A&M University* College Station, TX
Advised by Prof. Roozbeh Jafari, Prof. Reza Langari, Prof. Peng Li

- Processed EEG signals recorded from stroke patients to monitor patient's levels of alertness in rehabilitation VR games. Applied support vector machines to classify attention levels based on spectra of beta and theta brain rhythms.
- Developed a wireless wearable system for 3D hand trajectory reconstruction. Processed signals and developed a Kalman sensor fusion scheme for Inertial Measurement Unit and Kinect camera to overcome drift error and occlusion error in complementary scenarios.
- Improved the learning cores reconfigurability of an FPGA-based cascade support vector machine implementation. Recommended solutions for PCIe data transfer interface to enhance big data handling capability of the design.

## INDUSTRY EXPERIENCE

**Research Intern** Summer 2023
*Cyber Engineering Research Laboratory, Sandia National Laboratories* New Mexico, NM
Advised by Dr. Corinne Teeter, Dr. George W. Chapman

**Autonomous Systems Research Intern** Summer 2019 - Fall 2020
*Information and Systems Sciences Laboratory, HRL Laboratories* Malibu, CA
Advised by Dr. Rajan Bhattacharyya

- Developed a Generative Adversarial Network and a Graph Attention Network to predict trajectories of traffic agents in complex rule-lacking environments, achieving state-of-the-art performance in chaotic situations.
- Incorporated the model in an awareness system and a route planning scheme for autonomous vehicles leveraging human-like flocking behaviors of traffic agents.

**Software Engineer** Feb 2018 – Aug 2018
*Infotainment Software Group, General Motors* Detroit, MI

- Implemented new logics and UI functionalities for Android infotainment apps incorporating current automotive technologies.
- Refactored legacy code to enhance code maintainability, reusability, and structural modularity.
- Developed automated tests, analyzed and resolved reported bugs, and monitored app performance metrics to ensure a smooth user experience. Improved code coverage from 30% to over 50%.

**Hardware Intern** Summer 2014
*HDD Development Group, Toshiba Corporation* Yokohama, Japan

- Performed failure analysis and investigated performance of hard disk drives (HDD) under a spectrum of technical parameters to derive optimized working conditions for current HDD models.

## PUBLICATIONS

**Peer-Reviewed Conference Papers**

[C3] Lu Mi*, **Trung Le***, Tianxing He, Eli Shlizerman, Uygar Sümbül. Learning Time-Invariant Representations for Individual Neurons from Population Dynamics. In *Conference on Neural Information Processing Systems (NeurIPS)*. 2023. (* denotes equal contribution)

[C2] Jingyuan Li, Leo Scholl, **Trung Le**, Pavithra Rajeswaran, Amy Orsborn, Eli Shlizerman. AMAG: Additive, Multiplicative and Adaptive Graph Neural Network For Forecasting Neural Activity. In *Conference on Neural Information Processing Systems (NeurIPS)*. 2023.

[C1] **Trung Le**, Eli Shlizerman. STNDT: Modeling Neural Population Activity with Spatiotemporal Transformers. In *Conference on Neural Information Processing Systems (NeurIPS)*. 2022.

**Peer-Reviewed Journal Articles**

[J1] Jingyuan Li, **Trung Le**, Eli Shlizerman. AL-SAR: Active Learning for Skeleton-based Action Recognition. *IEEE Transactions on Neural Networks and Learning Systems*. 2023.

**Intellectual Properties**

[I1] (Invention Disclosure) **Trung Le**, Rajan Bhattacharyya, Michael Daily. Systems and Methods for Trajectory Prediction of Traffic Agents in Chaotic Scenarios. 2020.

**Invited Talks**

[T1] Learning Time-Invariant Neuronal Identity from Population Dynamics. Spotlight talk. *NeuroAI in Montreal workshop*. October 2023, Montreal, Québec, Canada.

**Poster Presentations**

[P4] **Trung Le**, Eli Shlizerman. Modeling Neural Population Activity with Spatiotemporal Transformers. *Neuroscience and Artificial Intelligence Seattle Meeting*. September 2022, Seattle, WA.

[P3] **Trung Le**, Xiao Zhou, Sadhana Ravikumar, Steven Chase. Assessing anatomical connectivity in motor cortex. *Carnegie Mellon Undergraduate Program in Neural Computation Poster Symposium*. August 2017, Pittsburgh, PA.

[P2] **Trung Le**, Ali Akbari, Jian Wu, Roozbeh Jafari. An efficient sensor fusion scheme for hand trajectory reconstruction using inertial measurement unit and Kinect camera. *Texas A&M Student Research Week Symposium*. March 2017, College Station, TX.

[P1] **Trung Le,** Yen-ju Lin, Qian Wang, Peng Li. Implementation of cascade support vector machine on field programmable gate array. *Texas A&M Summer Undergraduate Research Poster Symposium.* August 2016, College Station, TX.

## HONORS & AWARDS

- **Miscellaneous Travel Grants** 2022, 2023
- **$25,000 HRL Master's Fellowship** 2019
- **Mary and Albert Loudon Scholarship** 2017
- **Robert Chenoweth Scholarship** 2016
- **American Chamber of Commerce Scholarship** – Best of the Best honor among 556 candidates 2014
- **2nd prize – PIF GameAthon** – 3D game & wireless gaming glove development [Video] 2014
- **HCMUT EE Department Scholarships** (top 2%) 2011 - 2014

## SERVICES

- **Journal Reviewer:** IEEE TNNLS 2022
- **UW ECE Masters Admission Triage Committee** 2020, 2021, 2022

## SKILLS

| | |
|---|---|
| **Programming:** | Python, MATLAB, R, Java, C, C++, C#, Verilog, Git, Unix, Android, Slurm |
| **Frameworks/Libraries:** | PyTorch, TensorFlow, Keras, Scikit-learn, Pandas, NLTK, etc. |
| **Tools:** | LaTeX, Cadence, LabVIEW, Orcad, Unity3D |
| **Hardware:** | Microcontroller, FPGA, Inertial Measurement Unit, Kinect |