Yahia H. Ali

SUMMARY

Engineer with 6+ years of experience developing software and ML solutions for brain-computer interfaces. Created real-time frameworks with sub-millisecond latency adopted by leading clinical trials, replacing legacy systems and enabling advanced ML workflows for neural signal processing.

PROFESSIONAL EXPERIENCE

Systems Neural Engineering Lab, Emory University and Georgia Tech, Atlanta, GA

Graduate Research Assistant (August 2019 - Present)

- Developed a real-time brain-computer interface software framework achieving sub-millisecond communication latency with native ML library support, adopted by multiple leading clinical trials to replace legacy platforms
- Optimized and validated an unsupervised deep learning pipeline for calibration-free neural signal stabilization, demonstrating effectiveness on non-human primate datasets and establishing feasibility for real-time implementation
- Managed end-to-end infrastructure operations including GPU servers, file servers, and real-time signal processing systems, ensuring 99%+ uptime for critical research operations
- Collaborated cross-functionally with neurosurgeons, neurologists, and scientists to launch a clinical trial site and advance research directions toward clinical translation

Research Specialist (May 2019 - August 2019)

- Developed and deployed real-time deep learning algorithms for neural signal denoising
- Supported clinical research operations across 8 intracranial electrode recording sessions with epilepsy patients

Undergraduate Research Assistant (January 2017 - May 2019)

- Re-engineered server-based haptic robot control system into cost-effective embedded solution using Simulink and Raspberry Pi, reducing costs while preserving a 500 Hz closed-loop control rate
- Built full-stack Django web application managing large-scale automated rodent training system with MySQL integration, implementing adaptive difficulty algorithms that improved training efficiency
- Maintained and troubleshot complex experimental setups, ensuring consistent data collection across multi-month research studies

TECHNICAL SKILLS

- **Programming Languages**: Python, MATLAB, Simulink, C, C++, Rust
- **Frameworks & Libraries**: TensorFlow, PyTorch, Pandas, NumPy, Django
- **Databases**: Redis, MySQL
- **Tools & Platforms**: Git, JIRA, Linux kernel customization
- **Hardware**: electrophysiology data acquisition, microcontrollers, GPUs

EDUCATION

Emory University & Georgia Institute of Technology, Atlanta, GA

Ph.D. in Biomedical Engineering (Minor: Machine Learning)

August 2019 - December 2025 (Expected)

Georgia Institute of Technology, Atlanta, GA

B.S. in Biomedical Engineering

August 2015 - May 2019

PUBLICATIONS

- **Ali, Y.H.**, Bodkin, K., Rigotti-Thompson, M., Patel, K., Card, N.S., Bhaduri, B., Nason-Tomaszewski, S.R., Mifsud, D.M., Hou, X., Nicolas, C., Allcroft, S., Hochberg, L.R., Au Yong, N., Stavisky, S.D., Miller, L.E., Brandman, D.M., Pandarinath, C., 2024. BRAND: a platform for closed-loop experiments with deep network models. *J. Neural Eng.* 21, 026046. https://doi.org/10.1088/1741-2552/ad3b3a
- Karpowicz, B.M., **Ali, Y.H.**, Wimalasena, L.N., Sedler, A.R., Keshtkaran, M.R., Bodkin, K., Ma, X., Miller, L.E., Pandarinath, C., 2022. Stabilizing brain-computer interfaces through alignment of latent dynamics. *bioRxiv.* https://doi.org/10.1101/2022.04.06.487388 (accepted at *Nat Commun* in April 2025)
- Karpowicz, B.M., Bhaduri, B., Nason-Tomaszewski, S.R., Jacques, B.G., **Ali, Y.H.**, Flint, R.D., Bechefsky, P.H., Hochberg, L.R., AuYong, N., Slutzky, M.W., Pandarinath, C., 2024. Reducing power requirements for high-accuracy decoding in iBCIs. *J. Neural Eng.* 21, 066001. https://doi.org/10.1088/1741-2552/ad88a4
- Pandarinath, C., **Ali, Y.H.**, 2019. Brain implants that let you speak your mind. *Nature* (News & Views) 568, 466–467. https://doi.org/10.1038/d41586-019-01181-y

PATENT APPLICATIONS

- Karpowicz, B., Pandarinath, C., Slutzky, M., Flint, R., **Ali, Y.**, Bhaduri, B., 2024. Systems and Methods for Latent Variable Modeling of Multiscale Neural Signals for Brain-Computer Interfaces. US20240412070A1.
- Pandarinath, C., Keshtkaran, M., **Ali, Y.H.**, Wimalasena, L.N., Sedler, A.R., Miller, L.E., Wallner, J.J., MA, X., Farshchian, A., Karpowicz, B.M., 2022. Systems and Methods for Nonlinear Latent Spatiotemporal Representation Alignment Decoding for Brain-Computer Interfaces. US20220129071A1.

PROJECTS

Backend for Realtime Asynchronous Neural Decoding (BRAND) [paper] [code]

- Developed and deployed a high-performance software framework enabling sub-millisecond interprocess communication across 50+ programming languages
- Replaced outdated Simulink-based infrastructure with a modern, scalable system supporting real-time deep learning inference and deployment across diverse hardware configurations
- Achieved widespread adoption: BRAND now powers neural decoding pipelines at BrainGate2 and ReHAB trial sites, serving the majority of active Utah array BCI participants and enabling breakthrough research in neural prosthetics

Nonlinear Manifold Alignment Decoding (NoMAD) [paper] [code]

- Designed and executed comprehensive hyperparameter optimization workflows across multiple datasets
- Conducted systematic analyses comparing NoMAD variants to other published models to identify which aspects of the model's design were critical to its performance

AWARDS & HONORS

- BCI Society Student and PostDoc Travel Award (2023)
- Fellow, NIH/NIBIB Georgia Tech/Emory Computational Neuralengineering Training Program (2019-2021)
- Georgia Tech President's Fellowship (2019-2023)
- 1st Place & People's Choice, Rice 360 Global Health Design Competition (2019)
- Semifinalist, Georgia Tech InVenture Prize (2018)
- Georgia Tech Charles I. Hancock Endowed Research Award (2018)
- Georgia Tech University Interdisciplinary Research Award (2017)
- Georgia Tech President's Undergraduate Research Salary Award (2017)