

Alexander Speer

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EDUCATION

Columbia University

B.A. Cognitive Science / Neural Engineering, GPA: 3.95/4.0

New York, NY

May 2026

Clarkston High School

GPA: 4.45/4.00, Valedictorian

Clarkston, MI

September 2019 - June 2022

TECHNICAL SKILLS

Coding Languages: Python, MATLAB, C/C++, Git/GitHub, SQL, R, GCP, Azure, JavaScript, HTML, CSS

Neural Signal Processing: Filtering, detrending, artifact rejection, epoching, FFT, PSD, feature extraction, and feature vector assembly.

Machine Learning: PyTorch, TensorFlow, scikit-learn, SVM, Logistic Regression, Random Forest, CNNs, RNNs/LSTMs, PCA/ICA: t-SNE.

Statistical Analysis: Cohen's d, confidence intervals, ANOVA, Mann-Whitney U, PSD, ERP, normalization, visualization.

Hardware: RF transmission, Arduino/Raspberry Pi, EEG acquisition, CAD modeling, PCB design, analog/digital circuit design.

WORK EXPERIENCE

Neuromodulation Research Assistant

New York, NY

Ultrasound and Elasticity Imaging Laboratory (UEIL)

September 2025 - Present

- Supported focused ultrasound neuromodulation experiments on murine models, calibrating transducer parameters (3.1 MHz, 10 Hz PRF, 1 ms pulses) and verifying sciatic nerve targeting through displacement imaging and motor response confirmation.
- Collected and analyzed behavioral data (von Frey thresholds, Rotarod, CatWalk) to quantify analgesic effects of FUS vs. ibuprofen, identifying significant post-sonication improvements in withdrawal thresholds.
- Processed longitudinal datasets across 15-day trials, applying ANOVA and Mann-Whitney U tests to evaluate treatment efficacy and motor performance consistency.

Brain-Computer Interface Engineer

San Francisco, CA

AWEAR

June 2025 - Present

- Owned end-to-end ML development for the BCI platform, applying EEG preprocessing (filtering, artifact rejection, FFT/PSD features) and training classifiers for cognitive/affective states, achieving 85% mean accuracy on valence/arousal.
- Built a cross-platform app for real-time brainwave visualization with seizure-risk and sleep anomaly detection, stress/arousal monitoring, and dashboards, deployed to 200+ beta users, helping them log and track emotional states for personal insight.
- Led statistical validation with Stanford and UCSF, applying effect sizes, CIs, and ANOVA/Mann-Whitney tests to assess EEG features, culminating in a peer-reviewed paper presented at Stanford BAAS 2025 and IEEE EMBS.

Neural Engineer, Multimodal AI

New York, NY

Sama Therapeutics

June - September 2025

- Engineered multimodal biomarker pipeline (EEG, audio, video) for PHQ-8 depression prediction using deep feature extractors with early/late fusion models, deployed on GCP with agentic AI, achieving 82% accuracy and 0.80 AUC.
- Executed end-to-end EEG preprocessing and feature engineering for rodent dataset, extracting advanced biomarkers and training H2O AutoML to achieve 92% accuracy distinguishing baseline vs. post-manipulation states.
- Developed a video-based infant movement analysis platform deployed on GCP to automate and predict Cerebral Palsy risk, integrating pose estimation, feature extraction, and AutoSklearn classifiers to achieve 79% accuracy and 0.76 AUC.

Human-Computer Interaction Engineer, AI Interfaces

Remote, NY

Harvard Medical School and Massachusetts General Hospital

May - September 2025

- Built and deployed a clinical simulator combining LLM-driven dialogue, neural TTS, and affect-responsive 3D avatars with performance logging, used by 150+ Harvard Med/MGH trainees for low-stress practice in early training and OSCE prep.
- Owned the full-stack simulation platform, doubling user-reported realism by adding variable voice speed, emotion-conditioned interactions, synchronized audio-visual cues, and performance consoles for customizable latency, volume, and playback.
- Fine-tuned the LLM and re-architected the response pipeline to reduce end-to-end latency by ~40%, leveraging early token streaming, parallelized audio-visual rendering, and asynchronous API handling to enable real-time clinical interaction.

Explore more of my technical and creative projects at alexspeer.com