
Alexander Speer

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EDUCATION

Columbia University

B.A. Cognitive Science / Neural Engineering, GPA: 3.97/4.0

New York, NY

May 2026

Clarkston High School

GPA: 4.45/4.00, Valedictorian

Clarkston, MI

September 2019 - June 2022

TECHNICAL SKILLS

Programming & Tools: Python, MATLAB, C/C++, SQL, Git/GitHub, GCP, Azure, MNE

Signal Processing: EEG preprocessing, filtering, ICA artifact rejection, FFT/PSD analysis, ERP analysis, feature extraction

Machine Learning: PyTorch, scikit-learn, CNNs, LSTMs, SVMs, Random Forests, multimodal EEG/audio/video modeling, PCA/t-SNE

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

WORK EXPERIENCE

Brain-Computer Interface Engineer

AWEAR

San Francisco, CA

June 2025 - Present

- Developed EEG preprocessing and classification pipelines for the BCI platform, applying filtering, artifact rejection, and FFT/PSD feature extraction to decode cognitive and affective states with 85% accuracy on valence/arousal tasks.
- 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

Sama Therapeutics

New York, NY

June - September 2025

- Engineered a multimodal biomarker pipeline (EEG, audio, video) for PHQ-8 depression prediction using deep feature extractors and early/late fusion models, deployed on GCP with automated inference workflows, achieving 82% accuracy and 0.80 AUC.
- Performed 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 on GCP integrating pose estimation and AutoSklearn classifiers for automated cerebral palsy risk assessment.

Human-Computer Interaction Engineer, AI Interfaces

Harvard Medical School and Massachusetts General Hospital

Remote, NY

May - September 2025

- Built and deployed a real-time clinical simulation platform integrating conversational AI, neural TTS, and affect-responsive avatars for adaptive human-computer interaction, used by 150+ Harvard Med/MGH trainees.
- Developed multimodal interaction pipelines with synchronized speech, visual rendering, emotion-conditioned responses, and real-time performance monitoring to improve simulation realism and responsiveness.
- Optimized low-latency inference and rendering systems using asynchronous API handling, early token streaming, and parallelized audio-visual processing, reducing end-to-end latency by ~40%.

PROJECTS

DIY EEG Epilepsy Monitoring System: Built single-channel EEG hardware (AD8237 + ADS1115) and Python/MNE seizure-detection pipeline for temporal lobe activity analysis.

Blindsight Synthetic Visual Cortex: Built a real-time Raspberry Pi-based V1-inspired vision system that converted live camera input into spike-based cortical activity to model coarse visual perception through cortical stimulation.

Foundations of EEG & BCIs: Implemented EEG preprocessing and classification pipelines including ERP, SSVEP, ASSR, CSP/LDA motor imagery, and closed-loop BCI paradigms.

Feature-Engineered MRI Classification of FCD: Built multimodal MRI pipeline using SPM and Python to classify focal cortical dysplasia from T1/FLAIR imaging features.

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