

STEVEN E. HAWORTH

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Machine learning engineering: deep learning on large-scale time-series data, model pipelines from ingestion through training, evaluation, deployment, orchestration, and production monitoring, and interpretable models for high-stakes decision support. Domain expertise in clinical neurophysiology.

TECHNICAL SKILLS

Languages	Python · R · SQL · MATLAB · PowerShell · Julia
Tools	PyTorch · TensorFlow · scikit-learn · MNE · Spark · AWS · Docker · Git · Postgres · MLflow
Methods	EEG signal processing · deep learning · computer vision · survival analysis · optimization

EDUCATION

Expected Dec 2026	M.S., Data Science <i>University of Wisconsin–Madison</i> Highly Qualified Candidate Scholarship
May 2025	B.S., Data Science <i>University of Wisconsin–Madison</i> Dean's List
Coursework	Machine Learning (CS 760) · Artificial Intelligence (CS 540) · Computer Vision (CS 771) · Big Data Systems (CS 544) · Database Systems (CS 564) · Classification & Pattern Recognition (STAT 451) · Mathematical Statistics (STAT 611) · Statistical Inference (STAT 612) · Optimization (CS 524)

PROFESSIONAL EXPERIENCE

May 2026 – Present	Machine Learning Engineer — EEG/Neurotech <i>WashU Medicine Neurology, Washington University in St. Louis</i> • Own ARGUS end to end: a two-stage EEG pipeline pairing an artifact detector (91.9% AUROC) with a CNN-BiLSTM seizure detector with attention, trained across 675 patients • Domain-adapted the seizure detector to ICU recordings using hard negative mining and staged layer freezing, cutting false alarms 22% and reducing missed seizures from 1 in 16 to 1 in 20 • Built the signal processing front end: bandpass filtering, per-channel normalization, and ICA-based removal of ocular, muscle, and cardiac artifact before model input • Validated cross-corpus against labeled ICU cohorts stratified by annotation confidence, separating high-confidence, weak-label, and clean non-seizure recordings
Jun 2026 – Present	Data Scientist — Freelance, Analytics Database <i>Critical Care EEG Monitoring Research Consortium (CCEMRC)</i> • Contracted under a fixed-fee agreement to design and build an analytics database; scope reviewed and approved by CCEMRC, ACNS, and Stanford epilepsy faculty • Designed a six-table schema (institutions, profiles, membership periods, collaborators, projects, publications) modeling consortium membership and output across institutions • Built a recommendation system linking researchers with overlapping interests across consortium sites, drawing on member profiles and project history • Presented schema designs and interface mockups to consortium stakeholders across review cycles, iterating to sign-off

RESEARCH EXPERIENCE

Jun 2025 – May 2026

Graduate Researcher — Machine Learning, EEG & Neurotechnology
Struck Lab, Washington University in St. Louis · PI: Aaron F. Struck, MD

- Developed deep learning systems for seizure detection, forecasting, and artifact rejection on continuous ICU EEG, with collaborators at UW–Madison, Harvard Medical School, and Beth Israel Deaconess Medical Center
- Queried and joined up to 30 TB of EEG and metadata from AWS S3 using Apache Spark; constructed confounder-controlled patient cohorts to support unbiased seizure risk modeling
- Tuned CNN-based embedding pipelines in PyTorch that compress long-form EEG into compact feature vectors for temporal modeling of seizure recurrence

May 2023 – Jun 2025

Machine Learning Research Assistant — Neural Diagnostics, Sleep Science & Neural Monitoring
Department of Neurology, University of Wisconsin Hospital & Clinics, UW–Madison

- Applied Bayesian network modeling and graph-based feature extraction to EEG for mental state classification, reaching 0.88 ROC-AUC on network-derived embeddings
- Forecast 72-hour seizure recurrence from EEG features using Cox regression; produced survival visualizations and identified interpretable risk factors
- Recovered manifold geometry in a previously inseparable feature space, enabling sleep-stage differentiation (precision 82%, F1 76%)

PUBLICATIONS

2026

Engineering and clinical biomarkers for machine learning based seizure prediction in hospitalized patients

Phadikar S, Fatima S, Haworth SE, Grobbelaar M, Westover BM, Struck AF
Journal of Clinical Neurophysiology — *in press*

2026

Thermodynamic rigidity of harmonic brain states relates to general mental ability in juvenile myoclonic epilepsy

De Paiva FB, Zhao Meixian, Zhao Meishu, Philibert-Rosas S, Brace CJ, Moe E, Haworth SE, Hermann BP, Chung MK, Struck AF
Brain — PMID 41993553

2026

Duration of EEG monitoring needed to ensure a low risk of seizure recurrence in hospitalized patients

Krishnamurthy PV, Philibert-Rosas S, Rivkin M, Brace CJ, Haworth SE, Fatima S, Selte A, Kalkach Aparicio M, Struck AF
Journal of Neurology 273(1):70 — doi:10.1007/s00415-025-13596-x

2026

A putative role of heavy cannabis use in temporal lobe epilepsy: a retrospective cohort study

Philibert-Rosas S, Guston KA, Kalkach-Aparicio M, Keller A, Semia S, Imhoff-Smith T, Adluru N, Brace CJ, Haworth SE, Jiang Y, Williams J, Jones JE, Struck AF
Epilepsia

Submitted

Neural signatures of conscious experience during sleep: a serial awakening study using high-density EEG

Selte A[†], Haworth SE[†], Vanasse T, Alauddin T, Gjini K, Philibert-Rosas S, Brace CJ, Sevak B, Riedner B, Kalkach Aparicio M, Tononi G, Boly M, Struck AF[†] (co-first authors)
Nature Neuroscience — *under review*

In preparation

Towards a semi-interpretable approach to seizure forecasting in the ICU: automated 2HELPS2B seizure prediction

Phadikar S, Fatima S, Kalkach-Aparicio M, Philibert-Rosas S, Haworth SE, Grobbelaar M, Jin J, Ge W, Westover BM, Struck AF

In preparation

ARGUS: deep learning methods for seizure detection, forecasting, and artifact rejection across EEG acquisition stacks

Haworth SE, Philibert-Rosas S, Phadikar S, Struck AF, Jing J, Westover BM, Zafar S

CONFERENCE ABSTRACTS

Dec 2026	ARGUS: a spatiotemporal deep learning model for seizure detection, localization, and forecasting Haworth SE, Struck AF <i>American Epilepsy Society Annual Meeting — abstract in preparation</i>
Apr 2025	Neural signatures of conscious experience during sleep: a serial awakening study using high-density EEG Haworth SE, Selte A, Vanasse T, Gjini K, Philibert-Rosas S, Boly M, Struck AF <i>American Academy of Neurology Annual Meeting, San Diego, CA</i>
Feb 2025	Graph topology predicts consciousness Haworth SE, Selte A, Vanasse T, Gjini K, Philibert-Rosas S, Boly M, Struck AF <i>American Clinical Neurophysiology Society Annual Meeting, Baltimore, MD</i>

TEACHING & MENTORING

Jun 2026 – Present	Research Mentor — Machine Learning Apprenticeship <i>WashU Medicine Neurology, Washington University in St. Louis</i> • Mentor an apprentice through machine learning and EEG signal processing fundamentals; design problem sets, review submitted work line by line, and return written feedback keyed to the student's own approach • Set milestones and evaluation criteria in advance so assessment stays consistent across assignments
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SELECTED PROJECTS

ARGUS	Artifact Rejection & Seizure Detection System GitHub link Spatiotemporal deep learning over raw 22-channel bipolar EEG: 94.4% sensitivity, 93.4% specificity on neurologist-annotated recordings.
LOCUS	Optimal EEG Montage Builder GitHub link Mixed-integer programs in GAMSPy optimizing electrode selection: 70% fewer electrodes at +0.12 ROC-AUC over baseline.
Topic Miner	Transformer-Based EEG Literature Miner GitHub link Retrieval-augmented system accelerating EEG literature discovery and systematic review, pairing FAISS semantic retrieval over 40,000+ biomedical papers with a SciBERT classifier fine-tuned on weakly labeled PubMed abstracts (97% hold-out accuracy). Containerized with Docker and CI/CD hooks that trigger retraining on drift as new literature arrives.

REFERENCES

Principal Investigator	Aaron F. Struck, MD <i>Associate Professor of Neurology, Washington University in St. Louis</i> Head of the Adult Epilepsy Section Chair of the Critical Care EEG Monitoring Research Consortium (2023–2025) struck@wustl.edu · struck@neurology.wisc.edu · ORCID 0000-0002-9103-1798
Supervisor	Mariel Kalkach Aparicio, MD, MBE <i>Department of Neurology, University of South Dakota</i> mariel.kalkachaparc@usd.edu · ORCID 0000-0002-3509-3548
Supervisor	Santiago Philibert-Rosas, MD <i>Researcher, Department of Neurology, Washington University in St. Louis</i> psantiago@wustl.edu · ORCID 0000-0002-2521-334X
Course instructor	Blerina Gkotse, PhD <i>Faculty Associate, Department of Computer Sciences, University of Wisconsin–Madison</i> gkotse@wisc.edu · ORCID 0000-0003-0099-2188