

Yeganeh Abdollahinejad (Yegi)

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Education

Bachelor of Science in Computer Science

Minors: Mathematics and Business Administration

Pennsylvania State University | Expected Graduation: May 2026

Research Publications & Presentations

EMO-CARE: EEG Multi-Scale Temporal Modeling with Channel-Wise Attention for Subject-Independent Emotion Recognition — IEEE Computer Society DOI: 10.1109/OJCS.2026.3653766

- Evaluated on SEED, SEED-V, and DREAMER under strict LOSO; lightweight design supports low-latency deployment for real-time EEG applications.
- Includes ablations (attention on/off, kernel scales, TCN depth) and frequency-band analysis, with channel-wise attention aiding interpretability.
- Invited for *accepted for JMM 2026 Talk*

Systematic Literature Review of ML for Emotion Recognition Using EEG & Physiological Signals in Healthcare — IEEE Access DOI: 10.1109/ACCESS.2026.3681521.

- Synthesizes a decade of EEG/physio ER work; highlights multimodal fusion, patient-specific calibration, and XAI for clinical translation.
- Surveys 70 peer-reviewed studies (2014–2024) using a PRISMA/Kitchenham SLR protocol; catalogs modalities (EEG, ECG, GSR), common datasets (e.g., DEAP, SEED, DREAMER), and evaluation schemes for clinical ER.
- Details translation barriers signal noise, inter-subject variability, privacy/interpretability constraints and prioritizes multimodal fusion, patient-specific calibration, longitudinal validation, and XAI to enable clinician trust.

Computational Fatigue Detection from Physiological Signals with Calibrated Multimodal Fusion — Full paper accepted in *CSCI 2025*; to appear with Springer Nature

- Multimodal Mixture-of-Experts (MoE) encoders for EEG, ECG-HRV, and EDA with LoRA tuning; modality-aware routing and graceful degradation under missing/noisy sensors.
- Calibrated (isotonic) pipeline with a bounded fatigue index and nested LOSO; controls time-on-task confounding and supports real-time deployment.

E-CaTCH: Event-Centric Cross-Modal Attention with Temporal Consistency for Misinformation Detection — IEEE transaction, Under 2nd revision; arXiv preprint(DOI: arXiv.2508.11197)

- Event-centric pipeline: clusters posts into pseudo-events (textual similarity + temporal proximity), uses overlapping windows and a trend-aware LSTM (momentum/semantic-shift signals) to track narrative drift.
- Imbalance-aware training with adaptive class weights, temporal-consistency regularization, and hard-example mining shows robust cross-dataset behavior on Fakeddit, IND, and Mediaeval .

Graph-ML for Care Pathways: Quantifying Disparities in Clinical Outcomes — MIT Undergraduate Research Technology Conference (URTC), Presenter

- Mapped ED care pathways as CPT co-occurrence networks; spectral clustering & centrality revealed procedure bundles and bottlenecks.

- Trained ensemble ML on pathway + demographic features with fairness/interpretability checks surfacing drivers of disparity.

Event-Aware Multimodal Misinformation Detection for Operational Decision Support — *IDeaS @ Carnegie Mellon, accepted full paper*

- Event-centric, leakage-safe evaluation with overlapping temporal windows to match real drift.
- Integrated adaptive cross-modal attention, feature-wise gating, and decay-weighted temporal encoding to track narrative change; produced calibrated, risk-aware outputs with interpretable diagnostics.
- *Expanded journal version invited for Computational and Mathematical Organization Theory (CMOT)*
- Event-level modeling, cross-modal alignment, and operational decision mapping for deployable detection.

A Hybrid Model of Nanoparticle Transport in Tumors: Digital Oncology Towards Zone Specific Therapy — *submitted to Physical Review X*

- Developed a hybrid biophysical–ML framework: five coupled kinetic ODEs with Bayesian MCMC for patient-specific uncertainty, validated against LSTM and Neural ODE surrogates.
- Modeled zone-structured tumors (necrotic/quiescent/proliferative) and glycolytic trapping of mNP-FDG to yield interpretable, clinically aligned predictions.
- Findings converge across mechanistic and ML models, highlighting mNP-FDG as the most durable therapy; saline effects are transient.

Integrating Network DEA with Machine Learning for Hospital Performance Prediction — *INFORMS Annual Meeting, Invited Talk*

- Built a multi-stage Network DEA of hospital operations and distilled frontier metrics (θ , super-efficiency, slacks, peer weights) into structured features.
- OR \times ML hybrid: fused DEA signals with CatBoost/RF/GBM to predict LOS/ER admits/discharges, with clearer drivers via SHAP.

Enhancing Early Diagnosis of Autism Spectrum Disorder Using Multimodal Data and Explainable AI Models — *published in IEEE Xplore(IEEE Big Data)- (DOI: 10.1109/BigData62323.2024.10825173)*

- Built a multimodal pipeline integrating phenotypic data with neuroimaging quality metrics; GBM emerged as the most consistent model across evaluations.
- Applied SHAP for global/local interpretability, [Google Scholar](#)ing key drivers (e.g., FIQ, SNR) to clinically meaningful markers and supporting decision workflows.
- Production-oriented delivery: unified preprocessing, stratified CV, and serialized model artifacts to support reproducible clinical deployment.

Experience

Research Assistant — Optimization & Deep Learning, Penn State University (Aug 2024–Present, part-time)

- Led **healthcare ML** projects in **fatigue detection** (EEG/ECG-HRV/EDA) and **EEG-based emotion recognition**(including an SLR), from data engineering through modeling and evaluation.
- Built multimodal pipelines with Mixture-of-Experts (MoE) and LoRA (parameter-efficient fine-tuning), with modality-aware routing and robustness to missing/noisy sensors.
- Implemented rigorous validation (nested LOSO), probability calibration (isotonic/ECE), and XAI (SHAP, Grad-CAM, Integrated Gradients) for clinician-facing interpretability.

- Applied optimization & OR (DEA/Network DEA) with statistical inference and time-series/spatiotemporal modeling for hospital performance and utilization analytics.

Analyst — Housing & Food Services, Penn State University (Jan 2025–May 2025)

- Sales/inventory analysis for procurement optimization; ML-based forecasting; automated recurring reporting.

ML Application Developer Intern, Inchtome (Remote) (May 2024–Aug 2024)

- Built scalable backend services and optimized database workflows for AI-driven applications; integrated ML models into web products for data-driven insights.

Skills

Programming Languages: Python, C++; intermediate: Java, JavaScript, Lisp, VBA, HTML/CSS

ML & Data Tools: PyTorch, TensorFlow, Keras, scikit-learn, Pandas, NumPy, SciPy, OpenCV

Data Visualization & Reporting: Plotly, Seaborn, Matplotlib, ggplot2, R Shiny dashboards, RMarkdown, Excel charts, interactive web visuals (JavaScript)

Methods & Expertise:

- Machine learning pipelines & deep learning
- Evolutionary algorithms & multi-objective optimization
- Hyperparameter tuning & time-series forecasting
- Data-driven decision making, statistical inference & pattern mining
- Data visualization & presentation in Python (Seaborn, Plotly, Matplotlib)
- Experimental design, model evaluation, A/B testing; t- and z-tests
- CNN, TCN, Mixture-of-Experts (MoE), LoRA
- Mathematical modeling: regression, ODE, PDE, Bayesian; DEA; SVM

Honors & Awards

- **Multi-Campus Research Experience for Undergraduates (MCREU)** — “Trusting the Black Box: Stakeholder Perspectives on Explainable AI in Healthcare”; Summer Research Scholarship \$5,500
- **NSF GEOPATH / GEOENV (EnvironMentors) — Mentor** (2024–2025; 2025–2026); Certificate of Achievement (NSF Grant #2119953)
- **Dean’s List (4×); International Student Scholarship — \$7,000 total**
- **Research Grant — \$2,000; Research Assistantship** in Machine Learning Optimization & Healthcare (*Penn State Harrisburg, Office of Research & Outreach*)
- **Journal Reviewer:** *Information Fusion* and *Systems and Soft Computing*

Academic References

- **Dr. Sayed Mohsin Reza**, Penn State Harrisburg — skr6024@psu.edu
- **Dr. Amit K. Chattopadhyay**, National College of Ireland — Amit.Chattopadhyay@ncirl.ie
- **Dr. Ahmad Mousavi**, American University — mousavi@american.edu
- **Dr. Jeremy Joseph Blum**, Penn State Harrisburg — jjb24@psu.edu
- **Dr. Md Faisal Kabir**, Penn State Harrisburg — mpk5904@psu.edu
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