Haya Bugshan

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Education

Brown University *Providence, RI*
B.A.Sc. Computational Neuroscience & Applied Mathematics 2024 – 2028
GPA: 3.75 / 4.0

Relevant Coursework
Mathematics: Linear Algebra, Introduction to Higher Mathematics (proofs), Multivariable Calculus with Theory, Analysis: Functions of One Variable (real analysis), Applied Ordinary Differential Equations, Probability & Statistics with Calculus
Computer Science: Data Structures & Algorithms, Computing Foundations (Data), Deep Learning

Research Experience

Perception, Action & Cognition Lab — Brown University *Providence, RI*
Computational Neuroscience Consultant Apr 2026 – Present

- Designed the full ML pipeline (parsing, tokenization, masked-autoencoder pretraining, downstream evaluation) for **PupilFM**, a pupillometry foundation model pretrained on **1,000+ hours** of recordings spanning **7 datasets and 2,000+ subjects** (BrainLM framework)
- Analyze cross-dataset generalization of learned representations to novel cognitive and motor tasks; probe whether scale yields emergent structure encoding cognitive load, arousal, and attentional state

Center for Technological Responsibility (CNTR) — Brown University *Providence, RI*
Undergraduate Research Assistant, AI & NLP Apr 2026 – Present

- Design prompt-engineering frameworks to evaluate LLM reliability and safety, probing failure modes and hallucination patterns across geographic and cross-lingual (Spanish) settings in policy-sensitive contexts

Rhode Island Hospital, Neurosurgery — Lee Lab (CANARY Project) *Providence, RI*
AI in Neurosurgery Research Assistant Apr 2025 – Nov 2025

- Built a multimodal ML pipeline combining structured clinical features with PCA-compressed LLM embeddings (768-dim) to predict surgical case duration; evaluated against structured-only baselines (MAE, RMSE, R^2)

Cognitive Neuroplasticity Lab (Watanabe Lab) — Brown University *Providence, RI*
Research Assistant Feb 2025 – Present

- Built an end-to-end **EEG analysis pipeline** (MATLAB/EEGLAB, Python) for a visual perceptual-learning study, automating preprocessing, trial-level integration of behavioral and neural data, and group-level statistics (linear mixed-effects and mass-univariate/LIMO models with multiple-comparison correction)
- Design PsychoPy experiments and run study participants for pupillary-biofeedback tasks

Technical Skills

Programming: Python, MATLAB
Frameworks & Tools: PyTorch, NumPy/Pandas, scikit-learn, EEGLAB, PsychoPy, Git/GitHub, LaTeX
Mathematical methods: Linear algebra, probability & statistics, optimization, ODEs, mixed-effects modeling
Languages: Arabic (native), English (fluent)

Leadership

AI Robotics Ethics Society @ Brown *Providence, RI*
Vice President May 2026 – Present

- Lead recruitment and coordinate initiative teams; manage speaker recruitment, external partnerships, and cross-disciplinary collaborations in AI, robotics, and ethics

Presentations

Bugshan H., Nguyen T., Lader J., Song J., Ritt J. *Learning Task-General Signals of Cognition from Pupil Dynamics via a Pupillometry Foundation Model.* Brown University Summer Research Symposium, Providence, RI. August 2026.

Ying C.*, Bugshan H.*, Lee S. *Improving Estimation of OR Times Using Multimodal Clinical Data.* Brown University Summer Research Symposium, Providence, RI. August 2025. (* equal contribution)

Awards & Certifications

Carney Quantitative Scholar (2026) · Undergraduate Teaching & Research Award (2025) · CITI Certified (Human Subjects, RCR) · HNN Bootcamp (2025)