Benjamin Bowman

M.S. in Computer Science

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Interdisciplinary AI researcher and computer scientist with a forthcoming peer-reviewed publication at AIIoT 2025 on adaptive CNN-based crowd counting. Recently completed an M.S. in Computer Science at Florida Polytechnic University, where my thesis bridged computer science, neuroscience, and data science to deliver interpretable deep-learning pipelines for EEG analysis and telemedicine. Industry-honed software engineering skills from developing production-grade, cloud-deployed machine-learning systems for a fintech firm— including an AWS-based vector store and recommendation engine for large-language-model applications. Proven record of driving end-to-end research and deployment, blending rigorous methodology with practical impact across academic and commercial settings.

EDUCATION

Florida Polytechnic University **Aug. 2023 - May 2025**

- Masters of Computer Science. (GPA: 3.75)
- Thesis: Synthetic EEG data for improving Performance and Interpretability in EEG Disease Classification

Florida Polytechnic University **Aug. 2020 - May 2023**

- Bachelors in Computer Science. (GPA: 3.55)

Valencia Community College **Aug. 2018 - May 2020**

- Associates of Arts with Honors (GPA: 3.2)

EMPLOYMENT

Florida Polytechnic University, Department of Computer Science **Aug. 2022 - Present**

- Graduate Assistant, **(Aug. 2023 - May. 2025)**
  - Taught Support Vector Machines (SVM) to an undergraduate class.
  - Assisted in grading and evaluating over 160 student assignments and assessments, providing constructive feedback to foster academic growth and understanding.
  - Supported professors in administrative tasks such as maintaining organizing course materials, and preparing instructional materials.

RedChip **Feb. 2024 - May 2024**

- Software Engineer Contractor, **(Aug. 2023 - Dec. 2023)**
  - Designed and developed a scalable vector store in AWS to support a large language model (LLM) product.
  - Refactored and optimized the LLM toolchain using LangChain in Python, enhancing performance and maintainability.
  - Implemented a recommendation algorithm leveraging cosine similarity to improve product functionality and user experience.
  - Worked closely with the development team to integrate and deploy machine learning components in a production environment.

RESEARCH

- **Context Aware Electrode Weighting** **May 2024 - Present**
  - Designed and implemented the Context Aware Electrode Weighting (CAEW) framework in PyTorch, a novel CNN-transformer hybrid, to dynamically weight EEG electrodes for depression classification.
  - Optimized CAEW using dilated and separable convolutions, average pooling, and transformer layers, achieving state-of-the-art performance by surpassing three benchmark models and slightly outperforming DeprNet.
  - Conducted interpretability analyses of CAEW weights to uncover distinctive EEG patterns between depressed and healthy individuals.
- **Telemedicine EEG Portal** **May 2023 - Present**
  - Developed a telemedicine portal with a 3D brain model to visualize electrode data as a topographical map in real time.
  - Implemented an interactive 3D EEG setup guide for accurate headset placement, aligned with the 10-20 system for consumer-grade devices.
- **Synthetic EEG Data Using Wasserstein Generative Adversarial Networks** **Aug. 2023 - Present**
  - Designed and implemented a CNN-based Wasserstein GAN (WGAN) framework in PyTorch to generate synthetic EEG data, leveraging transfer learning by pretraining on a depression dataset and fine-tuning on a smaller OCD dataset to address data scarcity.
  - Optimized the generator and discriminator architectures to ensure realistic EEG signal synthesis, enhancing model stability and augmenting training datasets for classification tasks.
  - Conducted performance evaluations to validate the quality of synthetic EEG data for downstream analysis.

TECHNICAL SKILLS

Programming and Scripting: C, C++, Python, SQL, R, Java, JavaScript
Tools and Platforms: AWS, Git, CI/CD, Docker
Machine Learning: TensorFlow, Keras, ScikitLearn, PyTorch
Data Analysis and Visualization: Matplotlib, Pandas, Seaborn, Numpy

PUBLICATIONS

- **B. Bowman**, Z. Zheng, N. Dalhy, B. Geary, I. Bentley, and B. Karaman*. *Improving Object Counting Accuracy with Adaptive CNN Models and Meta-Level Routing.* AIIoT 2025. Developed a hybrid CNN–Mixture of Experts model for video-based bat counting using background subtraction and adaptive augmentation. Achieved a 7% accuracy gain and improved generalization on synthetic data.
- **B. Bowman**. *Advancing Telemedicine: Integrating EEG Technology and Deep Learning for Timely Mental Health Diagnosis.* Master's Thesis, Florida Polytechnic University, 2025. Developed an interpretable CNN-transformer model for EEG-based depression detection (CAEW) and a ResNet-WGAN for synthetic EEG data generation, improving diagnostic performance in low-data telemedicine environments.