Xuzhe Zhi

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EDUCATION

MSE, Computer Science, **Johns Hopkins University** *(GPA: 4.0)* *Aug 2024 - Dec 2025*
BS, Data Science (Machine Learning Track), **University of California, San Diego** *(GPA: 3.97)* *Sep 2020 - Dec 2023*

WORKING EXPERIENCE

The HEPIUS Lab, JHU
Computer Vision Research Assistant Aug 2024 – Present

- Implemented and optimized a physics-informed deep learning model (**DeepONet**) for multi-source focused ultrasound pressure field prediction in heterogeneous spinal cord environments, achieving a **2% prediction error rate**.
- Developed a deep learning pipeline for ETL using **DALI** and image annotation with **SAM2**, packaged in Docker, significantly improved the efficiency and scalability of data collection across multiple lab environments.
- Designed and automated inference scripts for benchmarking and fine-tuning CNN, Transformer, RNN, and FNN models within DeepONet, ensuring optimal compatibility and improving model robustness; validated cross-domain adaptation.

The CHAI Lab, JHU
NLP Research Assistant Dec 2024 – Aug 2025

- Fine-**tuned RoBERTa** using **Hugging Face** on 10M+ patient records (clinical notes + structured data); engineered time-series and NLP features, ran grid-search hyperparameter tuning, and improved blood-glucose and behavior prediction accuracy by **14%** compared to a baseline model using CGM data alone.
- Optimized time-series patient behavior modeling using Transformer-based architectures, integrating **PyTorch Lightning** for efficient training and evaluation.

The Cottrell Lab, Computer Sci&Eng
Computer Vision Research Assistant, *Computer vision, Cognitive Modeling* Dec 2022 – May 2024

- Deployed and trained deep learning models on a multi-GPU cluster Nautilus using **Kubernetes**, built training monitor with TensorBoard, allowing team members to monitor training progress and analyze results remotely and collaboratively.
- Developed a trainable **HC divisive normalization** layer for CNN model using **Pytorch** and increased accuracy of Alexnet by 4% in classifying ImageNet, enhanced feature representation and model interpretability.
- Optimized the layer structure. Reduced number of learnable parameters through sharing share backpropagation gradient across parameters, embedded GPU dataloader and parallelized training using Pytorch DDP, reduce training time by 50%.

Data Scientist Internship at AiCare Corp. July 2022 – May 2024
Health Condition assessment for patients recovering from severe diseases using Python, SQL

- Led the development and deployment of a **real-time** data-visualization and risk-assessment web application, enabling doctors and nurses to monitor patient compliance.
- Embedded time series analysis over months of patient's health data from Apple Watch; Implemented **Logistic Regression** and **Random Forest** to predict patients' long-term recovery trends with **87% accuracy** and **90% specificity**.
- Explored the characteristics of biometric data of the different patient symptom cohort using **k-means** clustering analysis.

PUBLICATIONS

- *Convolutional Deep Operator Networks for Learning Nonlinear Focused Ultrasound Wave Propagation in Heterogeneous Spinal Cord Anatomy;* A. Kumar, **X. Zhi,** Z. Ahmad, M. Yin, A. Manbachi (Accepted for oral presentation at AAAI Conference on Artificial Intelligence: AI for Accelerating Science and Engineering Workshop 2025)
- *Causal Monitoring of Glucose and Behavior Using a Large-Scale Sensor Foundation Model* (AAAI 2026 Submission); J. Luo, **X. Zhi**, R, Han, A. Iyer, R. Agarwal, G. Gao; 2025
- *Method and apparatus providing an ongoing and real time indicator for survival and major medical events;* F. Fang, **X. Zhi**, RF. Xu, J. Fee; 2024
- Modeling Divisive Normalization as Learned Local Competition in Visual Cortex **X.Zhi**, K. Long, Y. Shah, Garrison Cottrell

SELECTED PROJECTS

Web App: CuraCare At-Home Care Chatbot Sep 16, 2024 – Sep 18, 2024
Personalized Generative AI Chatbot for at-home health advice and medical care (Hophacks Hackathon Project)

- Led team of 4 and developed a web-based AI chatbot powered by **OpenAI GPT-4o** using **Flask** for real-time data exchange and answer delivery and **JavaScript** for user friendly interaction design, deployed in Docker.
- Integrated a scalable backend using **MongoDB**, implementing secure **CRUD** operations, indexing, and user authentication to ensure encrypted storage and retrieval of medical records and user conversations.

Undergrad Thesis: Background subtraction for Domain adaptation problem in CNN model Jan 2023 – March 2023

- Image analysis and animal classification on the iWildCam dataset with 200,000+ images from 323 locations of 180+ species
- Generalized pretrained CNN model, with noise suppression image preprocessing and background subtraction layer, to new subset of photos from cameras from various locations with a **70%** reduction in accuracy loss.
- Reached 92% accuracy in identified non-animal, environmental pixels in images using a **Random Forest** with **AdaBoost**.