

William Ouyang Xu

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EDUCATION

Georgia Institute of Technology

Bachelor of Science in Computer Science and Neuroscience, GPA: 4.0/4.0

Atlanta, GA

Expected May 2028

EXPERIENCE

Machine Learning Research Intern

Emory University School of Medicine, Pardue Lab

Atlanta, GA

Dec. 2025 – Present

- Sole computational scientist for a wet-lab group: built Python and R pipelines for large-scale transcriptomic analysis and differential expression using Scanpy, scVI-tools, scikit-learn, DESeq2, and WGCNA
- Trained scVI/scANVI variational autoencoders and a SOLO doublet classifier in PyTorch to integrate experimental libraries into a retinal atlas reused across the lab's studies
- Outperformed CIBERSORT with an NNLS deconvolution method in CPM space plus a cell-size correction, halving error against pseudobulk ground truth

Research Software Engineering Intern

Georgia Institute of Technology, NRD Lab

Atlanta, GA

May 2025 – Dec. 2025

- Developed a networked experimentation platform that synchronized task execution and data collection across servers
- Implemented probabilistic reward schedules, dynamic contingency reversals, experimental-condition controls, and trial-level behavioral logging for a 320-trial decision-making task
- Deployed the system in a ~100-participant human study, generating 28,800 decision trials used to model how sensorimotor context biases reward-guided behavior
- Co-authored a computational psychiatry paper validating the stability of individual decision patterns across sensorimotor conditions

SELECTED PROJECTS

ParkinPal — Python, NumPy/SciPy, Pandas, MediaPipe, XGBoost

2025

- Built a multimodal system to detect freezing of gait and quantify DBS response across ~100 Parkinson's patients and five longitudinal timepoints.
- Extracted APA onset, toe-off, step timing, and center-of-pressure dynamics; implemented a one-command, 13-stage QC pipeline retaining 91.3% of recordings with full audit logs.
- Generated patient gait-irregularity timelines from video using MediaPipe pose estimation, sliding-window kinematics, and XGBoost.

EEGaze — ADS1299/ESP32, BrainFlow, NumPy/SciPy, scikit-learn

2026

- Engineered a custom 8-channel EEG/EOG headset by adapting the Ultracortex frame with ADS1299/ESP32 electronics, electrode mounts, and interchangeable wet/dry interfaces.
- Built a real-time signal pipeline powering EOG-based gaze control and EEG-based five-stage sleep classification.
- Training personalized models with held-out sessions, targeting 95% balanced accuracy for gaze and cross-night reliability for sleep staging.

CurioBench — Environmental Curiosity in LLM Agents (ICLR Main 2027 Submission)

2026

- Led an ICLR 2027 submission with Jiatong Han (Google DeepMind) on environmental resource discovery and utilization in LLM agents.
- Built and released 1,000 deterministic tasks across 10 domains, 4 difficulty tiers, and 3 prompt framings, with paired causal controls and trajectory-level scoring.
- Raised CurioBench scores by up to 25% improvement via scan-rank-inspect scaffolds and GRPO-optimized tool-use policies.

SKILLS

Languages: Python, R, Java, C++, MATLAB, Swift

ML/AI: PyTorch, Hugging Face, scikit-learn, XGBoost, GRPO, LLM Agents, SAEs, YOLO, Weights & Biases

Tools: NumPy/SciPy, Pandas, Scanpy/scVI-tools, Seurat/DESeq2/WGCNA, MediaPipe, BrainFlow, ESP32/ADS1299, Git/Linux

PUBLICATIONS & MANUSCRIPTS

Huang, E., **Xu, W.**, & Wilson, R. C. "Sensorimotor features of a reversal learning task bias decision behavior without disrupting individual difference structure." *Submitted to Computational Psychiatry*, 2026.

Xu, W., et al. "Chronic ENDS exposure impairs rod-mediated retinal function and remodels the deep retinal microvasculature in mice." *Submitted to Frontiers in Immunology*, 2026.

Co-author — "Forced exercise modulates retinal inflammatory response and regulates miRNA expression to promote retinal neuroprotection during degeneration." *Submitted to IOVS*, 2026.

Co-author — "Noninvasive audiovisual neurostimulation differentially alters glial responses at 20 Hz and 40 Hz." *Manuscript in preparation*, 2026.