Kaiya (Ivy) Zhao

📞 +1 (857)-320-9075 ✉ kyzhao@mit.edu | kyzhao.ivy@gmail.com ⌨ kyzhao-ivy

EDUCATION

PhD Student, MIT, Cambridge, MA, USA   Sep. 2024 – Present
- Department of EECS, MIT CSAIL, Group: Embodied Intelligence
- **Advisors**: Phillip Isola *and* Josh Tenenbaum

B.S. in Computer Science, Fudan University, Shanghai, China   Sep. 2020 – Jun. 2024
- **GPA**: 3.82/4.00, **Rank**: 3/102
- **Core Coursework**: Mathematical Analysis, Probability Theory and Mathematical Statistics, Machine Learning, Data Structure, Computation Theory, Digital Logic and Component Design, Graph Theory (Honors)
- **Awards**: 2021-2022 **National Scholarship** & 2020-2021 **National Scholarship** (top **0.005%** nationwide), 2022 Outstanding Student Leader of Fudan University (FDU), 2022 & 2021 Excellent Student of FDU

RESEARCH EXPERIENCE

Lyfe Agent: LLM-Powered Autonomous Agent in 3D Environment | *Project Leader*   Apr. 2023 – Dec. 2023
Advisor: Guangyu Robert Yang, Assistant Professor, MIT
- Propose the framework for modeling the human brain using large language model (LLM)-powered, autonomous, and generative agents in 3D Unity environment with human interactions.
- Explore the abilities of LLMs to execute agent communication, reflection, reasoning, and planning, further extend LLMs' capabilities via prompt engineering, neural networks, and well-organized memory architecture.
- Implement non-linguistic fast process to model subconscious brain activities and complete downstream tasks, using external grounded observation and action spaces in the virtual world and internal homeostasis on energy, joy, etc.
- Investigate and validate the long-term self-coherence and personality consistency inside human-like agents.
- Provide a platform for academics to conduct brain simulation experiments, and promote the iterations of artificial generative intelligence (AGI) game in a cost-efficient way, namely up to 100 times lower than existing alternatives.
- Serve a foundational role in incubating a startup and focus on transforming the project to be market-ready.

Modeling C. Elegans: Pipeline on Neural Activity Predictions and Scaling   Feb. 2023 – May. 2023
Advisor: Guangyu Robert Yang, Assistant Professor, MIT *and* Edward Boyden, Professor, MIT
- Fabricated pipelines using Hydra on multiple models such as LSTM, NeuralCfC and Transformer across 7 worm datasets; simulated neural activity and calcium trace in nematode *Caenorhabditis elegans* (C. Elegans).
- Investigated and visualized how scaling properties interacted with quantitative factors such as number of time steps, worms and neurons. Observed a quadratic dependency between the model's hidden size and the Mean Squared Error on the validation set, and a linear correlation between time steps per neuron (TSN) and loss.
- Explored neural prediction with methods of data preprocessing (FFT, TVR, etc) and hyperparameters-tuning on models, analyzing the biologically-interpretable future GCaMP traces and relevant influencing factors.

Poisson Mixup: Data Augmentation in Neural Spike Decoding | *Project Leader*   Jul. 2022 – Nov. 2022
Advisor: Yu Qi, Associate Professor, Zhejiang University
- Proposed and developed manifold mixup to enhance spike-decoding by augmenting features in hidden space.
- Improvised experiments using neural networks (FNN, LSTM) on DAD monkey neural spikes dataset and optimized the model via augmentation methods (input & manifold mixup), increasing 0.16 on R^2.

Application of Laser SLAM Navigation on AGV Positioning   Apr. 2022 – Jul. 2022
Advisor: Liang Zhao, Associate Professor, Zhejiang University
- Applied the Kalman filter and improved the accuracy of autonomous guided vehicles (AGV) positioning in the lab-developed system, applied real-time field testing in factories such as BYD, an automobile manufacturer.

PUBLICATIONS

- **Zhao Kaiya**, Michelangelo Naim, Jovana Kondic*, Manuel Cortes*, Jiaxin Ge, Shuying Luo, Guangyu Robert Yang[‡], Andrew Ahn[‡]. "Lyfe Agents: Generative Agents for Low-cost Real-time Social Interactions.", available on arxiv: https://arxiv.org/abs/2310.02172
- Quilee Simeon*, Leandro Venancio*, **Kaiya Zhao**[†], Michael Skuhersky[†], Aran Nayebi[†], Edward S. Boyden[‡], Guangyu R. Yang[‡]. "Scaling Properties for ANN Models of the *C. elegans* Nervous System", *Under Review*
- Jiaxin Ge*, **Kaiya Zhao***, Manuel Cortes, Jovana Kondic, Shuying Luo, Michelangelo Naim, Andrew Ahn, Guangyu Robert Yang. "Enhance Understanding in Generative Agents through Active Inquiring", *IMOL@NeurIPS 2023*

SKILLS

Languages: Python, C++, C#, C, LaTeX, Java, Matlab, SQL, JavaScript, Verilog