

Kevin Zhai

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SUMMARY

- Ph.D. researcher in Computer Science at the University of Central Florida, advised by Dr. Mubarak Shah.
- Specialize in inference-time alignment, safety, and personalization for diffusion and diffusion-LLM models.
- Previous experience as a computer engineer building simulation systems; background in computer science, physics, and mathematics (triple major).

RESEARCH INTERESTS

- Generative modeling: diffusion models, diffusion LLMs, flow matching.
- Inference-time alignment and test-time scaling.
- Safety, personalization, and unlearning in text-to-image models.

SELECTED PUBLICATIONS & MANUSCRIPTS

1. **[ACCEPTED]** Lee, J., Moon, H., **Zhai, K.**, et al. *Test-Time Scaling in Diffusion LLMs via Hidden Semi-Autoregressive Experts*. **Published at ICLR 2026.**
2. **Zhai, K.**, Singh, U., et al. *MIRA: Mitigating Reward Hacking in Inference-Time Noise Optimization for Text-to-Image Diffusion Models*.
3. **Zhai, K.**, Mollah, S., et al. *CORE: Context-Robust Remasking for Diffusion Language Models*.
4. **Zhai, K.**, Singh, U., et al. *Consensus-to-Personal: Inference-Time Alignment for Text-to-Image Personalization*.
5. Ghosh, S., **Zhai, K.**, et al. *Repair-Aware Forgetting: An Iterative Approach to Unlearning in T2I Diffusion Models*.

RESEARCH AND WORK EXPERIENCE

Graduate Research Assistant

Aug 2023 – Present

Institute of Artificial Intelligence (IAI), University of Central Florida

Orlando, FL

- Research on generative models, focusing on inference-time alignment, safety, and test-time scaling for diffusion and diffusion-LLMs.
- **First Author of MIRA:** Designed a training-free inference-time alignment algorithm that mitigates reward hacking via score-based KL regularization, outperforming standard guidance methods.
- **First Author of CORE:** Developed “Context-Robust Remasking,” a framework for diffusion LLMs that identifies and corrects structural inconsistencies via targeted context perturbation.
- **First Author of COPE:** Architected a two-stage “Consensus-to-Personal” framework using a single safety-aligned backbone with group-specific inference-time steering.
- **Co-Author of HEX (Accepted to ICLR 2026):** Contributed to a test-time scaling method for diffusion LLMs via heterogeneous block schedules; led ablation design and analysis of decoding optimization.
- Developed and maintained distributed experimental pipelines in Python/PyTorch on SLURM multi-GPU clusters, managing data preparation, job arrays, logging (WandB), and automated evaluation.

Computer Engineer

Jul 2021 – Jun 2023

DCS Corp

Alexandria, VA

- Developed algorithms to mimic human driving behavior in ground-vehicle simulations, combining physics-based models with behavior rules.
- Planned and built a testing environment in Unreal Engine 4 to approximate real-world driving conditions for evaluating autonomy stacks.

Undergraduate Researcher

May 2020 – May 2021

Vanderbilt University

Nashville, TN

- Developed network-simulation software to study fidelity under adversarial conditions.
- Explored approaches for mitigating network attacks using simulation-driven analysis.

TECHNICAL SKILLS

Languages: Python, C++, JavaScript, Bash
ML / AI: Diffusion models, diffusion LLMs, deep learning, RL, preference optimization
Frameworks: PyTorch (DDP, FSDP), Hugging Face Diffusers, Accelerate, SLURM, WandB, Docker
Other: High-performance computing, experiment design, data visualization

EDUCATION

Ph.D. in Computer Science Aug 2023 – Present
 University of Central Florida, Center for Research in Computer Vision Orlando, FL

B.Sc. in Computer Science, Physics, and Mathematics (Triple Major) Aug 2017 – May 2021
 Vanderbilt University Nashville, TN

TEACHING AND MENTORING

Graduate Teaching Assistant – Data Structures Fall 2024 – Spring 2025
 University of Central Florida

- Helped students learn core data structures and debugging strategies through labs and office hours.
- Contributed to a course pass rate above 80% (historically around 50%) by providing targeted support on programming assignments.
- Gave individual feedback on code quality and problem-solving approaches.

GRANTS AND AWARDS

- UCF ORCGS Doctoral Fellowship (\$25,000 per year)