ZHANG ZEHAO

Email: taekho@yonsei.ac.kr

EDUCATION

Yonsei University, Seoul, South Korea — Mar. 2021–Jan. 2026 (Expected)
Bachelor of Science in Computer Science

Relevant Courses: Linear Algebra and Applications, Probability and Statistics, Discrete Structures, Data Structures, Operating System, Computer Vision, Network Security, Machine Learning, Natural Language Processing, Reinforcement Learning, Large Language Models, etc.

RESEARCH INTERESTS

My research goal is to design intelligent systems that can perceive, understand, and generate complex multimodal information for real-world applications. In particular, I am interested in combining computer vision and large language models with reinforcement learning techniques to build more adaptive and autonomous AI systems. My interests include:

- **Computer Vision**
- **Large Language Models**
- **Generative AI**
- **Reinforcement Learning**

PUBLICATIONS

- Li, W., **Zhang, Z.**, Lin, L., & Wang, G. (2025). *HumanGenesis: Agent-Based Geometric and Generative Modeling for Synthetic Human Dynamics*. Submitted to AAAI 2026. https://liwq229.github.io/humangenesis
- Li, W., **Zhang, Z.**, Wang, G. (2025). *Direct Conditional Control for Video Diffusion Models*. Ready to Submit to Journal.

RESEARCH EXPERIENCES

Research Intern, Advisor: Prof. Guangrun Wang, Sun Yat-sen University
Dec. 2024–Sept. 2025

Project 1: HumanGenesis: Agent-Based Geometric and Generative Modeling for Synthetic Human Dynamics

- Developed a high-fidelity 3D human synthesis framework combining geometric modeling with generative refinement, enabling consistent reconstruction and dynamic sequence generation from monocular video.
- Introduced a "Reflector" module with human-in-the-loop feedback to correct reconstruction errors, improving detail and fidelity in rendered videos.

Project 2: Direct Conditional Control for Video Diffusion Model

- Proposed Attention-Conditional Diffusion (ACD), injecting conditional control via supervised attention, achieving stronger semantic and spatial alignment.
- Designed a sparse 3D-aware layout with ControlNet and automated annotation to provide interpretable control, enhancing fine-grained video generation and reducing artifacts.

Undergraduate Research Project, Advisor: Prof. Park Sang-hyun, Yonsei University
Mar. 2025–Jul. 2025

Efficient Language Agent System Based on Distillation-enhanced Tiny Reasoning Model

- Applied Knowledge Distillation to improve reasoning-chain generation and environment interaction of tiny language models, enabling autonomous task execution.
- Built an efficient agent system integrating Chain-of-Thought reasoning with external tool use under the ReAct framework.

INDUSTRY EXPERIENCE

Research Intern, Lenovo AI Lab Oct. 2023–Jan. 2024

Object Detection Model Development and Optimization

- Focused on object detection tasks, implementing and optimizing deep learning models with PyTorch to improve detection accuracy and runtime efficiency.
- Conducted systematic evaluations of different model configurations, analyzing trade-offs in accuracy, inference speed, and resource utilization.
- Adapted model deployment strategies for diverse real-world scenarios, strengthening skills in model development, parameter tuning, and performance optimization.

TRAINING PROJECTS

Large Language Models Training Projects

1. Analysis and Implementation of LLaMA 2 Architecture Features

- Conducted an in-depth study of five LLaMA 2 features: Rotary Positional Embedding, Pre-Norm, SwiGLU, RMSNorm, and Grouped Query Attention.
- Analyzed limitations of traditional transformers and explained how each feature addresses specific challenges to highlight its advantages.

2. Agent Optimization and Multi-Policy Comparative Experiments Based on the ReAct Framework

- Explored four strategies (Few-Shot Prompting, Self-Ask, Self-Consistency, Self-Refine) within the ReAct framework to enhance reasoning stability and accuracy.
- Benchmarked on HotpotQA and ALFWorld, showing that moderate structural guidance (Few-Shot + Self-Ask) improves reasoning, while excessive stacking degrades performance.

3. Experiment on Reducing the Perplexity of the LLaMA-3.2-1B Model

- Continued pretraining on a large-scale Korean corpus, adapting the LLaMA-3.2-1B architecture to capture linguistic and syntactic patterns.

- Applied LoRA for resource-efficient fine-tuning and curated domain-specific datasets, enhancing model relevance and robustness.

4. Enhancing LLM Reasoning with Chain-of-Thought and Tree-of-Thought

- Evaluated CoT and ToT prompting strategies on NLP benchmarks (CSQA, MRPC), consistently outperforming direct-answer baselines.
- Achieved 92.0% accuracy on MRPC (vs. 77.0% baseline) and 74.5% on CSQA; findings suggest that while ToT is generally stronger, CoT can be more effective in small-data tasks due to its simplicity.

Reinforcement Learning Training Projects

1. Implementation of Model-based Reinforcement Learning Framework and Evaluation of MPC (Model Predictive Control) Policies

- Implemented a CEM-based MPC framework with state-difference prediction and normalization to enhance stability and performance.
- Comparative experiments (HalfCheetah, random shooting vs. CEM) showed that CEM achieves superior trajectory optimization, policy performance, and training stability.

2. Experiments on Human Feedback-based Policy Optimization and Behavior Alignment

- Proposed a reward function based on user preference probabilities and conducted phased reward learning with PPO in PointMaze; results showed human feedback compensates for policy bias from sparse or misleading rewards.
- Applied the reward-function-based algorithms to UI tasks, demonstrating that models trained with real human feedback achieved significantly better alignment and performance.

SKILLS

Programming, Operating Systems and Tools: Python, Java, C, C++, PyTorch, Linux, LaTeX, MATLAB

LANGUAGES

English (Fluent), Mandarin (Native), Korean (Fluent)