

Yunzhe Daniel Wang

RESEARCH · MACHINE LEARNING · SOFTWARE

Los Angeles, CA 90057

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Education

University of Southern California

PHD IN COMPUTER SCIENCE

- Research focus: Realistic Behavioral Generation for **AI Companion** and **Human-AI Teaming**
- Advisors: Volkan Ustun, William R. Swartout, Gale Lucas

Los Angeles, CA

Aug 2024 - Present

Columbia University

MS IN COMPUTER SCIENCE, MACHINE LEARNING TRACK

- Machine Learning and Robotics Research at Creative Machines Lab
- Advisor: Hod Lipson

New York, NY

Aug 2021 - May 2023

University of Southern California

BS IN COMPUTATIONAL NEUROSCIENCE, BA IN APPLIED MATHEMATICS, MINOR IN COMPUTER SCIENCE

- Reinforcement Learning Research at USC Cognitive Architecture Lab

Los Angeles, CA

Aug 2017 - May 2021

Experience

University of Southern California

GRADUATE RESEARCH ASSISTANT (PHD RESEARCH)

Los Angeles, CA

Aug 2024 - Present

- Led multiple first-author **AI/ML projects** spanning **Machine Learning (ML)**, **Large Language Models (LLMs)**, **Reinforcement Learning (RL)**, **Multi-Agent Systems (MAS)**, and **Generative Modeling**; selected projects summarized below, with further details in links to publications.
- *Multi-Agent LLM Behavioral Alignment*
 - Developed *PersonaEvolve*, a novel LLM behavioral alignment **evolutionary algorithm** for **Multi-Agent LLM** through **persona optimization** for LLM-based agents in **social simulation**, achieving an average 84% reduction in behavior divergence to the expert baseline.
 - Created a physics-based multi-agent social simulator in **Unity-3D** for high-stakes simulation, integrating LLMs such as **Gemini**, **Deepseek**, and **GPT-4o** for agentic behavior generation.
- *Multi-Agent Video Understanding*
 - Developed *CECL*, a novel **contrastive learning** framework for multi-view **ego-centric** video representation alignment with **sigmoid loss**, improving cross-agent spatial and temporal reasoning in multi-agent collaborative-adversarial environments.
 - Fine-tuned Multimodal Large Language Models (**MLLM**) by integrating vision encoders (**V-JEPA2**, **SigLIP2**, **DINOv3**) with language backbones (**LLama**) using **LoRA** adaptor and **Q-Former** projector for **multi-modal alignment**.
 - Collected and curated a **benchmark dataset** for gameplay **video understanding** with synchronized multi-agent ego-centric view, supporting tasks for Video Question Answering (**VQA**), Video Captioning, and teammate modeling.
- *Action-Conditioned Video Generation and World Modeling*
 - Developing a genie-style **action-conditioned video generation** framework based on **flow matching** and **diffusion models**, with a focus on accurately modeling, predicting, and simulating the interactions of other agents
- *Multi-Agent Tactics Decision Generation*
 - Developed *DECOY*, a physics-based 3D **multi-agent reinforcement learning (MARL)** simulation environment built with **Panda3D** and **Unity**, integrating variational auto-encoder (**VAE**) for data-driven state-value estimation.
 - Developed a **text-conditioned trajectory generation** model for tactical decision synthesis using **DDPM diffusion models**.
- *Preference-Driven Multi-Objective Reinforcement Learning*
 - Developed *GraphAllocBench*, a scalable graph-based **multi-objective reinforcement learning** benchmark for **human preference Pareto-front learning** and evaluation in multi-objective policy optimization.

Bubble Group, Inc.

SOFTWARE ENGINEER II

New York, NY

Jul 2023 - Jul 2024

- **Founding Engineer** of the Bubble AI team, leading Generative AI Research and Development for **UI/UX generation** in Bubble's low-code/no-code (LCNC) platform using **Large Language Models**.
- Developed and launched the first Bubble AI product, **AI Page Designer**, from zero to one, enabling text-to-interface generation of customized and responsive web UIs through **LLM-based agents** and **domain-specific languages (DSLs)**.

Creative Machines Lab at Columbia University

New York, NY

Sep 2021 - May 2023

RESEARCH ASSISTANT

- Developed several deep learning models from scratch for modeling **robotics perception and embodied intelligence**, enabling inference of legged robots from intrinsic motion dynamics (**kinaesthesia**) for control and **planning** on unseen morphologies.
- Created *Emo*, a **conversational face robot** with co-expressive facial dynamics and **speech-driven lip-synced expressions**, achieving human-like multimodal communication through **CNN**, **Transformer** and **LSTM**-based architectures.

USC Institute for Creative Technologies

Los Angeles, CA

RESEARCH ASSISTANT

Feb 2020 - Aug 2021

- Designed and implemented a **Reinforcement Learning** system using **Graph Transformers** for solving routing problems like **Traveling Salesman** in **Search-and-Rescue** missions, improving agent coordination in Human-AI teaming research
- Software development of the **(Py)Sigma Cognitive Architecture**, implementing the **Graphical Model** components for real-time cognitive reasoning and decision-making simulations.

Institute of Computing Technology, Chinese Academy of Sciences

Beijing, China

RESEARCH ENGINEER INTERN

May 2019 - Aug 2019

- Conducted **Natural Language Processing** research on **knowledge extraction**; developed a **rule-based system** for enhanced Chinese Part-of-Speech tagging, data-mined linguistic rules to improve downstream entity and relation extraction accuracy.

Skills & Tech Stack

AI / ML / DS	PyTorch, PyTorch Lightning, PyG (PyTorch Geometric), TensorFlow, TensorRT, ONNX, Scikit-Learn, Hugging Face (Transformers, Diffusers), LangChain, PEFT, Ollama, OpenAI API, OpenRouter, Weights & Biases (W&B), Unity ML-Agents, PyBullet, NumPy, Pandas, Polars, Jupyter, Matplotlib, Plotly, Label Studio
Software	Python, C++, C#, JavaScript / TypeScript, Node.js, React, Next.js, FastAPI, Flask, Docker, AWS (S3, EC2, Lambda), Redis, Nginx, SQL, Selenium, FFmpeg, MATLAB, LaTeX, Git, Tailwind CSS, Jira, Confluence, Cursor, Claude Code
Languages	English (Fluent), Chinese (Native)

Preprints

1. Yunzhe Wang, Runhui Xu, Kexin Zheng, Tianyi Zhang, Jayavibhav Kogundi, Soham Hans, Volkan Ustun. “**GameplayQA: A Benchmarking Framework for Decision-Dense POV-Synced Multi-Video Understanding of 3D Virtual Agents.**” *under review*.
2. Yunzhe Wang, Soham Hans, Volkan Ustun. “**X-Ego: Acquiring Team-Level Tactical Situational Awareness via Cross-Egocentric Contrastive Video Representation Learning.**” *under review*. Link ↗
3. Zhiheng Jiang, Yunzhe Wang, Ryan Marr, Ellen Novoseller, Benjamin T. Files, Volkan Ustun. “**GraphAllocBench: A Flexible Benchmark for Preference-Conditioned Multi-Objective Policy Learning.**” *under review*.
4. Tianyi Zhang, Xiaolin Zhou, Yunzhe Wang, Erik Cambria, David Traum, Rui Mao. “**Individualized Cognitive Simulation in Large Language Models: Evaluating Different Cognitive Representation Methods.**” *under review*. Link ↗

Publications

1. Yuhang Hu, Jiong Lin, Judah Goldfeder, Philippe Wyder, Yifeng Cao, Steven Tian, Yunzhe Wang, Jingran Wang, Mengmeng Wang, Jie Zeng, Cameron Mehlman, Yingke Wang, Delin Zeng, Boyuan Chen, Hod Lipson. “**Learning Realistic Lip Motions for Humanoid Face Robots.**” *Science Robotics*, 2026.
2. Yunzhe Wang, Gale M. Lucas, Burcin Becerik-Gerber, Volkan Ustun. “**Implicit Behavioral Alignment of Language Agents in High-Stakes Crowd Simulations.**” *Empirical Methods in Natural Language Processing (EMNLP 2025)*. Link ↗
3. Yunzhe Wang, Volkan Ustun, Chris McGroarty. “**A Data-Driven Discretized CS:GO Simulation Environment to Facilitate Strategic Multi-Agent Planning Research.**” *2025 Winter Simulation Conference (WSC 2025)*. Link ↗
4. Yuhang Hu, Yunzhe Wang, Ruibo Liu, Zhou Shen, Hod Lipson. “**Robot Configuration Identification from Motion Data.**” *International Conference on Intelligent Robots and Systems (IROS 2024)*. Link ↗
5. Yuhang Hu, Boyuan Chen, Jiong Lin, Yunzhe Wang, Yingke Wang, Cameron Mehlman, Hod Lipson. “**Human-Robot Facial Co-expression.**” *Science Robotics*, 2024. Link ↗
6. Yunzhe Wang, Nikolos Gurney, Jincheng Zhou, David Pynadath, Volkan Ustun . “**Route Optimization in Service of a Search and Rescue Artificial Social Intelligence Agent.**” *Association for the Advancement of Artificial Intelligence 2021 Fall Symposium Series (AAAI FSS 2021)*. Link ↗