

Yunzhe Daniel Wang

RESEARCH · MACHINE LEARNING · SOFTWARE

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Education

University of Southern California

PHD IN COMPUTER SCIENCE

Los Angeles, CA

Aug 2024 - Present

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

Columbia University

MS IN COMPUTER SCIENCE, MACHINE LEARNING TRACK

New York, NY

Aug 2021 - May 2023

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

University of Southern California

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

Los Angeles, CA

Aug 2017 - May 2021

- Reinforcement Learning Research at USC Cognitive Architecture Lab

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

RESEARCH ASSISTANT

New York, NY

Sep 2021 - May 2023

- 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.

- 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

- 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

- 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.*
- Yunzhe Wang, Soham Hans, Volkan Ustun. **“X-Ego: Acquiring Team-Level Tactical Situational Awareness via Cross-Egocentric Contrastive Video Representation Learning.”** *under review.* [Link](#)
- 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.*
- 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

- 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.
- 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](#)
- 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](#)
- 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](#)
- Yuhang Hu, Boyuan Chen, Jiong Lin, Yunzhe Wang, Yingke Wang, Cameron Mehlman, Hod Lipson. **“Human-Robot Facial Co-expression.”** *Science Robotics*, 2024. [Link](#)
- 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](#)