

# Yunzhe Daniel Wang

RESEARCH · MACHINE LEARNING · SOFTWARE

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## Education

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### 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

New York, NY

MS IN COMPUTER SCIENCE, MACHINE LEARNING TRACK

Aug 2021 - May 2023

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

### University of Southern California

Los Angeles, CA

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

Aug 2017 - May 2021

- Reinforcement Learning Research at USC Cognitive Architecture Lab

## Experience

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### University of Southern California

Los Angeles, CA

GRADUATE RESEARCH ASSISTANT (PHD RESEARCH)

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.

New York, NY

SOFTWARE ENGINEER II

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

RESEARCH ASSISTANT

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.

## 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

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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

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1. Yunzhe Wang, Soham Hans, Volkan Ustun. "**X-Ego: Acquiring Team-Level Tactical Situational Awareness via Cross-Egocentric Contrastive Video Representation Learning**." *under review*. Link ↗
2. 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*.
3. 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 ↗
4. Yuhang Hu, Yunzhe Wang, Judah Goldfeder, Philippe Wyder, Yifeng Cao, Steven Tian, Jiong Lin, Jingran Wang, Mengmeng Wang, Jie Zeng, Cameron Mehlman, Yingke Wang, Delin Zeng, Boyuan Chen, Hod Lipson. "**Learning Realistic Lip Motions for Humanoid Face Robots**." *In Revision at Science Robotics*.

## Publications

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1. 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 ↗
2. 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 ↗
3. 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 ↗
4. Yuhang Hu, Boyuan Chen, Jiong Lin, Yunzhe Wang, Yingke Wang, Cameron Mehlman, Hod Lipson. "**Human-Robot Facial Co-expression**." *Science Robotics, 2024*. Link ↗
5. 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 ↗