

Power Yao

powenyao@gmail.com - (714) 860-0215 - powenyao.com/

Education

University of Southern California

Ph.D. Computer Science - [“Design Lenses for 3D Interaction in Extended Reality”](#)

2024

M.S. Computer Science

2012

University of California, Irvine

B.S. Electrical Engineering

2010

Work Experience

XR Advisor @ Easley Dunn Productions

Current

- Advising the Medical VR team working on an orthopedic surgery (foot) simulator prototype in VR

Substitute Military Service @ Tourism Bureau - Planning and Research Division

2017 - 2018

- Served in the mandatory Substitute Military Service for the Republic of China

Teaching Assistant & GamePipe Lab Manager @ USC

2019 - 2024

- Teaching Assistant for Advanced Game Projects, Networked Games, Networked Artificial Intelligence, AR/VR/MR, Machine Learning for Games, and Mobile Games, with class sizes up to 90.

2012 - 2017

[Teaching Page](#)

- Worked in a variety of roles, notably course and syllabus restructuring, lecturing, creating course material, mentoring student teams, leading and managing teaching staff (up to 6), managing and purchasing the lab's hardware and software, event planning and execution, liaison with neighboring art schools, etc.

Student Researcher, UI, AI @ USC - Information Sciences Institute, GamePipe Lab

2011 - 2012

Technology: Unity 3D for SEAVAK, C# Custome Engine for Cosmopolis

- Worked as the lead programmer and User Interface designer on SEAVAK: a multi-user data visualization & simulation tool designed for open-source intelligence analysts
 - Created a variety of data visualization features and tools with an emphasis on data provenance.
- Worked on AI for Cosmopolis, a Massively Multiplayer Online Game for game research
 - Researched and Implemented a navigation mesh system and behavior tree system from scratch in C#

[Video](#)

Design, Engineer, & Research Projects

PhD Research Project - XROSS UI - Team Leader, Lead Design, Lead Programmer

2020 - 2024

Technology: Unity3D, XR Interaction Toolkit, HTC Vive, Meta Quest 1/2/3, Oculus Rift S

[Website](#)

- Led teams (max 6, 30 total collaborators) to explore, build, and evaluate 3D User Interfaces for XR, using Design Lenses of Hyperphysical User Interfaces, Whole Body Interactions, and Extradimensional Space.
- This resulted in 17 publications of demos/papers, ranging from a spatial interaction model, gesture taxonomy, sensor fusion, multi-modal machine learning, text entry, HCI, etc.

[Publication Page](#)

PhD Research Project - VR RTS Arkology - Team Leader, Lead Design, Lead Programmer

2016 - 2017

Technology: Unity3D, HTC Vive, Photon Unity Networking

[Trailer](#)

- Led a team (6 core, 17 total) on a Virtual Reality Real-Time Strategy game for user interface research
- Explored Tailored User Interface - Command Table and information posters that respond based on user's physical profile. Explored Customizable User Interface; developed UI Chandelier, Customizable UI Panel
- Explored other HCI interaction techniques, such as Proxy Units and Control Group Volume
- Architected data-driven game by remote CSV files(e.g., game balance, localization (Chinese, English, Japanese))
- Presented at the Taipei Game Show, Intel University Game Showcase at GDC, and Tokyo Indie Fest

[Gameplay Video](#)

CSCI529 Advanced Game Project - Toward the Stars - Team Leader, Lead Design

2014 - 2015

Technology: Unreal Engine 4, C++, Perforce

[Trailer](#)

- Led a team (30) with external school collaboration on a networked cooperative multiplayer action game
- Presented at USC GamePipe Tech showcase

CSCI 499 Social Game Development - Sky RPG - Team Leader, Client-side Programmer, Designer

Spring 2012

Technology: Unity3D for client-side & Windows Communication Foundation for server-side

[Gameplay Video](#)

- Led a team (12) on an online multiplayer social game on Facebook

CSCI 499 Immersive Game Development - Speaker, Lead Programmer, Designer

Spring 2011

Technology: C++ with Visual Studio, Maya, and custom PrimeEngine to interface with Kinect

[Gameplay Video](#)

- Two immersive games using Microsoft Kinect with a team of 4 and 7. Presented at USC Games Demo Day

Technical Proficiencies

Programming: C#, Java, C, C++, Javascript, Python/GdScript, SQL, Matlab, R, XML, HTML/CSS

Version Control: TortoiseSVN, TortoiseHg, Perforce, Git with GitHub, Assembla

Game Engine: Unity3D, Unreal Engine, Godot

Misc Tools: Visual Studio, JetBrains Rider, Overleaf/LaTeX, GIMP, OBS Studio

Publications

My main research area is User Interface & User Interaction in Extended Reality (XR), primarily manifested in the Virtual Equipment System. I also explored novel interaction techniques at the intersection of XR with students I mentor in combination with Machine Learning, Natural Language Processing, Computer Vision, or Text Entry.

Virtual Equipment System

- **P. Yao**, Z. Ye, and M. Zyda, "Virtual Equipment System: Toward Bag of Holding and Other Extradimensional Storage in Extended Reality," in *Virtual, Augmented and Mixed Reality: Design and Development*, vol. 13317, J. Y. C. Chen and G. Fragomeni, Eds. Cham: Springer International Publishing, 2022, pp. 113–130.
- **P. Yao**, S. Shen, and M. Zyda, "Virtual Equipment System: First Evaluation of Egocentric Virtual Equipment for Sensory Settings," in *Virtual, Augmented and Mixed Reality: Design and Development*, vol. 13317, J. Y. C. Chen and G. Fragomeni, Eds. Cham: Springer International Publishing, 2022, pp. 131–149.
- **P. Yao**, V. Lympouridis, and M. Zyda, "Virtual Equipment System: Expansion to Address Alternate Contexts," in *International Conference on Human-Computer Interaction*, 2021, pp. 353–360.
- **P. Yao**, V. Lympouridis, and M. Zyda, "Virtual Equipment System: Face Mask and Voodoo Doll for User Privacy and Self-Expression Options in Virtual Reality," in *2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*, 2021, pp. 747–748.
- **P. Yao**, V. Lympouridis, T. Zhu, and M. Zyda, "Interfacing with sensory options using a virtual equipment system," in *Symposium on Spatial User Interaction*, 2020, pp. 1–2.
- **P. Yao**, T. Zhu, and M. Zyda, "Designing Virtual Equipment Systems for VR," in *International Conference on Human-Computer Interaction*, 2020, pp. 137–144.

Machine Learning

- P. Jalapati, S. Naraparaju, **P. Yao**, and M. Zyda, "Integrating Sensor Fusion with Pose Estimation for Simulating Human Interactions in Virtual Reality," in *HCI International 2022 – Late Breaking Papers: Interacting with eXtended Reality and Artificial Intelligence*, vol. 13518, J. Y. C. Chen, G. Fragomeni, H. Degen, and S. Ntoa, Eds. Cham: Springer Nature Switzerland, 2022, pp. 74–87. doi: 10.1007/978-3-031-21707-4_6.
- **P. Yao**, Y. Hou, Y. He, D. Cheng, H. Hu, and M. Zyda, "Toward Using Multi-Modal Machine Learning for User Behavior Prediction in Simulated Smart Home for Extended Reality," in *2022 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*, Christchurch, New Zealand, Mar. 2022, pp. 688–689.
- **P. Yao**, Y. Hou, Y. He, D. Cheng, H. Hu, and M. Zyda, "Using Multi-modal Machine Learning for User Behavior Prediction in Simulated Smart Home for Extended Reality," in *Virtual, Augmented and Mixed Reality: Design and Development*, vol. 13317, J. Y. C. Chen and G. Fragomeni, Eds. Cham: Springer International Publishing, 2022, pp. 94–112.
- A. Jothi, **P. Yao**, A. Zhao, M. Miller, S. Swieso, and M. Zyda, "Toward Predicting User Waist Location From VR Headset and Controllers Through Machine Learning," 2021, pp. 1–2.
- S. Swieso, **P. Yao**, M. Miller, A. Jothi, A. Zhao, and M. Zyda, "Toward Using Machine Learning-Based Motion Gesture for 3D Text Input," 2021, pp. 1–2.
- M. Miller, **P. Yao**, A. Jothi, A. Zhao, S. Swieso, and M. Zyda, "Virtual Equipment System: Toward Peripersonal Equipment Slots with Machine Learning," 2021, pp. 1–2.
- T. Zhu, **P. Yao**, and M. Zyda, "Using Reinforcement Learning Agents to Analyze Player Experience," in *International Conference on Human-Computer Interaction*, 2020, pp. 510–519.

Text Entry

- T. Yang, **P. Yao**, and M. Zyda, "Flick Typing: Toward A New XR Text Input System Based on 3D Gestures and Machine Learning," in *2022 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*, 2022, pp. 888–889.
- T. Yang, **P. Yao**, and M. Zyda, "Flick Typing: A New VR Text Input System Based on Space Gestures," in *Virtual, Augmented and Mixed Reality: Design and Development*, vol. 13317, J. Y. C. Chen and G. Fragomeni, Eds. Cham: Springer International Publishing, 2022, pp. 379–392.
- **P. Yao**, V. Lympouridis, T. Zhu, M. Zyda, and R. Jia, "Punch Typing: Alternative Method for Text Entry in Virtual Reality," in *Symposium on Spatial User Interaction*, 2020, pp. 1–2.

General

- **P. Yao**, T. Yang, and M. Zyda, "Toward a Gesture System Architecture in Extended Reality Based on a Multi-dimensional Taxonomy of Gestures," presented at the *International Conference on Human-Computer Interaction*, Springer, 2023, pp. 340–347.
- Z. Xu, **P. Yao**, and V. Lympouridis, "Virtual Control Interface: A System for Exploring AR and IoT Multimodal Interactions Within a Simulated Virtual Environment," in *International Conference on Human-Computer Interaction*, 2021, pp. 345–352.
- **P. Yao**, T. Zhu, and M. Zyda, "Adjustable Pointer in Virtual Reality for Ergonomic Interaction," in *2020 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*, 2020, pp. 828–829.