Jia-Wei Fang

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EDUCATIONS

Keio University **Tokyo, Japan**

- Keio Exchange Program March 2024 – July 2024

National Tsing Hua University **Hsinchu, Taiwan**

- M.S. in Computer Science
- Advisor: Cheng-Hsin Hsu
- Thesis Topic: Foveation in XR Cloud Streaming Systems September 2022 – Present

GPA: 4.30/4.30

National Tsing Hua University **Hsinchu, Taiwan**

- B.S. in Computer Science September 2018 – June 2022

GPA:3.98/4.30

PUBLICATIONS

[1] J. Fang, K. Lee, T. Kamarainen, M. Siekkinen, and C. Hsu, "Will dynamic foveation boost the gaming experience in cloud VR?" in Proc. of *ACM International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV'23)*, Vancouver, Canada, June 2023.

[2] K. Lee, J. Fang, Y. Sun, and C. Hsu, "Modeling gamer quality-of-experience using a real cloud VR gaming testbed," in Proc. of *ACM International Workshop on Immersive Mixed and Virtual Environment Systems (MMVE'23)*, Vancouver, Canada, June 2023.

[3] T. Fan, F. Liu, J. Fang, N. Venkatasubramanian, and C. Hsu, "Enhancing Situational Awareness with Adaptive Firefighting Drones: Leveraging Diverse Media Types and Classifiers.", in Proc. of *ACM Multimedia Systems Conference (MMSys'22)*, Athlone, Ireland, June 2022.

[4] S. Tang, Y. Sun, J. Fang, K. Lee, and C. Hsu, "Optimal Camera Placement for 6 Degree-of-Freedom Immersive Video Streaming Without Accessing 3D Scenes", in Proc. of *ACM International Workshop on Interactive eXtended Reality (IXR'22)*, Lisbon, Portugal, October 2022.

[5] J. Fang, K. Lee, T. Kamarainen, M. Siekkinen, and C. Hsu, "Optimizing Dynamic Foveation in Cloud VR Streaming System.", in preparation for *IEEE Transactions on Multimedia (TMM'24)*, 2024.

AWARDS

- National Science and Technology Council Travel Grant, Vancouver, Canada 2023
- Outstanding Academic Achievement Award (Ranked first in the semester) 2021
- Outstanding Academic Achievement Award (Ranked first in the semester) 2020

EXPERIENCE

Network and Multimedia Systems Lab, NTHU **Hsinchu, Taiwan**

Research Assistant

- Dynamic Foveation in Cloud VR Gaming Systems July 2022 – Present

Cloud VR gaming offloads the computationally-intensive rendering tasks from resource-limited Head-Mounted

Displays (HMDs) to cloud servers, which consume a staggering amount of bandwidth for high-quality gaming experiences. One way to cope with such high bandwidth demands is to capitalize on human vision systems by allocating a higher bitrate to the foveal region of the HMD viewport, which is known as "foveation". We construct the very first cloud VR gaming system that supports dynamic foveation. That is, the real-time gaze positions of gamers are streamed from eye-trackers on HMDs to cloud servers, which in turn adjust the foveation parameters, such as foveal region size/location and peripheral region quality degradation, accordingly. Using our developed cloud VR gaming system, we design and carry out a user study to find the optimal foveation parameters. Our contributions to the open-source ALXR project would stimulate further research in cloud VR gaming. The techniques developed by us can be leveraged by other VR applications, as cloud VR gaming imposes the strictest requirements on both high visual quality and short response time.

- Camera Placement for 6DoF Immersive Video Streaming May 2022 – July 2022

  We consider a three-party 6 Degree-of-Freedom (6DoF) immersive video streaming eco-system, composed of content creators, cloud service providers, and HMD users. We design an algorithm that given the users' 6DoF poses in the scene, we can synthesize the best-quality target views for the users by selecting suitable source views from the content creators. We have proposed three algorithms and used the source cameras' coverage ratio as the approximation of the synthesized HMD view quality. The evaluation results show that our algorithm outperforms the baseline in PSNR, SSIM, and VMAF.

- Enhancing Situational Awareness with Adaptive Firefighting Drones January 2022 – April 2022

  In modern society, high-rise fire is one of the threatening situations that may cause a serious disaster. To help with these problems, we use autonomous drones with diverse multi-modal sensors to enhance situational awareness. We see window openness as our target solution since it is dangerous that an immediate increase of fresh air caused by a window loss can lead to high-speed spreading fire, which may end up making it an unsurvivable environment. We design algorithms that determine the drones' trajectories to fly through the measurement points and find out which windows are open. In this project, I have developed the event-driven simulator for simulating the process of open window detection in the photo-realistic Airsim to evaluate our algorithms. The results show that our algorithms achieve higher accuracy and reduce energy consumption compared to others' works.

Teaching Assistant

- Advanced UNIX Programming Fall 2023
- Introduction to Computer Networks Fall 2022

Computer Graphics & Vision Lab, NTHU **Hsinchu, Taiwan**

Research Assistant

- AI Home Staging December 2020 – December 2021

  We built a system that can help people who want to decorate their homes without going out and buying the furniture or decorations back home; instead, they can just use our system at home to refurnish their rooms. We use Unity to build an application that can reconstruct the 3D layouts of the rooms, and the users can place the furniture's 3D models in the layouts at whatever place they want. Since all the 3D models are without textures, we also train a Neural Network (NN) model that can automatically put suitable materials on them.

Teaching Assistant

- Software Studio Spring 2021
- Introduction to Game Programming Fall 2020