YIQIN ZHAO

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About: My research interests lie in mobile computing, augmented reality, and computer vision. Recently, my research projects had a strong focus on improving photorealism in mobile AR by developing novel mobile AR environment understanding systems. In the past, I have designed machine learning models (*HotMobile'20 Poster*, *ECCV'20*) and real-time systems (*MobiSys'21*, *IEEEVRW'22*, and *IMWUT'22*) for improving mobile AR environment lighting estimation. I'm also interested in security and privacy issues associated with photorealism in AR (*ACM MM'22*). In addition to my primary focus on lighting estimation, I have also participated in multiple mobile AR research projects including depth estimation for mobile AR (*arXiv'23*), mobile portrait photo editing (SigGraph Asia'23 TC), and AR software architecture design (*HotMobile'22*, *arXiv'23*, and *ImmerCom'23 (best paper runner-up)*).

EDUCATION

Worcester Polytechnic Institute, Worcester, MA, USA — *Aug. 2021 - Present*
Ph.D. in Computer Science — *Expected Graduation: May, 2025*

Worcester Polytechnic Institute, Worcester, MA, USA — *Aug. 2019 - June 2021*
M.S. in Computer Science
Thesis: *Rethink Lighting Estimation for 3D Vision-enabled Mobile Augmented Reality*

Tianjin Normal University, Tianjin, China — *Sept. 2015 - June 2019*
B.Eng. in Software Engineering

PUBLICATIONS

arXiv'23 Ashkan Ganj, **Yiqin Zhao**, Tian Guo "Mobile AR Depth Estimation: Challenges & Prospects Extended Version" arXiv 2023. In submission.

SA'23 TC **Yiqin Zhao**, Rohit Pandey, Yinda Zhang, Ruofei Du, Feitong Tan, Chetan Ramaiah, Tian Guo, Sean Fanello "Portrait Expression Editing With Mobile Photo Sequence" The 16th ACM SIGGRAPH Conference and Exhibition on Computer Graphics and Interactive Techniques in Asia (SigGraph Asia) 2023 Technical Communication. Accepted, to appear.

ImmerCom'23 Ashkan Ganj, **Yiqin Zhao**, Federico Galbiati, Tian Guo. "Toward Scalable and Controllable AR Experimentation" 1st ACM Workshop on Mobile Immersive Computing, Networking, and Systems (ImmerCom 2023). Best paper runner-up.

HotMobile'23 **Yiqin Zhao**, Sean Fanello, Tian Guo. "Multi-Camera Lighting Estimation for Photorealistic Front-Facing Mobile Augmented Reality" The Twenty-fourth International Workshop on Mobile Computing Systems and Applications (HotMobile) 2023.

IMWUT'22 **Yiqin Zhao**, Chongyang Ma, Haibin Huang, Tian Guo. "LitAR: Visually Coherent Lighting for Mobile Augmented Reality" The Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) 2022, journal paper.

ACMMM'22 **Yiqin Zhao**, Sheng Wei and Tian Guo. "Privacy-preserving Reflection Rendering for Augmented Reality" ACM International Conference on Multimedia (ACM MM) 2022.

VR'22 Poster **Yiqin Zhao**, and Tian Guo. "FusedAR Adaptive Environment Lighting Reconstruction for Visually Coherent Mobile AR Rendering" The IEEE Conference on Virtual Reality and 3D User Interfaces (IEEE VR) 2022, abstract poster paper.

MobiSys'21 **Yiqin Zhao**, and Tian Guo. "Xihe: A 3D Vision-based Lighting Estimation Framework for Mobile Augmented Reality." The 19th annual international conference on mobile systems, 2021. Artifacts Evaluated – Functional

ECCV'20 **Yiqin Zhao**, and Tian Guo. "PointAR: Efficient Lighting Estimation for Mobile Augmented Reality." The 16th European Conference On Computer Vision, 2020.

HotMobile'20 **Yiqin Zhao**, and Tian Guo. "PointAR: Efficient Lighting Estimation for Mobile Augmented Reality." The 21st International Workshop on Mobile Computing Systems and Applications, 2020, abstract poster paper.

— *Publications prior to graduate school.*

Access'19 Ziping Zhao, Zhongtian Bao, **Yiqin Zhao**, Zixing Zhang, Nicholas Cummins, Zhao Ren, Björn W. Schuller. "Exploring Deep Spectrum Representations via Attention-Based Recurrent and Convolutional Neural Networks for Speech Emotion Recognition.", IEEE Access Journal, 2019

Interspeech'18 Ziping Zhao, Yu Zheng, Zixing Zhang, Haishuai Wang, **Yiqin Zhao**, Chao Li. "Exploring spatio-temporal representations by integrating attention-based bidirectional-LSTM-RNNs and FCNs for speech emotion recognition.", Conference of the International Speech Communication Association, 2018

ASMMC-MMAC'18 Ziping Zhao, **Yiqin Zhao**, Zhongtian Bao, Haishuai Wang, Zixing Zhang, Chao Li "Deep spectrum feature representations for speech emotion recognition.", The 4th Workshop on Affective Social Multimedia Computing and first Multi-Modal Affective Computing of Large-Scale Multimedia, 2018

EMPLOYMENT

Worcester Polytechnic Institute, Worcester, MA, USA — *Aug. 2019 - Present*
Research Assistant

Google AR&VR, Mountain View, CA, USA — *Aug. 2022 - May. 2023*
Student Researcher Intern (Part-time)

Google AR&VR, Mountain View, CA, USA — *May. 2022 - Aug. 2022*
Student Researcher Intern (Full-time)

Kuaishou Technology, Palo Alto, CA, USA — *Jan. 2022 - May. 2022*
Research Intern

Baidu, Haidian, Beijing, China — *July. 2018 - Sept. 2018*
Software Engineer Intern

PROJECT EXPERIENCES

Google AR&VR, Mountain View, CA, USA — *May. 2022 - May. 2023*
Portrait Editing for Mobile Devices
Student Researcher, Advisor: Sean Fanello.

- The goal of this project is to design and implement high-quality portrait editing systems that preserve the user's identity during editing and are deployable to resource-constrained mobile devices.
- Proposed a novel mobile phone-friendly design that uses near-time photos to achieve high-quality portrait editing.
- Research paper accepted at SigGraph Asia 2023 Technical Communication.

Worcester Polytechnic Institute, Worcester, MA, USA — *Feb. 2021 - Nov. 2021*
Visually Coherent Lighting for Mobile Augmented Reality
Research Assistant, Advisor: Tian Guo. Artifacts: Project Page, Code

- Designed a mobile-oriented pipeline based on investigations of user and device dynamics of AR applications to generate high-fidelity and spatially-variant environment lighting representation.
- Developed tools for real-world environment lighting data acquisition, on-device system debugging, and end-to-end system evaluations.
- Developed an Unreal Engine-based simulation environment to perform quantitative and qualitative evaluations of controlled user dynamic variables.
- Research paper published at *IMWUT'22 (UbiComp'22)*.

Worcester Polytechnic Institute, Worcester, MA, USA *Mar. 2020 - Feb. 2021*
A 3D Vision-based Lighting Estimation Framework for Mobile AR
Research Assistant, Advisor: Tian Guo. Artifacts: Project Page, Code

- Designed lighting estimation system control policies jointly with the estimation deep model to optimize network transfer and end-to-end inference time.
- Designed and implemented a system prototype with an edge-based deep model inference server and a Unity-based iOS app, which includes on-device real-time point cloud GPU processing.
- Research paper published at *MobiSys'21*.

Worcester Polytechnic Institute, Worcester, MA, USA *Aug. 2019 - Mar. 2020*
Efficient Low-frequency Lighting Estimation for Mobile AR
Research Assistant, Advisor: Tian Guo. Artifacts: Project Page, Code

- Proposed a spatially-variant lighting estimation pipeline for mobile AR by incorporating 3D physical knowledge with point cloud-based learning components.
- Our model improved estimation accuracy while substantially reducing computation complexities.
- Research paper published at *HotMobile'20* and *ECCV'20*.

Tianjin Normal University, Tianjin, China *Dec. 2016 - May 2018*
Learning to Recognize Emotions from Speech
Undergraduate Research Assistant, Advisor: Ziping Zhao

- *Research topic*: affective computing and applied machine learning.
- Designed and implemented an attention-based neural network architecture (prior to transformer time) that effectively learns the spatial and temporal representations of human emotions from conversation speech audio spectrogram signals.
- Research paper published at *Interspeech'18* and *IEEE Access'19*.

SERVICES AND AWARDS

Academic services

- UbiComp 2022 student volunteer.
- Paper reviewer: ICDCS'23, CAAI'23, MMSys'20

Student Travel Grant

- ACM HotMobile 2023 Student Travel Grant. *Jan 2023*
- ACM HotMobile 2020 Student Travel Grant. *Jan 2020*

China Collegiate Computing Contest, Apple Inc., China
This contest is held by Tsinghua University, Zhejiang University, and Apple, Inc. to students from the great China area to develop and design innovative mobile applications.

- 2017 national third prize, top 6% *Oct. 2017.*
- 2016 national third prize, top 10% *Oct. 2016*

Tianjin Normal University Scholarship, Tianjin Normal University

- 2018 - 2019 academic first-grade scholarship, top 10% *May 2019*
- Wang Kechang Culture and Technology Innovation Scholarship, $\leq 1\%$ *Sept. 2018*
- 2017 - 2018 academic year top grade scholarship, top 5% *Sept. 2018*
- 2016 - 2017 academic year second-grade scholarship, top 20% *Sept. 2017*
- 2015 - 2016 academic year first-grade scholarship, top 10% *Sept. 2016*

LEADERSHIP EXPERIENCE

Founder of the TJNU iOS Club, Tianjin Normal University *2017 - 2018*

TJNU iOS Club is a college student association developed to democratize and support innovative mobile application development through the Apple device ecosystem. The iOS Club program is a cross-university program in mainland China supported by leading Chinese academic institutes and Apple Inc.

- Organized biweekly workshops on mobile application design and development on campus.
- Led educational programming student activities with Apple China at the local Apple Store.
- Led team to attend national iOS Club summer and winter camps held by Apple China.
- Developed the Tianjin Normal University iOS Club to be the largest and most influential student technology club in the department.

SKILLS

- Proficient in data science research and engineering, including Unix-like environment, deep learning model training, image/3D data processing, and graphics rendering engines.
- Proficient in system programming with Python, JavaScript, TypeScript, C#, and Swift.
- Proficient in data science technologies including NumPy, Numba, PyTorch, and TensorFlow.
- Familiar with modern GPU programming: Metal, WebGL, shader, and CUDA.
- Familiar with IoT device development and debugging: Android ADB, Xcode Instrument, Nvidia Jetson, and Raspberry Pi.