

YIQIN ZHAO

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Research Interests: My research interest lies in designing mobile augmented reality (AR) systems and algorithms. My recent research has a strong focus on improving mobile AR lighting estimation to enable photorealistic AR experiences. In the past, I’ve designed algorithms (HotMobile’20, ECCV’20) and edge-assisted real-time systems (IMWUT’22, IEEEVRW’22, MobiSys’21, HotMobile’22) for mobile AR environment lighting estimation. I’m also interested in security issues associated with photorealism in AR (ACM MM’22). I’m fortunate to have conducted my research in these areas under the guidance of Prof. Tian Guo alongside many wonderful collaborators.

EDUCATION

Worcester Polytechnic Institute, Worcester, MA, USA

Ph.D. in Computer Science

Aug. 2021 - Present

Expected Graduation: Dec, 2024

Worcester Polytechnic Institute, Worcester, MA, USA

M.S. in Computer Science

Aug. 2019 - June 2021

Tianjin Normal University, Tianjin, China

B.Eng. in Software Engineering

Sept. 2015 - June 2019

PUBLICATIONS

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, poster paper.

IEEEVR’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 Before WPI

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

- ACIIW'19 Chao Li, Jinlong Jiao, **Yiqin Zhao**, Ziping Zhao. “Combining gated convolutional networks and self-attention mechanism for speech emotion recognition.”, 8th International Conference on Affective Computing and Intelligent Interaction Workshops and Demos, 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

Google , Mountain View, CA, USA Student Researcher Intern	<i>May. 2022 - Present</i>
Kuaishou Technology , Palo Alto, CA, USA Research Intern	<i>Jan. 2022 - May. 2022</i>
Worcester Polytechnic Institute , Worcester, MA, USA Research Assistant	<i>Aug. 2019 - Present</i>
Baidu , Haidian, Beijing, China Software Engineer Intern	<i>July. 2018 - Sept. 2018</i>

RESEARCH & INDUSTRIAL EXPERIENCE

Worcester Polytechnic Institute, Worcester, MA, USA Multi-camera Lighting Estimation for Mobile AR <i>Research Assistant, Advisor: Tian Guo</i>	<i>Nov. 2021 - present</i>
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- The high-level goal of this project is to design and implement a system prototype that can leverage multi-camera images to improve mobile AR lighting estimation accuracy.
- Will address three key challenges in lighting estimation: spatially-variant lighting, high-resolution environment map generation, and HDR lighting estimation.
- Will address the temporal environment changing and will design system policies and components to provide temporally stable lighting support.

Worcester Polytechnic Institute, Worcester, MA, USA High-fidelity Lighting Estimation for Mobile AR <i>Research Assistant, Advisor: Tian Guo</i>	<i>Feb. 2021 - Nov. 2021</i>
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- Designed a mobile-oriented end-to-end pipeline that takes camera images and outputs high-fidelity spatially-variant environment lighting representation.
- Conducted quantitative and qualitative evaluations, leveraging a rendering engine-based simulator built for this project, that demonstrates good performance compared to ground truth lighting.
- Addressed a number of challenges associated with real-world data acquisition and compare them to commercial frameworks (ARKit).

Worcester Polytechnic Institute, Worcester, MA, USA A 3D Vision-based Lighting Estimation Framework for Mobile AR <i>Research Assistant, Advisor: Tian Guo, Project Page, Code</i>	<i>Mar. 2020 - Feb. 2021</i>
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- This project resulted in the **MobiSys'21** paper.

- Co-designed lighting estimation policies and deep learning 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, including an on-device real-time point cloud GPU processing pipeline.

Worcester Polytechnic Institute, Worcester, MA, USA

Aug. 2019 - Mar. 2020

Efficient Low-frequency Lighting Estimation for Mobile AR

Research Assistant, Advisor: [Tian Guo](#), [Project Page](#), [Code](#)

- This project resulted in the **HotMobile'20** abstract poster paper and the **ECCV'20** paper.
- Proposed a spatially-variant lighting estimation pipeline for mobile AR with 3D vision techniques and point cloud-based neural networks.
- Improved estimation accuracy while substantially reducing model complexity.

Worcester Polytechnic Institute, Worcester, MA, USA

Aug. 2019 - Sept. 2020

NSF Proposal for Lighting-based 3D Face Authentication

Research Assistant, Advisor: [Tian Guo](#)

- This effort led to a collaborative NSF proposal submission with Rutgers University.
- Proposed an attack that combines real-time lighting estimation (based on my prior work PointAR) and rendering techniques to achieve the low-latency and realistic visual effect requirement of state-of-the-art face authentication and liveness detection systems.

Baidu, Haidian, Beijing, China

July, 2018 - Sept., 2018

Software Engineer Intern

- Worked as a software engineering intern for the mobile application front-end development for Baidu smart speaker (similar to Amazon Alex) with hybrid web technologies.
- Closely worked with UI designers and framework team for designing and developing applications and user interface component library.
- Designed and implemented internal tools for improving testing and debugging workflow efficiency.

Tianjin Normal University, Tianjin, China

Dec. 2016 - May 2018

Undergraduate Research Assistant, Advisor: [Ziping Zhao](#)

- *Research topic:* affective computing and applied machine learning.
- Designed and implemented novel deep neural networks that effectively learn the spatial and temporal representations of human emotions from speech audio spectrogram signals.

AWARDS AND SCHOLARSHIPS

China Collegiate Computing Contest, Apple Inc., China

This contest is held by Tsinghua University, Zhejiang University and Apple, Inc China to students from the great China area for developing and designing 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 and President of TJNU iOS Club, Tianjin Normal University *2017 - 2018*

- Organized biweekly mobile application development and design workshops on campus.
- Led collaborative 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 relevant research pipelines including Unix-like environment, end-to-end deep learning 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