YIQIN ZHAO

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Research Interests: Broadly, I'm interested in designing mobile and edge augmented reality (AR) algorithms and systems. My recent research has a strong focus on environment lighting understanding. In particular, I designed an algorithm (HotMobile'20, ECCV'20) and an edge-assisted real-time system (MobiSys'21) for mobile AR environment lighting estimation. I'm also interested in the interplay of environment understanding and graphics rendering, as well as their real-time application systems.

EDUCATION

Worcester Polytechnic Institute, Worcester, MA, USA — *Aug. 2021 - Present*
Ph.D. in Computer Science

Worcester Polytechnic Institute, Worcester, MA, USA — *Aug. 2019 - June 2021*
M.S. in Computer Science

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

PUBLICATIONS

Anonymous'22 **Yiqin Zhao**, and Tian Guo. "*Anonymous Title.*" Under double-blind submission. (*Introduced a mobile-oriented pipeline to provide high-fidelity environment lighting for mobile AR rendering*).

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.

— **Paper 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

Kuaishou Technology, Palo Alto, CA, USA *Jan. 2022 - Apr. 2022*
Upcoming Research Intern
Worcester Polytechnic Institute, Worcester, MA, USA *Aug. 2019 - Present*
Research Assistant
Baidu, Haidian, Beijing, China *July. 2018 - Sept. 2018*
Software Engineer Intern

RESEARCH & INDUSTRIAL EXPERIENCE

Worcester Polytechnic Institute, Worcester, MA, USA *Nov. 2021 - present*
An End-to-end High-fidelity Lighting Estimation Framework for Mobile AR
Research Assistant, Advisor: Tian Guo

- The high-level goal of this project is to design and implement a system prototype that can provide high-fidelity environment lighting for Mobile AR.
- Currently implementing a reference prototype based on the ARKit and Metal framework.
- Will address a number of challenges associated with real-world data acquisition and compare to commercial frameworks (ARKit and ARCore).
- 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 *Feb. 2021 - Nov. 2021*
High-fidelity Lighting Estimation for Mobile AR
Research Assistant, Advisor: Tian Guo

- This project is currently under double blind submission.
- Designed a mobile-oriented end-to-end pipeline that takes HDR 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 demonstrate good performance compared to ground truth lighting.

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, Project Page, Code

- 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 an Unity-based iOS app, including a 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 reduced 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