Ruizhi Cheng

CONTACT INFORMATION

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Scholar

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George Mason University

EDUCATION

Ph.D. Student in Computer Science — Aug. 2021 - Present
George Mason University — Fairfax, VA
Advisor: Dr. Bo Han

Bachelor of Science in Computer Science — Sep. 2017 - June 2021

WORKING EXPERIENCE

George Mason University, Fairfax, USA
Research Assistant — Aug. 2021 - Present

- Design gaze-driven volumetric video streaming system.
- Design privacy-preserving biometric-based user authentication system in virtual reality (VR).
- Conduct network measurement study on social VR platforms.

PUBLICATIONS

Under Review

7. **Ruizhi Cheng**, Erdem Murat, Lap-Fai Yu, Songqing Chen, Bo Han
   Understanding User Experience of Online Education in Metaverse: A Systems Perspective
   Submitted to **IEEE VR**, 2022
6. **Ruizhi Cheng**, Puqi Zhou, Jie Li, Songqing Chen, Bo Han
   Dissecting User Experience of Social VR: A Tale of Five Popular Platforms
   Submitted to **IEEE VR**, 2022
5. **Ruizhi Cheng**, Songqing Chen, Bo Han
   Towards Zero-trust Security for the Metaverse
   Submitted to **ACM HotMobile**, 2022

Peer-reviewed Papers

4. **Ruizhi Cheng**, Nan Wu, Songqing Chen, Bo Han
   Will Metaverse be NextG Internet? Vision, Hype, and Reality
   IEEE Network, 2022
3. **Ruizhi Cheng**, Nan Wu, Matteo Varvello, Songqing Chen, Bo Han
   Are We Ready for Metaverse? A Measurement Study of Social Virtual Reality Platforms
   ACM IMC, 2022
2. Nan Wu, **Ruizhi Cheng**, Songqing Chen, Bo Han
   Preserving Privacy in Mobile Spatial Computing
   ACM NOSSDAV, 2022
1. **Ruizhi Cheng**, Nan Wu, Songqing Chen, Bo Han
   Reality Check of Metaverse: A First Look at Commercial Social Virtual Reality Platforms
   Metabuild@IEEE VR, 2022 Best Paper Award

SELECTED PROJECTS

Gaze-driven Volumetric Video Streaming (Ongoing)

- Build a gaze-driven volumetric streaming system on Hololens 2.
- Segment volumetric data into cells and encode them on the server.
- Transmit high-quality content near the foveal area and low-quality content to the periphery to save bandwidth while maintaining a high Quality of Experience (QoE).

Privacy-preserving Biometric-based User Authentication in Social VR (Ongoing)

- Utilize federated learning (FL), a privacy-preserving distributed machine learning technique, to conduct user authentication while protecting user privacy.
- Re-implement two state-of-the-art FL-based user authentication algorithms, FedAWS (ICML 2020) and FedUV (ICML 2021).
- Improve authentication accuracy with multimodal data and time-series analysis.

Network Measurement in Social VR (Ongoing)

- Conduct an in-depth measurement study on several social VR platforms.
- Identify all measured platforms face scalability issues in terms of throughput, end-to-end latency, and on-device computation resource utilization.
- Decrypt network traffic to better understand transmission content.
- Design social bots to understand the geographic distribution and usage frequency of users on social VR platforms.

An Online Classroom in Social VR (Past)

- Design an online classroom on Mozilla Hubs, a social VR platform.
- Propose a novel analytic method that combines qualitative and quantitative analysis with end-to-end network measurements to understand the user experience.

Honors and Awards

Best Paper Award, Metabuild@IEEE VR	2022
Student Travel Grant, IEEE VR	2022
Mason Engineers Week Poster Winner, George Mason University	2022

Services

Conference Reviewer

- IEEE VR 2022

Journal Reviewer

- IEEE Network
- IEEE Multimedia
- SAGE Open

Technical Skills

Programming Languages. Python, C++, C#, JAVA
Deep Learning Frameworks. Pytorch, Keras