Shwetha Rajaram

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University of Michigan, Ann Arbor
School of Information

Overview

I am a HCI interactive systems researcher pursuing my PhD at the University of Michigan School of Information, where I am advised by Dr. Michael Nebeling.

Broadly, my research explores how to enable novel interactions with emerging technologies, such as augmented reality (AR) and generative AI, that are both beneficial and safe for end-users.

As we approach the everyday usage of AR, novel privacy concerns arise (e.g., environmental sensing techniques capturing sensitive physical areas or bystanders without their consent). **To mitigate privacy risks across the AR development and usage lifecycle, my PhD research develops tools and frameworks that equip AR designers, developers, and end-users with a privacy mindset.** As examples, I:

- Developed an AR authoring system with integrated threat modeling tools to analyze privacy risks directly within prototypes [C5], evaluating its effectiveness with novice AR designers and security & privacy experts
- Conducted elicitation studies with AR and privacy researchers to derive design frameworks for privacy-driven adaptation of AR interfaces [C4, C9]

End-users' goals and perceptions of risk when using emerging technologies can vary across public vs. private settings and personal vs. collaborative experiences. **Through internships and other projects, I explored customization techniques that allow users to tailor XR and GenAI-enabled interactions to their context-dependent needs**, such as:

- AI image generation techniques to tailor video-conferencing and VR environments to support distributed collaborators' meeting goals [C7, C6] *(explored through my 2023 internship at Microsoft Research)*
- Facilitating socially-acceptable conversations with wearable voice interfaces through gesture and haptic-driven interaction techniques [C8] *(explored through my 2024 internship at Meta Reality Labs Research)*

Research interests: human-computer interaction (HCI), augmented & virtual reality (AR/VR), usable security & privacy, human-AI interaction

Education

University of Michigan, Ann Arbor SEPT 2020 - present
Ph.D. in Information
Advisor: Prof. Michael Nebeling

**completed a year of coursework in the UM School of Information Masters program (with a full scholarship), before matriculating to PhD* SEPT 2019 - MAY 2020

B.S.E. in Computer Science & Engineering SEPT 2015 - MAY 2019

Publications

Peer-Reviewed Full Papers

[C9] Shwetha Rajaram, Macarena Peralta, Janet Johnson, Michael Nebeling. **Exploring the Design Space of Privacy-Driven Adaptation Techniques for Future Augmented Reality Interfaces.** CHI 2025

[C8] Shwetha Rajaram, Hemant Bhaskar Surale, Codie McConkey, Carine Rognon, Hrim Mehta, Michael Glueck, Christopher Collins. **Gesture and Audio-Haptic Guidance Techniques to Direct Conversations with Intelligent Voice Interfaces.** CHI 2025

[C7] Shwetha Rajaram*, Nels Numan*, Bala Kumaravel, Nicolai Marquardt, Andrew D. Wilson. **BlendScape: Enabling End-User Customization of Video-Conferencing Environments through Generative AI.** UIST 2024 Honorable Mention

[C6] Nels Numan*, Shwetha Rajaram*, Bala Kumaravel, Nicolai Marquardt, Andrew D. Wilson. **SpaceBlender: Creating Context-Rich Collaborative Spaces Through Generative 3D Scene Blending.** UIST 2024

[C5] Shwetha Rajaram, Franziska Roesner, Michael Nebeling. **Reframe: An Augmented Reality Storyboarding Tool for Character-Driven Analysis of Security & Privacy Concerns.** UIST 2023

[C4] Shwetha Rajaram, Chen Chen, Franziska Roesner, Michael Nebeling. **Eliciting Security & Privacy-Informed Sharing Techniques for Multi-User Augmented Reality.** CHI 2023

[C3] Shwetha Rajaram, Michael Nebeling. **Paper Trail: An Immersive Authoring System for Augmented Reality Instructional Experiences.** CHI 2022

[C2] Michael Nebeling, Shwetha Rajaram, Liwei Wu, Yifei Cheng, Jaylin Herskovitz. **XRStudio: A Virtual Production and Live Streaming System for Immersive Instructional Experiences.** CHI 2021

[C1] Michael Nebeling, Maximillian Speicher, Xizi Wang, Shwetha Rajaram, Brian D. Hall, Zijian Xie, Alexander R. E. Raistrick, Michelle Aebersold, Edward G. Happ, Jiayin Wang, Yanan Sun, Lotus Zhang, Leah E. Ramsier, Rhea Kulkarni. **MRAT: The Mixed Reality Analytics Toolkit.** CHI 2020 Best Paper

Peer-Reviewed Journal Articles

[J1] Abraham Mhaidli, Shwetha Rajaram, Selin Fidan, Gina Herakovic, Florian Schaub. **Manipulation In VR Marketing: A Content Analysis Of Virtual Reality Marketing Experiences.** IEEE Security & Privacy, 2023

Workshop Papers

[W4] Shwetha Rajaram. **Enabling Safer Everyday Augmented Reality Experiences: Usable Privacy Interventions for AR Creators and End-Users.** UIST 2024 Doctoral Symposium

[W3] Shwetha Rajaram, Michael Nebeling. **Balancing Accessibility and Privacy Considerations in the Design of AR Assistive Technologies.** CHI 2024

[W2] Shwetha Rajaram, Michael Nebeling. **Extending AR Authoring Tools with Built-in Support for Privacy and Security Analysis.** CHI 2022

[W1] Shwetha Rajaram, Franziska Roesner, Michael Nebeling. **Designing Privacy-Informed Sharing Techniques for Multi-User Augmented Reality.** SOUPS 2021

Professional Experience

Meta Reality Labs Research, Toronto, ON, Canada — MAY 2024 - AUG 2024
Research Intern
Mentor: Christopher Collins

Microsoft Research, Redmond, WA — MAY 2023 - AUG 2023
Research Intern
Mentors: Andy Wilson, Nic Marquardt, Bala Kumaravel

JP Morgan Chase, Jersey City, NJ — JAN - DEC 2018
Software Engineering Intern

John Deere, Moline, IL — MAY - AUG 2017
Information Technology Intern

Teaching Experience

University of Michigan, Ann Arbor

Graduate Student Instructor, SI 659: Developing AR/VR Experiences — 2022, 2024
Instructor: Michael Nebeling

Graduate Student Instructor, SI 559: Introduction to AR/VR Application Design — 2021, 2023
Instructor: Michael Nebeling

Instructional Aide, EECS 493: User Interface Development — 2019

Scholarships & Awards

University of Michigan Rackham Predoctoral Fellowship — SEPT 2024- AUG 2025

ACM-Women Scholarship — FEB 2023

CHI 2020 Best Paper Award — MAY 2020

Society of Women Engineers Outstanding Collegiate Member — OCT 2019

MLK Spirit Award, UM College of Engineering — JAN 2019

Service

Assistant to Program Chairs

UIST 2021

Program Chairs: Michael Nebeling, Ranjitha Kumar

Reviewing

ACM Conference on Human Factors in Computing Systems **(CHI)** 2021-2025
Full Papers & Late-Breaking Work

ACM Symposium on User Interface Software and Technology **(UIST)** 2023-2024

ACM Conference On Computer-Supported Cooperative Work And Social Computing **(CSCW)** 2023-2024

ACM Designing Interactive Systems **(DIS)** 2023

IEEE International Symposium on Mixed and Augmented Reality **(ISMAR)** 2021-2024

IEEE Conference on Virtual Reality and 3D User Interfaces **(IEEE VR)** 2024

Leadership & Outreach

Michigan Interactive & Social Computing Group (MISC) JUNE 2023 - APR 2024
Seminar Series Coordinator

Washtenaw Elementary Science Olympiad (WESO) SEP 2011 - present
Event Supervisor

Society of Women Engineers (SWE) at UMich APR 2016 - APR 2019
President, Executive Board
Secretary, Executive Board
Summer Engineering Exploration Camp Director
Elementary Outreach Officer

Women+ Excelling More in Mathematics, Engineering and Science (F.E.M.M.E.S.) APR 2016 - present
Website Developer
Grants Manager
STEM Activities Coordinator

Academic Mentoring

Master Thesis supervision

Anhua Wu, University of Michigan School of Information *(Masters)* AUG 2024 – present

Research Assistants

Anthony Walker, University of Michigan Computer Science *(Undergraduate)* OCT 2024 – present

Macarena Peralta, University of Michigan Computer Science *(Undergraduate)* NOV 2022 – APR 2023

Chen Chen, University of Michigan School of Information *(Masters)* JUN 2021 - APR 2022

Jihee Yoon, University of Michigan School of Information *(Masters)* JAN 2022 - APR 2022

Sereen Kallerackal, University of Michigan School of Information *(Masters)* FEB - APR 2021

Maya Subramanian, University of Michigan Computer Science *(Undergraduate)* JAN - MAR 2021

I Hun Chan, University of Michigan Computer Science *(Undergraduate)* JAN - MAR 2021

Skills

Research Methods: HCI systems research, mixed-methods user studies, user-driven elicitation, interviews, focus groups

Programming Languages: C#, HTML/Javascript, Python

AR/VR Technologies
SDKs: Unity Engine (ARFoundation, Vuforia, MRTK) and A-Frame
Devices: mobile AR, HoloLens 1/2, Meta Quest, Windows Mixed Reality headsets

Generative AI Technologies: developed interactive systems using image generation techniques (Stable Diffusion) and large language models (GPT)

Coursework

Ph.D. Courses

Privacy in Information Technology, Human-Computer Interaction, Research Methods, Human-AI Interaction, Algorithms & Societal Implications, Introduction to Statistics and Data Analysis, Information Science Theory, Educational Technology Design

Masters in Information Courses

Developing AR/VR Experiences, Engineering Interactive Systems, Contextual Inquiry, Graphic Design, Fundamentals of Human Behavior, Game Development Research, Independent Study (AR/VR)

Selected Undergraduate Courses

Game Development, User Interface Development, Web Systems, Intro to Computer Security, Intro to Machine Learning, Data Structures and Algorithms, Intro to Computer Organization, Computer Science Theory, Interaction Design, Drawing