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   SEPT 2019 - MAY 2020
Masters program (with a full scholarship), before matriculating to PhD

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

Publications

Peer-Reviewed Conference Papers

[C10]   Shwetha Rajaram, Jiasi Chen, Michael Nebeling. **Privacy Equilibrium:**   To Appear in
        Balancing Privacy Needs in Dynamic Multi-User Augmented Reality   UIST 2025
        Scenarios.

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

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

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

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

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

[C4]   Shwetha Rajaram, Chen Chen, Franziska Roesner, Michael Nebeling.   CHI 2023

Eliciting Security & Privacy-Informed Sharing Techniques for Multi-User Augmented Reality.

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

[C2]   Michael Nebeling, <u>Shwetha Rajaram</u>, 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, <u>Shwetha Rajaram</u>, 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

[J2]   Janet Johnson, Macarena Peralta, Mansanjam Kaur, Ruijie Sophia Huang, Sheng Zhao, Ruijia Guan, <u>Shwetha Rajaram</u>, Michael Nebeling. **Exploring Collaborative GenAI Agents in Synchronous Group Settings: Eliciting Team Perceptions and Design Considerations for the Future of Work.**   To Appear in CSCW 2025

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

Workshop Organization & Participation

[W5]   Kaiming Cheng, <u>Shwetha Rajaram</u>, Franziska Roesner, Tadayoshi Kohno, Michael Nebeling, Mark Billinghurst. **Approaching AR Design & Development with a Security, Privacy, & Safety Mindset (Safe'AR).** *Workshop Organizer.*   ISMAR 2024

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

[W3]   <u>Shwetha Rajaram</u>, Michael Nebeling. **Balancing Accessibility and Privacy Considerations in the Design of AR Assistive Technologies.** *Participant in Designing Inclusive Future Augmented Realities Workshop.*   CHI 2024

[W2] <u>Shwetha Rajaram</u>, Michael Nebeling. **Extending AR Authoring Tools with Built-in Support for Privacy and Security Analysis.**
Participant in Novel Challenges of Safety, Security and Privacy in Extended Reality Workshop (SSPXR).
CHI 2022

[W1] <u>Shwetha Rajaram</u>, Franziska Roesner, Michael Nebeling. **Designing Privacy-Informed Sharing Techniques for Multi-User Augmented Reality.**
Participant in Security for XR and XR for Security (VR4Sec) Workshop.
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

CHI 2025 Honorable Mention Award	APR 2025
UIST 2024 Honorable Mention Award	OCT 2024
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)** *Full Papers & Late-Breaking Work*	2021-2025
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) Seminar Series Coordinator	JUNE 2023 - APR 2024
Washtenaw Elementary Science Olympiad (WESO) Event Supervisor	SEP 2011 - present
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   APR 2016 - present
Science (F.E.M.M.E.S.)
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   OCT 2024 – present
(Undergraduate)

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

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   FEB - APR 2021
(Masters)

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

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