Shakiba Davari

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STATEMENT — I specialize in integrating AI, UX, and 3D interaction design to develop adaptive, context-aware XR systems. My work combines machine learning, AI, and UX evaluation methods to uncover user needs and interpret both social and physical contexts. I design and implement 3D interfaces that adapt their information presentation and input interaction to the context to support productivity, situational awareness, accessibility, and effective interaction with virtual information/avatars, intelligent agents, and other people. Through mixed-methods research, I evaluate these systems and develop frameworks and guidelines for user-centered and intelligent interfaces.

ACADEMIC POSITIONS & EDUCATION

Postdoctral Researcher *(2025-Present)*	*SAIL: Symbiotic and Augmented Intelligence Lab*	***Georgia Tech**, USA*
Ph.D. *in Computer Science (Received: 2024)*	*Specialization: Human-Computer Interaction*	***Virginia Tech**, USA*
M.Sc. *in Computer Science (Received: 2020)*	*Specialization: Human-Computer Interaction*	***Virginia Tech**, USA*
M.Sc. *in Computer Science*	*Specialization: Computational Perception and Robotics*	***Georgia Tech**, USA*
B.Sc. *in Computer Engineering (Received: 2014)*	*Major: Computer Hardware*	***Beheshti University**, Iran*

INDUSTRY EXPERIENCE

Adobe Research — **Position: Research Scientist Intern** — **Summer 2021**

Context-Aware AR for Document Navigation:

- Developed 16 iOS interfaces for AR document navigation and evaluated their performance across various contexts.
- Leveraged survey results from 12 users and applied the design cycle to identify design principles for different contexts.

Skills & Tools: Apple ARKit, Swift, Adobe Aero, 3D Interface/Interaction(3DI) design, UX design

Microsoft Research(MSR) — **Position: Research Intern** — **Summer 2020**

Exploring the Benefits of Virtual Monitors for the Low-vision Population:

- Designed a VR tool to explore the potential benefits of virtual monitors for low-vision users and evaluated its effectiveness through a user study with 21 low-vision participants.
- Derived key design guidelines to improve hardware and software features of virtual monitors [6].

Skills & Tools: Assistive technology development, 3DI & US design, Unity Game Engine, C#, Mixed-methods research

RESEARCH EXPERIENCE AND PROJECTS

Virginia Tech — **Supervised by: Doug. A. Bowman** — **2018-2024**

Ph.D. Dissertation: Intelligent Augmented Reality (iAR)

Dissertation Title: Intelligent Augmented Reality (iAR): Context-aware Inference and Adaptation in AR [4]

Developed Comprehensive Desig Guidelines and Frameworks for XR & iAR Interface

- **Evaluation of AR Input Modalities**: Formulated a framework to assess AR input modality effectiveness and conducted an in-depth evaluation of Eye input [2].
- **XR Design Space**: Identified design dimensions for XR interfaces [5].
- **Taxonomy of Context**: Established a taxonomy of quantifiable contextual components impacting AR efficacy [3].
- **Architecture for iAR**: Developed an iAR architecture to infer implicit context from quantifiable data and enable automatic adaptation of the AR interface [3].
- **AR Interface Classification**: Proposed a classification methodology for AR interfaces and introduced the concept of "Glanceable AR" [9], [10].

Designed and Prototyped Context-Aware AR Interfaces

Designed and Conducted User Experience Evaluations of Behavioral, Qualitative, & Quantitative Data

- **User-Specified Adaptation in Various Contexts**: Designed an AR experiment to gather quantitative and qualitative data on user behavior and manual AR adaptations in a context-switching scenario. Analyzed patterns to understand the relationship between context and user adaptations, extracting design guidelines for AR interfaces [3].
- **Adaptive XR Placement Strategy for Social Interactions with Virtual Avatars**: Leveraging real-world physical objects, avatar positioning and persona, and avatar-user interactions, designed and implemented an adaptive spatial placement approach for XR content on HoloLens devices. Conducted a user study across diverse social settings and mobility contexts, resulting in design guidelines for effective placement strategies in dynamic environments [5].
- **Intelligent AR for Social Contexts**: Developed a socially intelligent AR interface that leverages computer vision and speech recognition to tailor content based on social context. Conducted a user study demonstrating its enhanced efficiency and increased social awareness [7]
- **Occlusion Management in AR**: Designed and evaluated various AR techniques to manage real-world occlusion and enhance user interaction with virtual avatars and situational awareness. Conducted user studies to assess their impact on user experience, awareness, and access to AR information [8], [10].

Other Team Projects and Collaborations We introduced and developed various 3D interactions and interfaces to enhance VR collaboration, effectiveness, user engagement, and presence [1].

Skills & Tools: C#, Swift, Python, AR/VR development, Unity 3D, MRTK, ARKit, ARCore, Adobe Aero, Photon Networking, Computer Vision, OpenCV, Flask Web App Dev, 3DI & UX design, Mixed-methods research, Quantitative and qualitative statistical analysis, JMP/SPSS/R, Systematic Review and Analysis, Research Management Tools, Critical Thinking, Brainstorming, Teamwork, LaTeX, Academic writing

Stanford University — **Supervised by: Dorsa Sadigh** — **2017-2018**

Leveraging Effects of Human Actions on Autonomous Cars Planning: Designed and developed driving simulation scenarios to gather driver data across diverse situations.

Skills & Tools: SimVista, SimCreator

University of Toronto — **Supervised by: Brenda McCabe & Frank Rudzicz** — **2015-2016**

CARE-RATE: An online Assistive Technology Rating System for Caregivers

Automated web crawling and data extraction to compile accurate, reliable information from target websites for Ludwig, a conversational robot to support Alzheimer's caregivers.

Skills & Tools: Selenium, Apache Nutch

InPRO: Automated Indoor Construction Progress Monitoring

Researched and implemented machine learning, swarm intelligence, classification, and computer vision algorithms for automating UAV flight paths in dynamic construction environments to capture images [12], , recognize construction progress states, and automatically update the 4D Building Information Model (BIM) [11].

Skills & Tools: Python2, OpenCV, Pymunck

Selected Professional Engagements

Invited Talk		
— *Intelligent Augmented Reality (iAR)*	*Building Construction Ph.D. Seminar, Georgia Tech*	*Mar. 2025*
— *Towards iAR: Designing Effective AR through Context-Awareness*	*Center for Responsible AI, Coburg University*	*2024*
— *Context-Aware Inference and Adaptation in iAR*	*PERCxR at IEEE ISMAR*[1]	*2022*
Co-Organizer		
— *Special Session: To Automate or To Augment? Advancing Cognitive & Physical Abilities in Industrial Workplaces*	*IEEE CASE*[2]	*2025*
— *The 1st Workshop on intelligent XR (iXR): Harnessing AI for Next-Generation XR User Experiences*	*IEEE ISMAR*	*2024*
International Program Committee(IPC)	*IEEE ISMAR*	*2025*
Conference Committee Member — *Poster Session*	*IEEE VR*[3]	*2025*
Conference Chair — *Poster Session*	*ACM Spatial User Interaction (SUI)*	*2024*
Winning Team — *Best 3DUI Award*	*IEEE VR*	*2021 & 2022*
Service Award — *Department of Computer Science*	*Virginia Tech*	*2020*
Mentoring	*Akhil Ajikumar, Parisa Ghasemi, Alexander Giovannelli, Steven Yoo, Daniel Stover*	*2020-present*
Peer Reviewer	*IEEE VR & ISMAR & TVCG*[4]*, ACM CHI & UIST & AutomotiveUI*	*2020-present*
Leadership	*CS Graduate Student Council & Iranian Society Virginia Tech*	*2018-2021*

Selected Publications

[1] A. Giovannelli, L. Pavanatto, **S. Davari**, *et al.*, "Investigating the Influence of Playback Interactivity during Guided Tours for Asynchronous Collaboration in Virtual Reality," 2025.

[2] **S. Davari** and D. A. Bowman, "Evaluating input modalities in ar: A framework and a survey on eye input," *[In Preparation]*, 2025.

[3] **S. Davari** *et al.*, "Towards Intelligent AR (iAR): A Taxonomy of Context, An iAR Architecture, and an Empirical Study," *IEEE TVCG[Under Review]*, 2024.

[4] **S. Davari**, "Intelligent Augmented Reality (iAR): Context-aware Inference and Adaptation in AR," Ph.D. dissertation, Virginia Tech, 2024.

[5] **S. Davari** and D. A. Bowman, "Towards Context-Aware Adaptation in XR: A Design Space for XR Interfaces and an Adaptive Placement Strategy," *IEEE TVCG[Under Review]*, 2024.

[6] L. Pavanatto, **S. Davari**, *et al.*, "Virtual monitors vs. physical monitors: an empirical comparison for productivity work," *Frontiers in VR*, vol. 4, 2023.

[7] **S. Davari** *et al.*, "Validating the Benefits of Glanceable and Context-Aware Augmented Reality for Everyday Information Access Tasks," in *IEEE VR*, 2022, pp. 336–444.

[8] F. Lu, **S. Davari**, and D. Bowman, "Exploration of Techniques for Rapid Activation of Glanceable Information in Head-Worn AR," in *ACM SUI*, 2021.

[9] F. Lu, **S. Davari**, *et al.*, "Glanceable AR: Evaluating Information Access Methods for Head-Worn AR," in *IEEE VR*, Mar. 2020, pp. 930–939.

[10] **S. Davari** *et al.*, "Occlusion Management Techniques for Everyday Glanceable AR Interfaces," in *IEEE VR Workshops (VRW)*, 2020, pp. 324–330.

[11] H. Hamledari, **S. Davari**, *et al.*, "Uav-enabled site-to-bim automation: aerial robotic- and computer vision-based development of as-built/as-is bims and quality control," *Construction Research Congress 2018*, pp. 336–346, 2018.

[12] H. Hamledari, **S. Davari**, *et al.*, "Uav mission planning using swarm intelligence and 4d bims in support of vision-based construction progress monitoring and as-built modeling," *Construction Research Congress 2018*, pp. 43–53, 2018. DOI: https://doi.org/10.1061/9780784481264.005.

[1] Workshop on Perceptual and Cognitive Issues in xR(PERCxR) at IEEE International Symposium on Mixed and Augmented Reality (ISMAR)
[2] IEEE International Conference on Automation Science and Engineering (CASE)
[3] IEEE Conference on Virtual Reality and 3D User Interfaces (IEEE VR)
[4] Transactions on Visualization and Computer Graphics (TVCG)