Shakiba Davari

sdavari@vt.edu — LinkedIn — Website — Google Scholar — ORCID — Green Card Holder

STATEMENT — My work integrates AI with HCI and UI/UX design, with a focus on intelligent XR (iXR). During my Ph.D., I leveraged my programming and applied ML expertise to develop context-aware AR interfaces that address AR intrusiveness, conducted mixed-methods user studies, analyzed findings, and published guidelines for advanced XR design. This experience has prepared me to contribute effectively to the research and development of intelligent, user-centered technologies.

EDUCATION

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 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 for this population.

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

ZIEP Technical Company, Iran — Position: Undergraduate Intern — Summer 2013

Supported system optimization and maintenance, addressing performance issues and ensuring operational efficiency.

Skills & Tools: System Optimization, Performance Tuning, C/C++ Programming, Technical Support

ACADEMIC RESEARCH EXPERIENCE

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 [2]

Guidelines and Frameworks for Designing XR & iAR Interfaces
Developed comprehensive guidelines and frameworks for iAR systems by conducting a systematic review and analysis of AR design challenges, applications, tasks, and data types, contributing to a roadmap for iAR development.

Context-Aware AR Designs and User Experience:
Created AR interfaces to enhance information access efficiency and address challenges like AR spatial layout, occlusion, and distractions in dynamic and social contexts. Conducted empirical, mixed-methods user studies to assess performance, analyze user behavior, and evaluate contextual interactions. Established AR design principles for spatial layout, occlusion management, and social context integration, improving AR usability across diverse environments.

Key Contributions:

- **XR Design Space**: Identified design dimensions for XR interfaces [4].
- **Taxonomy of Context**: Established a taxonomy of quantifiable contextual components impacting AR efficacy [1].
- **Architecture for iAR**: Developed an iAR architecture to infer implicit context from quantifiable data and enable automatic adaptation of the AR interface [1], [6].
- **Evaluation of AR Input Modalities**: Formulated a framework to assess AR input modality effectiveness and conducted an in-depth evaluation of Eye input [3].
- **AR Interface Classification**: Proposed a classification methodology for AR interfaces and introduced the concept of "Glanceable AR" [8], [9].
- **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 [1].
- **Adaptive XR Placement Strategy & Hybrid Frame of Reference**: Proposed a multi-reference approach for XR content's spatial layout, implementing adaptive and non-adaptive placement strategies on HoloLens devices.

Conducted a user study across varying social settings and user mobility contexts, extracting design guidelines on the effectiveness of various placement strategies in different scenarios [4].

- **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 [5]
- **Occlusion Management in AR**: Designed and evaluated various techniques for managing real-world occlusion in AR, conducting user studies to assess their impact on user experience, awareness, and information access [7], [9].

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, recognize construction progress states , and automatically update the 4D Building Information Model (BIM).

Skills & Tools: Python2, OpenCV, Pymunck

Selected Honors & Service

Conference Poster Committee	*IEEEVR*	*2025*
Invited Talk: Towards Intelligent AR(iAR): Designing Effective AR through Context-Awareness	*University of Coburg*	*2024*
Workshop Co-Organizer: The 1st Workshop on intelligent XR (iXR): Harnessing AI for Next-Generation XR User Experiences	*IEEE ISMAR Conference*	*2024*
Conference Poster Chair	*ACM Spatial User Interaction (SUI)*	*2024*
Invited Talk: Context-Aware Inference and Adaptation in Intelligent AR Interfaces	*Workshop on Perceptual and Cognitive Issues in xR at IEEE International Symposium on Mixed and Augmented Reality (PERCxR @ ISMAR)*	*2022*
Winning Team for Best 3DUI Award	*IEEEVR Conference*	*2021&2022*
Departmental Service Award	*The Department of Computer Science at Virginia Tech*	*2020*
Mentoring:	*Daniel Stover, Alexandar Giovannelli, Daniel Manesh*	*2020-present*
Peer Reviewer	*IEEE VR, IEEE ISMAR, ACM CHI, ACM UIST, ACM AutomotiveUI*	*2020-present*
Student Organization Leadership	*CS Graduate Student Council & at Iranian Society Virginia Tech*	*2019-2021*

Selected Publications

[1] **S. Davari** *et al.*, "Towards Intelligent Augmented Reality (iAR): A Taxonomy of Context, An Architecture for iAR, and an Empirical Study," *[Under Review] IEEE Transactions on Visualization and Computer Graphics*, Sep. 1, 2024.

[2] **S. Davari**, "Intelligent Augmented Reality (iAR): Context-aware Inference and Adaptation in AR," Ph.D. dissertation, Virginia Tech, Sep. 9, 2024.

[3] **S. Davari** and D. A. Bowman, "Evaluating input modalities in ar: A framework and a survey on eye input," *Manuscript in preparation*, Nov. 15, 2024.

[4] **S. Davari** and D. A. Bowman, "Towards Context-Aware Adaptation in XR: A Design Space for XR Interfaces and an Adaptive Placement Strategy," *[Under Review] IEEE Transactions on Visualization and Computer Graphics*, Aug. 15, 2024.

[5] **S. Davari** *et al.*, "Validating the Benefits of Glanceable and Context-Aware Augmented Reality for Everyday Information Access Tasks," in *2022 IEEE Virtual Reality and 3D User Interfaces (VR)*, IEEE, Mar. 25, 2022, pp. 336–444.

[6] **S. Davari**, "[DC] Context-Aware Inference and Adaptation in Augmented Reality," in *2022 IEEE Virtual Reality and 3D User Interfaces (VR)*, IEEE, Mar. 25, 2022, pp. 938–939.

[7] F. Lu, **S. Davari**, and D. Bowman, "Exploration of Techniques for Rapid Activation of Glanceable Information in Head-Worn Augmented Reality," in *Symposium on Spatial User Interaction*, ser. SUI '21, Virtual Event, USA: Association for Computing Machinery, 2021, ISBN: 9781450390910.

[8] F. Lu, **S. Davari**, *et al.*, "Glanceable AR: Evaluating Information Access Methods for Head-Worn Augmented Reality," in *2020 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, Mar. 2020, pp. 930–939.

[9] **S. Davari** *et al.*, "Occlusion Management Techniques for Everyday Glanceable AR Interfaces," in *2020 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*, IEEE, Mar. 25, 2020, pp. 324–330.