ALIREZA BAHREMAND

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SUMMARY

My research interest is in digitizing shared human experiences. I have worked towards a vision of adaptive experiential frameworks with software-hardware olfactory and tactile frameworks, multi-sensory platforming for XR storytelling, and AI-assisted volumetric multimedia streaming pipelines. Outside of work, I enjoy drawing, reading, rock climbing, and chatting about gaming classics.

EDUCATION

Ph.D. Computer Engineering LoA	| Focus Area: Adaptive AI Experiential Streaming Systems	
Arizona State University, Tempe, AZ		3.5 GPA
M.S. Computer Engineering May 2021	| Focus Area: Digitized Olfactory and Tactile Sensations in XR	
Arizona State University, Tempe, AZ		3.8 GPA
B.S. Software Engineering May 2018	| Focus Area: Embedded Systems and Web Applications	
Arizona State University, Tempe, AZ		3.9 GPA

TECHNICAL SKILLS

Programming Languages: C, C#, C++, Java, JavaScript, Prolog, Python

Tools, Frameworks, and Platforms: Node, .NET, Task Parallel Library, Git, OpenXR, Azure Kinect, Azure Web Services, AWS, NVIDIA (Cloud XR, Jetson, Omniverse), National Instruments MAX, Clang, Open3D, OpenCV, PyTorch, Raspberry Pi, Tensorflow, Unity3D (MLAPI, Photon, Timeline, XR), Visual Studio Debugging, Package Management, Adobe Suite, Xcode, WebRTC

SELECTED WORK EXPERIENCE

ASU School of Electrical and Computing Engineering, Tempe, AZ: Research Assistant   08/2018 – 06/2023
- Lead researcher for an adaptive volumetric streaming system, characterizing and exploring pipelined AI models on top of a streaming system to optimize the delivery of volumetric multimedia. Mentoring 5+ students, developing API documentation for 2+ research teams to use the system, and consulting with corporate partners for new advancements to our system (AWS, Verizon).
- Led research project and team to build unified olfactory hardware-software frameworks allowing for dynamic control of an olfactory display. Engineered a developer interface to create olfactory spaces for VR/AR environments, conducted system and user studies, and open-sourced the system.

Dreamscape Immersive, Los Angeles, CA: Software Engineering Contractor   08/2022 - 12/2022
- Worked with teams of professors and students to develop multi-sensory educational VR experiences for introductory Biology courses that were deployed for use by 1000+ ASU students.
- Helped develop experimental cinematic VR experiences and a face-, hand- and body-tracking multi-user interactive movie poster system, requiring collaboration with art team, sound design team, narrative team, and programming team.
- Proposed and developed a runtime debugging tool to dramatically reduce downtime, allowing developers to inspect the code for virtual objects, invoke methods dynamically, and view/edit variables in real-time.

Baltu Technologies and British Standards Institute (BSI), AZ: Software Engineering Contractor   01/2020 - 08/2021
- Developed tool to build XR training and a pipeline to adjust quality of dense point cloud scans to render on mobile devices. Presented tools to 3 different corporate teams as a means of automating international audit inspections at scale.
- Helped interview and evaluate 10+ international XR telecommunications tools and training applications. Worked with 3+ teams to provide business-case evaluation reports and cost justification for partnerships.

ASU Learning Futures Collaboratory, Tempe, AZ: Software Engineering Contractor   05/2021 - 01/2022
- Upskilled team of 6 students to build a mobile AR application as part of the ASU Dreamscape Learn platform, enabling 150+ students used the app per semester as a complement to introductory ASU Biology courses.
- Helped develop ASU Fall 2021 Commencement mobile app allowing families to attend graduation virtually during covid. Resulted in 5K virtual attendees that otherwise wouldn't have been able to see their family member graduate.

NASA, Huntsville, AL: Software Engineering Intern   05/2019 - 08/2019
- Developed a pipeline and system to import complex CAD models into VR training applications. Consulted and tested with 5+ teams (e.g., Design, Requirements, Mechanical Engineering, System Engineers). Presented work to MSFC board of directors as a means of reducing costs for designing and testing ISS system components.
- Led team of 4 to build a VR training system creator, then utilized that software to create two VR training experiences for astronauts that board the ISS on how to perform maintenance procedures for specific ISS modules.

SELECTED WORKS

Wen, J., **Bahremand, A.**, Shaikh, A., Gold, L., Farber, C., LiKamWa, R. "Demo: Adaptive 5G systems for interactive volumetric sports analysis in augmented reality", In Proc. ACM MobiSys '22

Bahremand, A., Manetta, M., Lai J., Spackman, C., Smith, B.H., Gerkin, R.C., LiKamWa, R. "The Smell Engine A system for artificial odor synthesis in virtual environments", In Proc. IEEE VR '22

Hu, J., Shaikh, A., **Bahremand, A.**, LiKamWa, R. "Characterizing real-time dense point cloud capture and streaming on mobile devices", In Proc. ACM HotEdgeVideo '21

Sagheb, S., Liu, F., **Bahremand, A.**, Kidane, A., LiKamWa, R. "SWISH: Shifting Weight-Based Interfaces For Simulated Hydrodynamics in Mixed Reality Fluid Vessels", In Proc. ACM UIST '19

Prakash, S., **Bahremand, A.**, Nguyen, L., Likamwa, R. "GLEAM: An Illumination Estimation Framework For Real-Time Photorealistic Augmented Reality On Mobile Devices", In Proc. ACM MobiSys '19

PERSONAL
INFORMATION

Alireza Bahremand
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alirezabahremand.com

EDUCATION

Ph.D. Computer Engineering *Arizona State University*
Advised by Dr. Robert LiKamWa, Leave of Absence

M.S. Computer Engineering *Arizona State University*
Graduated Spring 2021

B.S. Software Engineering *Arizona State University*
Graduated May 2018

PROFESSIONAL
EXPERIENCE

2017-2023 | Research Assistant

ASU Meteor Studio

Researching and engineering novel software-hardware frameworks for multi-sensory digital embodiment.

– Leading research and development into a volumetric streaming framework that optimizes delivery of volumetric multimedia using AI systems, resolution aware rendering, edge-assisted infrastructure, and AI data filtering.

– Led research project and team to explore unified olfactory hardware-software frameworks that allow for dynamic control of an olfactory display. Engineered a developer interface to create olfactory spaces for VR/AR environments, conducted system and user studies, and open-sourced the system.

– Led development for 6+ projects/applications, including the ASU 2020 Fall Commencement, ASU Dreamscape Learn experiences, ASU Virtual Campus exploration, and planetary data visualizations tools.

2022-Current | Independent Contractor

Dreamscape Immersive

– Working with teams of professors and students to develop multi-sensory educational VR experiences for introductory Biology courses which will be deployed for use by 1000+ ASU students.

– Helped develop experimental cinematic VR experiences and a hand- and body-tracking multi-user interactive movie poster system, requiring collaboration with art team, sound design team, narrative team, and programming team.

– Proposed and developed a runtime debugging tool to dramatically reduce downtime, allowing developers to inspect the code for virtual objects, invoke methods dynamically, and view/edit variables in real-time.

2019-2022 | Software Engineer

ASU Meteor Studio, ASU Learning Futures Collaboratory

- Led a team of undergraduates to build an iOS/Android AR application that will be used by ASU Introductory Biology courses in the semesters 2022+.
- Helped develop ASU Fall 2021 Commencement mobile AR application, presented to 500+ students. The application included interactive AR objects in the userâs environment and volumetric captures of all commencement speakers.

2020-2021 | Independent Contractor and Consultant

British Standards Institute, Baltu Studios

- Developed a tool for building VR training applications and a pipeline to dynamically adjust resolution of dense point cloud scans and render in VR. Presented these tools to 3 different corporate teams.
- Helped interview and evaluate 10+ international VR/AR telecommunications tools and training applications.

2019 | XR Software Engineer Intern

NASA

- Led team to build two VR training experiences for astronauts that board the ISS on how to perform maintenance procedures for specific ISS modules.
- Developed a pipeline and system to import complex CAD models into VR training applications. Consulted and tested with 5+ teams (e.g., Design, Requirements, Mechanical Engineering, System Engineers).
- Contributed to development of a Mars Habitat simulation at the NASA 50th Apollo 11 celebration in Washington D.C. Presented experience to 300+ people (e.g., families, various NASA agents).

2016-2018 | Undergraduate Teaching Assistant | Computer Support

ASU

- Wrote in-class assignments for SER334: Operating Systems & Networks and SER250: Microarchitecture & Computer Architecture.
- Provided technical support to 100+ ASU students and faculty for hardware and software issues.

PATENTS

Method and Apparatus for Simulated Hydrodynamics in Mixed-Reality Fluid Vessels - Robert LiKamWa,Shahabedin Sagheb, Alireza Bahremand, Byron Lahey, Frank W. Liu, Assegid Kidane, 2022, US 11,462,128.

Illumination estimation for captured video data in mixed-reality applications - Siddhant Prakash, Paul Nathan, Linda Nguyen, Robert LiKamWa, Alireza Bahremand, 2021, US 11,043,025.

PUBLICATIONS

"Demo: Adaptive 5G systems for interactive volumetric sports analysis in augmented reality"
Jiqing Wen, **Alireza Bahremand**, Aashiq Shaikh, Lauren Gold, Charmaine Farber, Robert LiKamWa
In Proc. ACM MobiSys 2022

"The Smell Engine A system for artificial odor synthesis in virtual environments"
Alireza Bahremand, Mason Manetta, Jessica Lai, Christy Spackman, Byron Lahey, Brian H Smith, Richard C Gerkin, Robert LiKamWa
In Proc. IEEE VR 2022

"Characterizing real-time dense point cloud capture and streaming on mobile devices"
Jinhan Hu, Aashiq Shaikh, **Alireza Bahremand**, Robert LiKamWa
In Proc. ACM Hot Topics in Video Analytics and Intelligent Edges 2021

"Virtually composing and dynamically mixing complex odors"
Alireza Bahremand, Christy Spackman, Richard C Gerkin, Brian H Smith, Robert LiKamWa
In Proc. ACM CHI Smell, Taste, Touch, Temperature 2021

"Visualizing Planetary Spectroscopy through Immersive On-site Rendering"
Lauren Gold, **Alireza Bahremand**, Connor Richards, Kyle Sese, Kathryn Powell, Scott Dickenshied, Christopher Scott Edwards, Robert LiKamWa
In Proc. IEEE VR 2021

"Virtual & Augmented Reality Tools for Planetary Scientific Analysis Public Engagement"
Alireza Bahremand, Lauren Gold, Connor Richards, Kyle Sese, Kathryn Powell, Scott Dickenshied, Christopher Scott Edwards, Robert LiKamWa
In Proc. LPSC 2020

"Coordinate: A Spreadsheet-Programmable Augmented Reality Framework for Immersive Map-Based Visualizations"
Aashiq Shaikh, Linda Nguyen, **Alireza Bahremand**, Hannah Bartolomea, Frank Liu, Van Nguyen, Derrick Anderson, Robert LiKamWa
Proc. ACM AIVR 2019

"HoloLucination: A Framework for Live Augmented Reality Presentations Across Mobile Devices,"
Alireza Bahremand, Linda Nguyen, Tanya Harrison, Robert LiKamWa
Demo ACM AIVR 2019

"SWISH: A shifting-weight interface of simulated hydrodynamics for haptic perception of virtual fluid vessels"
Shahabegin Sagheb, Frank Liu, **Alireza Bahremand**, Assegid Kidane, Robert LiKamWa
In Proc. ACM UIST 2019

"GLEAM: Global Light Estimation Across Mixed Reality Devices"
Siddhant Prakash, **Alireza Bahremand**, Linda Nguyen, Robert LiKamWa
In Proc. ACM MobiSys 2019

"An Integrated Environment for Visualizing In-Situ and Orbital Planetary Data"
Kathryn Powell, **Alireza Bahremand**, Alec Gonzalez, Robert LiKamWa, Chris Edwards
In Proc. LPSC 2019.

Technical Skills

Research Interests Multi-sensory Systems, Edge-Assisted Devices, Wearables, Volumetric Streaming, Storytelling Tools

Programming Languages C, C#, C++, Java, JavaScript, Prolog, Python

Tools, Frameworks, Technologies Adobe Suite, Arduino, AWS, Azure (Cloud, Kinect, Remote Rendering, Spatial Anchors), Clang, Git, MATLAB, Node.JS, .NET, NVIDIA (Cloud XR, Jetson), NI MAX, Open3D, OpenCV, Raspberry Pi, Sockets, Task Parallel Library, Unity3D (MLAPI, Photon, ARFoundation, MRTK, Timeline, XR), Visual Studio, Xcode

Spoken Languages **English** (primary), **Farsi** (proficient).

Extracurriculars **2022 | Teacher**

Digital Culture Summer Institute at ASU

Designed a project assignment and Unity template for building multiplayer games. Adapted to work on laptops, mobile devices, and VR. Had 20+ students (middle school and high school) develop custom multiplayer experiences and present them at showcase.

2017-2021 | Mentor, Judge, and Organizer

SunHacks Hackathon at ASU

Designed a hybrid (online and in-person) workshop and Unity template for building multiplayer games and cross-platform AR experiences. Presented at 3 ASU hackathons to over 150+ students total. Additionally helped organize and market the largest ASU Hackathon.

2019 | Vice President

TEDxASU

Helped organized one of the largest student-led events at ASU Gammage Theater, resulting in 54000 in revenue and 1500+ attendees. Contributed to interview/recruitment of 30+ students across multiple academic disciplines for roles such as marketing, research and development, stage design, and graphic design. Assisted with speaker coaching sessions, routinely meeting with 8+ speakers. Led development of website, digital services, and custom AR-application for event.

2015-2018 | President

Computer Science Club at ASU

Helped found and expand Computer Science Club at ASU, resulting in 100+ students (online and in-person) across two campus and various engineering majors (e.g., Aerospace, Mechanical, Electrical, Software). Coordinated bi-weekly workshops, guest lectures, and social events for engineering students for 6 semesters.

TALKS	**2022 -** Building Multiplayer Experiences *ASU DC Summer Institute*
	2022 - Game Development & Research *Mesa Public Schools*
	2021 - The Smell Engine *ACM CHI Smell, Taste, Touch Workshop*
	2018-20 - XR Software Development, *ASU Hackathons*
	2019 - XR Software Development, *NASA*
	2018 - The Art Within AR/VR, *TEDxASU*
SCHOLARSHIPS AND AWARDS	**2022 -** Best Demo Award, *ACM MobiSys*
	2021 - Best Hack Nomination, *XR Brain Jam*
	2020 - Top 5 Nomination, *MIT Reality Hacks*
	2019 - University Graduate Fellowship, *ASU*
	2019 - University Engineering Fellowship, *ASU*
	2019 - Best Demo Runner Up, *ACM MobiSys*
	2019 - Student Travel Award, *ACM MobiSys*
	2018 - Convocational Speaker Faculty Nomination, *ASU*
	2018 - Outstanding Software Engineer Faculty Nomination, *ASU*
	2018 - Blowers Engineering Scholarship, *ASU*
	2017 - First Place *PayPal Opportunity Hacks Hackathon*
	2017 - First Place *AZ Desert Hacks Hackathon*
	2016 - Best Embedded Hack Nomination *PennApps Hackathon*
	2010 - Second Degree Black Belt *American Karate Association*