

WORK EXPERIENCE

- **Smith-Kettlewell Eye Research Institute** San Francisco, California
Postdoctoral Research Fellow *September 2024 - Present*
 - **A11yOS**: Developing calibrated pass-through head-mounted system modules to assess residual visual ability and optimizing context-specific accessibility **Tools**: SwiftUI, VisionOS [Demo](#)
 - **TraceScotoma**: Collecting tracing data to train machine learning model to predict scotoma features in low vision individuals. **Tools**: UIKit, PencilKit [Demo](#)
 - **A11yFig**: Validating mental representation of scientific figures in blind students with layered haptic tracing. **Tools**: MX Ink, Meta Quest3, Haptikos [Demo](#)
- **EyeSightQuest LLC** Reno, Nevada
Software Development Internship *Summer 2020 - Summer 2023*
 - **Diagnostics**: Calibrated HMD systems to measure static and dynamic visual acuity, contrast sensitivity function, color vision, RAPD and metamorphopsia in astronauts during long duration spaceflight. Measured pupil reactivity under different luminance to predict RAPD in Houston Methodist Hospital and University of Texas Medical Branch-Galveston.
- **Rokkhi.com** Dhaka, Bangladesh
Software Engineer *March 2019 - July 2019*
 - **API for tenant information verification**: Implemented a REST API that would allow landlords to track the renters' billing status and allow occupants to enter and exit apartment complex securely through CCTV verification. **Tools**: React **Codes**: [Rokkhi Website](#): [Rokkhi.com](#)
- **Elab.ai** Dhaka, Bangladesh
Machine Learning Engineer *May 2018 - December 2018*
 - **Disease Prediction**: Created a simple ANN that would take encoded symptom information in Bengali language and predict diseases from demographic data and prevalence using scraped data from WebMD. **Tools**: Docker, selenium, pandas, numpy, sklearn **Codes**: [Elab](#)
 - **Medicine Portal**: Created a simple Portal that would scrape different medical websites in Bengali and allowed physicians to recommend the medicine related to predicted disease. **Tools**: Docker, React **Codes**: [Elab](#)

RECENT PROJECTS

- **Winner of Hack on VisionOS**: [DOGO](#) is a visionOS app that takes the viewer on an immersive journey of rural Africa and the efforts by DOGO to improve it. **Tools**: VisionOS, RealityKit, Insta360, OpenImmersive
- **Voice & Video AI Agents Hackathon**: Delivering a perfect pitch or presentation can be challenging. We help people refine their speech after an initial video recording without having to redo the entire process. [Pitch](#), an AI-powered agent designed to optimize your video presentations and pitch seamlessly. **Tools**: Deepgram, llama-3.2, Simli
- **Immerse the Bay**: [HarmonyXR](#) is a music composition tool for collaboration between deaf and hearing users. It allows users to modify music through gestures and interact with it through haptics in an immersive mixed reality environment. **Tools**: Unity, Passthrough, Haptics Studio, Mixed Reality Utility Kit, and Audio SDK
- **NASA Space Apps**: [Stellar Farmers](#) combines several live APIs from NASA with agricultural financial data at the county level for policymakers to make informed decisions about food security. **Tools**: HTML, CSS, JavaScript
- **Meta Quest Presence Hackathon**: Designed and developed [BugSkill](#), an immersive AR game leveraging Meta's advanced hand tracking and spatial audio. Players dynamically map their environment to eliminate virtual flies with gestures, enhancing realism and engagement. **Tools**: Passthrough, Scene API, Depth API, MRUK, and Audio SDK
- **Codepath**: [TablePlay](#) is an iPadOS table top game viewer for real game data. You can walk around the field and enjoy the game from any angle you like. **Tools**: SwiftUI, RealityKit
- **ICD Code Assignment using PrimeKG and GNN**: uses degree centrality to predict disease using ontology graph and assign ICD codes to MIMIC-III EHR entries. **Tools**: Networkx, MIMIC-III, pandas, gephi, numpy
- **ContrastMammogram**: is the first open-access implementation of a bilateral mammograph model that uses GNN with KNN to segment mammogram images. **Tools**: Detectron2, Pytorch Geometric
- **SpaceVision**: Used UE5 postprocessing materials to create a simulated cataract and metamorphopsia in Martian environment to judge astronaut performance with impaired vision. **Tools**: UE, Postprocessing shaders
- **Aniseikonia**: Used UE5, MetaXR plugin and Quest 2 headset to measure threshold of aniseikonia with dichoptic stimulation. **Tools**: UE, dichoptic rendering **Software**: [AniseikoniaQuest](#)

SKILLS

- **Programming Languages:** C++, C#, Python, Swift, Bash, MATLAB
- **Libraries & Programs:** OpenXR, Unreal Engine, Unity, Raylib, NumPy, AEPsych, SwiftUI, ARKit, RealityKit, Metal, VisionOS Accessibility, PyTorch, PyTorch Geometric, NVIDIA Omniverse, NVIDIA RAPIDS, PsychoPy
- **Systems & Cloud-computing:** Windows Mixed Reality, MacOS, VisionOS, iOS, Linux OS, Docker

EDUCATION

- **University Nevada, Reno** Reno, Nevada, USA
Doctor of Philosophy in Computer Science Aug. 2019 – May 2024
- **University Nevada, Reno** Reno, Nevada, USA
Master of Science in Computer Science Aug. 2019 – May 2021
- **Bangladesh University of Engineering and Technology** Dhaka, Bangladesh
Bachelor of Technology in Computer Science Oct. 2014 – Aug. 2018

RESEARCH EXPERIENCE

- **University of Nevada, Reno** Reno, NV, USA
Graduate Research Assistant Aug. 2019 - May, 2024
 - **Modeling visual health in astronauts during LDSF using VR-based psychophysical tests for understanding SANS:** Developed novel psychophysical and clinical visual function tests for disease diagnostics and rehabilitation using video see-through head-mounted displays. **Tools:** UE, C++, PsychoPy, SRanipal, SRWorks, OpenXR, OpenCV, Pandas, Numpy, HTC Vive Pro Eye, Oculus, Fove0, Pimax 8K, Varjo VR-3 **Codes:** [TeleOphthalmology](#), [VR Color Calibration](#), [StroboVR](#), **RAPD Software:** [EyeModules](#), [RAPD](#), [Trivector](#)
 - **Modeling Blur Perception in 2D and 3D with short and long term adaptation:** Developed novel graphics pipeline by modifying the game engine in UE 5.3 to shift 2D or 3D VR view towards blur or sharp in real time using shader-based FFT. Also worked with procedural content generation, lumen, and nanite to enhance realism in virtual environment. **Tools:** UE, Procedural Content Generation, Nanite, Lumen, Niagara, C++, MATLAB, OpenCV, Pandas, Numpy **Codes:** [BlurAdaptation2D](#), [FastFFTShift](#), [FaceAdaptation](#)
 - **Training NFL officiating personnel using embodied digital twin in VR:** Used UE5.3 and Metahuman to create animations from real-life sports data from NFL, NBA and soccer games so that referees may control a digital embodied agent to place themselves in-game scenarios and make correct calls using Ophthalmic concepts **Tools:** UE, C++, Metahuman, Pandas, Numpy **Codes:** [NFL](#), [Digital Twin](#), [Visualization](#)
 - **TeleOperation in Virtual Reality:** Used UE and ROS to create a 3D digital twin of a Robot in VR and observe the manipulations in VR first and see the accepted interactions in video-see through AR later **Tools:** UE, C++, ROSIntegration **Codes:** [TeleROS](#)
- **Bangladesh University of Engineering and Technology** Reno, NV, USA
Research Assistant Jan. 2019 - March 2019
 - **Uhead: Robust Map Segmentation Using Mask-RCNN:** Used morphological operations as well as Mask-RCNN based region segmentation for individual land plot identification as well as automatically assigning plot number by using Bengali numeral OCR **Tools:** ArcGIS, OpenCV, Pandas, Numpy, Torch, Mask-RCNN **Codes:** [Uhead](#)

TEACHING EXPERIENCE

- GRAD778: [Elements of Research Computing](#): Source Version Control and Visualization: Taught graduate students to use git, github, matplotlib, seaborn to visualize data for scientific computing across operating systems
- CS687: Fundamentals of Deep Learning: Supervized deep learning project developments: Taught graduate students to use numpy, cv2, sklearn, torch as well as Nvidia's GPU-specific parallel computing cluster infrastructure at UNR
- CS381: Game Engine Architecture: Raylib-cpp and Godot: I held lab sessions to teach Raylib C++ game engine architecture.
- CS382: [Fundamentals of Game Design](#): Game development and source version control with Unreal and Unity: For Fall 2021 I taught UE C++ development. From Fall 2022 and beyond I taught Unity and C#.

ACADEMIC SERVICES

- **Reviewer:** IEEE VR, Scientific Report, ACM HCI, ACM HRI, Cell Press Innovation, Brain Imaging and Behavior
- **Graduate Mentor:** US Army Educational Outreach Program, Summer'22
- **Student Organizer:** International Symposium on Visual Computing, ISVC'20

AWARDS

- **NSF Innovation Corps National Program - 2020:** Entrepreneurial Training Program (Seven weeks) (\$50,000 Awarded) I was the Entrepreneurial Lead for EyeSightQuest and conducted customer discovery for our AR-based assistive technology focused on increasing accessibility for visually impaired individuals with low vision
- **Undergraduate Student Merit Scholarship - 2013:** Awarded as a recognition for position (56) among the top 100 in undergrad admission Feb. 2014 - Sep. 2018

SELECTED PUBLICATIONS

- [Nasif Zaman](#), Joshua Ong, Ethan Waisberg, Mouayad Masalkhi, Andrew G Lee, Alireza Tavakkoli, Stewart Zuckerbrod: "Advanced Visualization Engineering for Vision Disorders: A Clinically Focused Guide to Current Technology and Future Applications." *Ann Biomed Eng* (2023).
- [Nasif Zaman](#), Prithul Sarker, and Alireza Tavakkoli: "Calibration of head mounted displays for vision research with virtual reality." *Journal of Vision* 23, no. 6 (2023): 7-7.
- Joshua Ong, Alireza Tavakkoli, Gary Strangman, [Nasif Zaman](#) Sharif Amit Kamran, Quan Zhang, Vladimir Ivkovic, Andrew G Lee: "Neuro-ophthalmic imaging and visual assessment technology for spaceflight associated neuro-ocular syndrome (SANS)." *survey of ophthalmology* 67, no. 5 (2022): 1443-1466.
- Joshua Ong, Alireza Tavakkoli, [Nasif Zaman](#), Sharif Amit Kamran, Ethan Waisberg, Nikhil Gautam, and Andrew G. Lee: "Terrestrial health applications of visual assessment technology and machine learning in spaceflight associated neuro-ocular syndrome." *npj Microgravity* 8, no. 1 (2022): 37.
- Ethan Waisberg, Joshua Ong, [Nasif Zaman](#), Sharif Amit Kamran, Andrew G Lee, Alireza Tavakkoli: "Head-mounted dynamic visual acuity for G-transition effects during interplanetary spaceflight: technology development and results from an early validation study." *Aerospace Medicine and Human Performance* 93, no. 11 (2022): 800-805.
- Ethan Waisberg, Joshua Ong, Phani Paladugu, [Nasif Zaman](#), Sharif Amit Kamran, Andrew G Lee, Alireza Tavakkoli: "Optimizing screening for preventable blindness with head-mounted visual assessment technology." *Journal of Visual Impairment & Blindness* 116, no. 4 (2022): 579-581.
- Joshua Ong, [Nasif Zaman](#), Ethan Waisberg, Sharif Amit Kamran, Andrew G Lee, Alireza Tavakkoli: "Head-mounted digital metamorphopsia suppression as a countermeasure for macular-related visual distortions for prolonged spaceflight missions and terrestrial health." *Wearable Technologies* 3 (2022): e26.
- Prithul Sarker, [Nasif Zaman](#), Joshua Ong, Phani Paladugu, Molly Aldred, Ethan Waisberg, Andrew G Lee, Alireza Tavakkoli: "Test-retest reliability of virtual reality devices in quantifying for relative afferent pupillary defect." *Translational Vision Science & Technology* 12, no. 6 (2023): 2-2.
- M. Brent Woodland, Joshua Ong, [Nasif Zaman](#), Mohammad Hirzallah, Ethan Waisberg, Mouayad Masalkhi, Sharif Amit Kamran, Andrew G. Lee, and Alireza Tavakkoli.: "Applications of extended reality in spaceflight for human health and performance." *Acta Astronautica* (2023).
- Prithul Sarker, [Nasif Zaman](#), Alireza Tavakkoli: "VR-SFT: reproducing swinging flashlight test in virtual reality to detect relative afferent pupillary defect." In *International Symposium on Visual Computing*, pp. 193-204. Cham: Springer Nature Switzerland, 2022.
- Sharif Amit Kamran, Khondker Fariha Hossain, Joshua Ong, Ethan Waisberg, [Nasif Zaman](#), Salah A. Baker, Andrew G. Lee, Alireza Tavakkoli: "FA4SANS-GAN: A novel machine learning generative adversarial network to further understand ophthalmic changes in Spaceflight Associated Neuro-Ocular Syndrome (SANS)" In *Ophthalmology Science* 4, no. 4 (2024): 100493.
- Phani Srivatsav Paladugu, Joshua Ong, Nicolas Nelson, Sharif Amit Kamran, Ethan Waisberg, [Nasif Zaman](#), Rahul Kumar, Roger Daglius Dias, Andrew Go Lee, Alireza Tavakkoli: "Generative adversarial networks in medicine: important considerations for this emerging innovation in artificial intelligence" In *Annals of biomedical engineering* 51, no. 10 (2023): 2130-2142.