Jiayi Xu

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Education

University of North Carolina at Chapel Hill, **Aug. 2018 - Dec 2021**
B.S. Computer Science | B.S. Psychology

Courses: *2D Computer Graphics; Computer Security; Computer Architecture; Data Structure; Machine Learning for BMME; Algorithms and Analysis; Virtual Reality & HCI; Computer Vision; Optical Instrumentation*

Skills

- **Languages/Frameworks**: C++, C#, Python, GLSL, Java, JavaScript
- **Tools**: Azure SQL, Unity3D, Blender, Fusion360, ARFoundation, Tensorflow, Matlab, Unreal

Experience

Nakamir, Menlo Park, CA **December 2022 - Present**
Mixed Reality Developer

- Designed and implemented user-friendly UI for AR training product (**C#, StereoKit, Hololens**)
- Integrated auto-formatting rules for the entire code base; improved code consistency and clarity

Meta, Menlo Park, CA **September - November 2022**
Software Engineer

- Added and tested ray casting feature for Oculus Interactive SDK (**C#, Unity**)
- Optimized GPU buffer memory checking and initialization for internal 3D engine (**Vulkan**)

Kitware Inc., Carrboro, NC **February - August 2022**
R&D Intern

- Led the effort of expanding open-sourced VTK-js (visualization toolkit) with state-of-the-art photo-realistic rendering algorithms (**JavaScript, GLSL**)
- Achieved in-browser cinematic rendering for medium size data with 5 times frame rate increase
- Designed qualitative and quantitative studies to validate the speed and perceived quality of the final rendering effects

ImagineX Consulting, Remote **May - August 2021**
Software Engineering Intern

- Built a fully automated data connector that calls Qualys API and populates the cleaned data into SQL database; removed the need to spend 2 hr/day to manually run the process (**Python, SQL**)
- Deployed application using Azure pipeline; scheduled automatic data refresh (**Docker**)
- Troubleshooted unexpected breakdown of NiFi data processing module; connected Power BI data visualization dashboard with AWS Hive database

UNC Computational Biophotonics Lab, Chapel Hill, NC **May 2019 - December 2021**
Research Assistant

- Modeled generative adversarial network for camera-in-the-loop aberration correction (**Tensorflow**)
- Prototyped a customizable fluorescence miniscope with 3D-printed frame; reduced cost by half and size by two third compared to commercial microscope (**Fusion360**)
- Invented DCGH algorithm that generates high frame rate multi-plane hologram; achieved 30% increase in display quality compared to traditional method (**MatLab, Arduino**)
- Adapted DCGH algorithm for commercial video projectors by encoding input frames in RGB format

VRware, Chapel Hill, NC **May - November 2020**
VR Developer

- Developed interactive VR experience for users to practice business pitches; created realistic characters animations (**Unreal, Blender**)
- Integrated voice detection, recording, and RESTful networking modules in Unreal; deployed the application on Oculus Quest (**C++**)

Carolina AR/VR Interest Group, Chapel Hill, NC **January 2019 - December 2021**
Outreach/Co-president

- Recruit core members; establish and maintain partnerships with 7+ student groups and faculties

- Campaign for VR spaces in residential halls, art studios and research labs; promote XR experience through pop-up events, bi-weekly development meeting and workshops
- Developed an augmented reality mobile app that spawns 3D interactive contents when users scan the marker with 300+ user visits; created interactive AR puzzles
- Organized the first XR-themed hackathon at UNC-CH with 200+ attendance from 10+ countries

Publications

[1] **Interactive, In-browser Cinematic Volume Rendering of Medical Images**
J. Xu, G. Thevenon, T. Chabat, M. McCormick, F. Li, T. Birdsong, K. Martin, Y. Lee, S. Aylward
Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization

[2] **Weighted Dynamic Computer Generated Holography for 3D Image Display With a Commercial Video Projector**
J. Xu, V. R. Curtis, N. W. Caira, and N. C. Pégard
2021 OSA Imaging and Applied Optics Congress

[3] **Perceptual Quality Assessment in Holographic Displays With a Semi-Supervised Neural Network**
M. H. Eybposh, A. Moossavi, J. Xu, N. W. Caira, N. C. Pégard
Digital Holography and Three-Dimensional Imaging 2022

[4] **DCGH: Dynamic Computer Generated Holography for Speckle-Free, High Fidelity Volumetric Displays**
T. M. Curtis, N. W. Caira, J. Xu, A.G. Sata and N. C. Pégard
IEEE VR 2021 Conference

[5] **Hardware and Computational Toolbox for 3D Partially Coherent Holography**
N. W Caira, J. Xu, M. H. Eybposh, and N. C. Pégard
OSA Biophotonics Congress 2020

Presentations

[1] *Interactive, In-browser Cinematic Volume Rendering of Medical Images*, AE-CAI | CARE | OR 2.0 Workshop, MICCAI 2022

[2] *Weighted DCGH for 3D Image Display With Commercial Video Projectors*, UNC APS Research Symposium, 2021

[3] *Pushing the Limits of Coherence to Enable Targeted Deep Brain Imaging*, UNC APS Weekly Research Talk, 2020

[4] *Low-cost Customizable Fluorescence Microscope With 3D Printed Frame*, BME Department Retreat, 2019

Projects

- **Eye Tracking for Medical Diagnosis**: Developing highly optimized 2D/3D eye tracking systems using low-cost cameras and open source software, with the aim of facilitating medical diagnosis; leading a team of 5 undergraduate students (C++, OpenCV, Unity3D)
- **Motion Re-targeting Across Skeletons**: Implemented a novel deep learning model that re-targets animations across skeletons with different typologies; wrote a simple BVH parser and encoder (Pytorch)
- **Panorama Generator**: Built panorama generator through feature detection, matching, and image stitching; implemented Harris Corner Detector and RANSAC algorithm (Python)
- **Light-weight 2D & 3D Graphics Engine**: Programmed a 2D Graphics Engine supporting color packaging, geometrical shapes and curve, Blendmodes, and vertex/bitmap shader; built a mini 3D graphics engine following online tutorials (C++, DirectX)