

# Evan Zhao

☎ +1 310-256-5810 | ✉ hzhao5@uw.edu | 🔗 LinkedIn | 🐙 GitHub | 📁 Portfolio | 📍 Seattle, Washington

## EDUCATION

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### University of Washington

Seattle, Washington

*B.S. in Computer Science; GPA: 3.91/4.00*

*Sep 2020 – Mar 2024*

*M.S. in Computer Science; GPA: 3.84/4.00*

*Mar 2024 – Mar 2026*

**Relevant coursework:** Algorithms, Data Structures and Parallelism, Software Design and implementation, Systems Programming, Operating Systems, Machine Learning, Deep Learning, Theory of Machine Learning, Computer Vision, Computer Graphics, Databases, Programming Languages, Hardware Software Interface, Computer Architecture, Cryptography

## EXPERIENCE

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### Kernel Labs Inc.

Seattle, Washington, US

*Machine Learning Engineer, Software Engineer*

*Jun 2025 – Sep 2025, Internship*

- Architected and deployed a real-time computer vision pipeline for holographic video quality enhancement, processing high-quality video streams with sub-50ms latency.
- Engineered client-side video processing infrastructure using JavaScript and WebGL, implementing custom encoding/decoding algorithms to support ML-driven quality improvements.
- Developed and integrated deep learning models for noise reduction, super-resolution, and error correction, achieving 45% improvement in visual quality (LPIPS/PSNR metrics).
- Built scalable cloud infrastructure on AWS with Firebase integration, supporting real-time video streaming for 70+ concurrent clients with 99.9% uptime.

### NewTouch Corp.

Shanghai, China

*Software Engineer*

*Jun 2023 – Sep 2023, Internship*

- Designed and developed a full-stack employee management system handling 1M+ sensitive records, implementing secure data processing workflows and automated HR operations.
- Built robust backend services using Java, PL/SQL, and shell scripting, with comprehensive API design supporting complex business logic and data validation.
- Migrated legacy database systems to OceanBase, optimizing data structures and queries to improve throughput by 60% and overall data security.
- Implemented secure deployment pipelines with version control and rollback capabilities, ensuring zero-downtime updates across multiple production environments.

### NASA SUITS Challenge

Seattle Washington, Houston Texas, US

*Software Engineer, Undergraduate Researcher*

*Jun 2022 – Mar 2023, Research*

- Developed advanced Augmented Reality application on Microsoft HoloLens 2 using Unity and C#, enabling real-time spatial computing for extraterrestrial navigation assistance.
- Implemented computer vision algorithms for spatial mesh processing and 3D mapping, creating dynamic waypoint systems with sub-meter precision for astronaut navigation.
- Architected real-time data processing pipeline using MRTK libraries and REST APIs, enabling seamless integration between AR interfaces and mission control systems.
- Engaged in interdisciplinary collaboration with aerospace engineers and UI/UX developers, leveraging user interviews to ensure the application met diverse operational and usability requirements.
- Conducted field validation at NASA Johnson Space Center, collaborating with astronauts and engineers to refine user experience and system reliability under simulated space conditions.

### Teaching Assistant - UW Paul G. Allen School

Seattle, Washington, US

*Computer Graphics, VR/AR Capstone, Programming Tools*

*Jan 2023 – Sep 2025, Teaching Assistant*

- Mentored more than 500 students in AR/VR, Graphics, and System Programming projects over the years.
- Designed and delivered technical workshops on computer graphics algorithms, shader programming, and real-time rendering techniques for undergraduate and graduate students.
- Collaborated with faculty to develop curriculum and assessment strategies, improving student learning outcomes and technical proficiency in emerging technologies.

### One-Step Flow Matching for Image Super-Resolution with Higher-order Flows

[Report](#)

- Architected and implemented end-to-end diffusion model pipeline from scratch using PyTorch, training on ImageNet dataset with distributed computing on UW Hyak cluster.
- Developed novel one-step image super-resolution algorithm combining flow matching with shortcut models, achieving 16x speed improvement over traditional 128-step diffusion methods.
- Optimized model convergence through higher-order flow matching techniques, reducing training time by 2-3x while maintaining comparable output quality metrics.
- Managed large-scale distributed training workflows and high-performance computing resources, gaining expertise in cloud computing and GPU optimization strategies.
- Conducted comprehensive experimental evaluation with quantitative metrics, demonstrating significant computational efficiency gains for real-world deployment scenarios.

### Accessible Robotic Kitchen Assistant with Computer Vision

[Report](#)

- Developed autonomous robotic system using Hello Robot Stretch 3 with ROS2 framework, integrating computer vision and motion planning for assistive technology applications.
- Implemented real-time object detection pipeline using YOLO deep learning model, achieving 95% accuracy in kitchen object recognition and localization tasks.
- Designed and 3D-printed custom robotic end-effectors optimized for manipulation of diverse kitchen utensils, enhancing grasping success rate by 40%.
- Conducted comprehensive user study with visually impaired individuals, achieving 100% task completion rate and validating real-world deployment readiness through human-robot interaction testing.

### Unix-like Operating System with Advanced Features

[Course](#)

- Architected complete operating system from scratch in C, implementing core functionalities including process management, memory allocation, and inter-process communication.
- Developed robust file system with multi-threading support, implementing advanced features like journaling, crash recovery, and concurrent access control mechanisms.
- Implemented essential system calls (exec, fork, sleep) and process scheduler, creating full Unix-like environment with support for multi-processing and thread synchronization.
- Built comprehensive testing framework and virtual shell interface, utilizing extensive debugging workflows with GDB to ensure system reliability and performance.

### High-Performance Five-Stage Pipelined ARM CPU

- Designed and implemented 64-bit RISC-V ARM CPU architecture in SystemVerilog, achieving 20% clock frequency improvement through advanced pipelining techniques.
- Developed sophisticated hazard detection and data forwarding units, optimizing instruction execution efficiency by 40% through pipeline stall minimization.
- Implemented comprehensive performance monitoring and optimization features, utilizing ModelSim simulation and Intel Quartus synthesis for timing analysis.
- Conducted extensive validation and performance benchmarking, demonstrating significant throughput improvements over single-cycle processor designs.
- Applied advanced computer architecture concepts including branch prediction and cache optimization units for maximum performance efficiency.

## RESEARCH

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### Hybrelighter: Combining Deep Anisotropic Diffusion and Scene Reconstruction for On-device Real-time Relighting in Mixed Reality

[arXiv 2025](#)*Hanwen Zhao, John Akers, Baback Elmieh, Ira Kemelmacher-Shlizerman**Jun 2024 – Apr 2025*

- Architected real-time relighting system for Mixed Reality applications, enabling dynamic lighting visualization for real estate and interior design with 100+ fps performance.
- Solved fundamental mesh quality limitations in on-device scene reconstruction by developing guided anisotropic diffusion for shading that preserves sharp edges while smoothing artifacts.

- Optimized computational pipeline through cascaded multi-resolution processing, achieving real-time performance constraints while maintaining high visual fidelity on mobile hardware.
- Demonstrated practical applications through Unity-based demo supporting dynamic lighting scenarios, furniture rearrangement, and virtual light placement with immediate visual feedback.
- **Publication:** [arXiv:2508.14930](https://arxiv.org/abs/2508.14930)

## Building Proactive and Instant-Reactive Safety Designs to Address Harassment in Social Virtual Reality

CSCW 2025

Zhehui Liao, **Hanwen Zhao**, Ayush Kulkarni, Shaan Chatrath, Amy X. Zhang

Mar 2023 – Jun 2024

- Designed and implemented safety systems for social VR platforms, developing automated detection and protection algorithms for harmful behaviors.
- Led iterative user-centered design process through 4 comprehensive user studies, engaging diverse stakeholders to validate safety features and user experience improvements.
- Achieved measurable impact with 92% user-reported improvement in perceived safety, demonstrating effectiveness of features we built including enhanced personal bubble and badge system in virtual environments.
- **Publication:** Accepted by [CSCW 2025](#)

## KnitA11y: Fabricating Accessible Designs with Machine Knitting

CHI 2025

Tongyan Wang, **Hanwen Zhao**, Yusuf Shahpurwala, Megan Hofmann, Jennifer Mankoff

Oct 2022 – Jul 2024

- Developed automated manufacturing pipeline for accessible textile design using SHIMA SEIKI industrial knitting machines, producing 50+ customized assistive devices.
- Built domain-specific compiler translating high-level design specifications to machine instructions, enabling parametric design of adaptive features like pockets, holes, straps, and various support structures.
- Created interactive design visualization system with backend data processing infrastructure, streamlining the design-to-manufacturing workflow for accessibility applications.
- **Publication:** Accepted by [CHI 2025](#)

## SKILLS

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**Programming Languages:** Python, C++, Java, JavaScript, C#, Swift, SQL, TypeScript, SystemVerilog

**Machine Learning & Data Science:** PyTorch, HuggingFace, Pandas, NumPy, Scikit-learn, Matplotlib, OpenCV, YOLO, TensorFlow

**Cloud & Infrastructure:** AWS, Google Firebase, Docker, Kubernetes, Google Colab, Hyak HPC, Git, CI/CD

**Frameworks & Technologies:** Unity, Unreal Engine, React, Node.js, ROS2, WebGL, Metal, MRTK, Cursor