

# Ailun (Allan) Pei

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## Education

Arizona State University, Tempe, AZ

Jan 2024 – May 2025

Master of Science in Computer Science

Arizona State University, Tempe, AZ

Aug 2020 – Dec 2023

Bachelor of Science in Computer Science, **magna cum laude**

## Technical Skills

**Graphics Development:** Unity, Unreal Engine, WebGL, Three.js, OpenGL, DirectX, Shader Programming, MonoGame

**Creative Tools & Automation:** Adobe Photoshop, Adobe Illustrator, Adobe After Effects, Sketch, Figma, Blender, Cinema 4D

**Languages:** C#, C++, Python, JavaScript, TypeScript, Swift, Kotlin, Java, SQL, Bash, HTML/CSS, HLSL, GLSL

**Web & Backend:** React, Node.js, Vue.js, Flask, FastAPI, RESTful API, Git, GitHub, JSON, XML, MySQL, Docker, AWS, CI/CD

**Data & ML:** PyTorch, TensorFlow, NumPy, pandas, scikit-learn, Matplotlib, D3.js, Statistical Analysis

## Experience

### Software Engineer Intern

Jun 2024 – Aug 2024

Feishu Extreme Trading Technology Co., Ltd.(CME Group-listed ISV)

Shanghai, China

- Built enterprise security modules for a large-scale **C++/MFC trading terminal**, including configurable screen-lock dialog, password validation, and idle-timeout policy, enhancing workflow safety and reducing session-related errors by **15%**
- Engineered **GDI double-buffered rendering** with custom DC and bitmap to eliminate UI flicker, improving rendering stability and interface performance by **20–30%**
- Optimized event handling in **PreTranslateMessage** and integrated **INI-driven configuration** with reusable UI components (status bar, tab, password input), ensuring consistent user interaction and reducing duplicate UI code

## Projects

### Unity FPS Game with AI Navigation and Shader Effects

May 2022

- Built a **3D first-person shooter** in Unity with **navmesh-based AI enemies** featuring patrol and chase logic, integrating complex state machine behavior for responsive enemy interactions
- Implemented **shader-based visual effects** including explosions and muzzle flashes, handling player input, shooting mechanics, and animation states through modular **C#** scripts
- Designed modular systems including scene transitions, health management logic, and item pickup mechanics, ensuring scalable and maintainable code architecture

### MonoGame Game Development Suite with Custom Shaders

Spring 2023

- Developed multiple game prototypes using **MonoGame** framework in **C#**, including a **whack-a-mole arcade game**, a **2D side-scrolling FPS**, and a **3D shooter**, demonstrating versatility across different game genres and dimensions
- Implemented particle systems, enemy spawning logic, and collision detection from scratch; integrated **custom compute shaders** for physics calculations in 3D shooter prototype
- Designed **modular shader pipeline** enabling designers to swap visual effects without touching core gameplay code, promoting separation of concerns between technical and creative teams

### Spherical Conformal Parameterization of 3D Meshes

Fall 2024

- Implemented a **folding-free spherical conformal mapping pipeline** for genus-0 surfaces using **Python/NumPy/SciPy** to support geometry processing applications
- Constructed **cotangent Laplace–Beltrami operator** and area-based mass matrix, initialized with eigenvector embeddings, and optimized harmonic energy via orthogonality-constrained updates with line search
- Reduced harmonic energy by approximately **0.4% to stable minimum** within 1,000 iterations, producing stable spherical embedding with uniform coverage and no fold-overs

### WebGL Visualization Suite – Interactive Shader Playground

Spring 2023

- Engineered interactive **WebGL demos** from scratch with custom **GLSL vertex/fragment shaders** supporting **Phong and Gouraud shading**, including parametric geometry generation (torus, sphere, cube)
- Implemented **camera control system** with spherical coordinate transforms, supporting rotation and zoom via mouse interaction with gimbal lock handling and viewport normalization
- Developed **real-time lighting system** with dynamic light positioning, material parameter adjustment, and reflection/collision detection for interactive object morphing

## Academic Experience

### Teaching Assistant (Undergraduate & Graduate) & Grader

Jan 2023 – May 2025

- Supported **250+** students across **5 courses**, including C++ (as grader) and multi-level **C#/MonoGame shader programming** (as teaching assistant); held weekly office hours for 40–60 students per semester
- Delivered guest lectures on advanced shader techniques, graded **200+** assignments with detailed feedback, improving students' shader programming proficiency and maintaining strong class attendance