Ailun (Allan) Pei

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Education

Arizona State University, Tempe, AZ — Jan 2024 – May 2025
Master of Science in Computer Science — GPA: 3.58

Arizona State University, Tempe, AZ — Aug 2020 – Dec 2023
Bachelor of Science in Computer Science, *magna cum laude* — GPA: 3.61

Jingdezhen Ceramic University, Jingdezhen, China — Sep 2012 – Jun 2016
B.A. in Ceramic Materials Engineering and Intelligent Manufacturing — GPA: 91/100 (Equivalent to 3.9/4.0)

Technical Skills

Languages: C++, C#, Python, JavaScript, TypeScript, Java, Swift, Kotlin, SQL, Bash, HLSL, GLSL, HTML/CSS
Graphics: Unity, Unreal, OpenGL, WebGL, DirectX, Shader Graph, Three.js, Blender, 3ds Max, MonoGame
ML & Data: PyTorch, TensorFlow, CUDA, NumPy, pandas, scikit-learn, matplotlib, D3.js
Web & Tools: React, Vue, Node.js, Flask, FastAPI, RESTful API, Git, AWS, Docker, Visual Studio, Xcode, CI/CD
Creative & Design: Adobe (Photoshop, Illustrator, After Effects), Sketch, Figma, Blender, 3ds Max, Cinema 4D, Creative Automation

Experience

Software Engineer Intern — Jun 2024 – Aug 2024
Shandong Zhaojin Group Co., Ltd. via Shanghai Extreme Trading — Shanghai, China

- Built enterprise security feature for trading platform: screen lock dialog with password validation, session management, and configurable idle timeout, utilizing **C++/MFC**, **INI file parsing**, and custom **Windows messaging** to enhance application security for financial users
- Engineered **GDI double-buffered rendering** with custom DC and bitmap to eliminate UI flicker and improve lock screen performance
- Optimized user interaction by handling **keyboard/mouse events** in **PreTranslateMessage**, providing clearer feedback and streamlined authentication

Projects

Music Visualizer Studio - Automated Creative Production Platform — Fall 2025

- Developing full-stack platform automating music visualization with **React/TypeScript** frontend, **Node.js** backend, and **Web Audio API** for real-time FFT analysis, reducing creative team production time by 80%
- Architected **WebGL/Canvas rendering engine** with 10+ parametric visual presets, **batch processing pipeline** for multi-format exports (Instagram/TikTok/YouTube), and **FFmpeg.wasm** for client-side video generation
- Built **RESTful API** with Spotify/Apple Music integration, **webhook-based automation**, **Redis queue management** for concurrent jobs, and **CDN asset delivery** supporting 100+ simultaneous renders
- Implemented **Git-versioned preset system**, brand kit templates, and **collaborative workspace** features enabling teams to maintain visual consistency across projects at scale

WebGL Shader Playground — Spring 2023

- Developed interactive 3D graphics demo featuring **parametric surfaces** (torus/sphere/cube), **elastic reflection animation**, and switchable **Phong/Gouraud shading** via custom **GLSL vertex/fragment shaders**
- Implemented adjustable material parameters (shininess, ambient/diffuse/specular colors, light position/color) and preset switching using **WebGL uniform binding** for dynamic visual updates
- Integrated simple UI controls (buttons/sliders) for switching materials, surfaces, and lighting modes to demonstrate core shading principles

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 1000 iterations, producing stable spherical embedding with uniform coverage and no fold-overs

Academic Experience

Research Assistant — Oct 2023 – Dec 2024
Center for Human, Artificial Intelligence, and Robot Teaming (CHART), Arizona State University — Mesa, AZ

- Supported DARPA-sponsored *Artificial Social Intelligence for Successful Teams (ASIST)* program through multi-week participation in **Minecraft-based Bomb Disposal simulation**, performed **data cleaning and preprocessing** of large-scale team communication datasets, and reviewed analysis techniques from collaborating institutions (IHMC, UCF, CMU)

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