

Tong Fu

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EDUCATION

Carnegie Mellon University

Bachelor of Science in Computational and Applied Math, Minor in Game Design

Pittsburgh, PA

Aug. 2022 – May 2026

Relevant Coursework

Computer Graphics, Texturing, Game Engine and Production; Math Modeling, Numerical Methods

SKILLS

Programming Languages: Java, Python, C/C++/C#, SQL, HTML/CSS, JavaScript, R

Frameworks & Tools: Unity, Unreal Engine, Maya, Blender, Substance Painter, Houdini, Git, Perforce

Specialized Skills: Game Design and Development, Rendering, PGC, Algorithm Optimization

EXPERIENCE

Social Cybersecurity Research Assistant, Programmer

Jan. 2025 – Sep. 2025

Carnegie Mellon University, Pittsburgh, PA

- Implemented and tested **MITRE ATT&CK** techniques within the **Red Cyber simulation** framework, enhancing its ability to model complex cyber-attacks on virtual organizations.
- Developed cybersecurity simulation models using **Java**, **Groovy**, and **Repast Symphony**, contributing to research on system and human vulnerabilities in cyber warfare.

Global Game Jam 2025, Lead Programmer

Jan. 2025

Pittsburgh, PA

- Led a 5-person group, engineered core gameplay systems in **Unity** using **C#**, including player controls, procedural fish generation, and dynamic scene management.
- Optimized team workflow with **Git**, resolving version control issues and integrating assets efficiently.

PROJECTS

Graphics Project | C++

Sep. 2025 – present

- Built a CPU **software rasterizer**: viewport transform, triangle rasterization with **perspective-correct barycentric** interpolation, **depth buffer** (z-test).
- Implemented **texture sampling** with nearest/bilinear/trilinear filtering and **mipmapped LOD**; added UV wrapping/clamping and stable derivatives for smooth LOD transitions.
- Built a Blender-like 3D modeling tool using **half-edge** data structure to perform local mesh operations, preserving **manifold topology**.
- Added **resampling** algorithms: **linear subdivision** and **Catmull–Clark**.

PBR Materials & Environment Shaders | Unreal Engine 5, Material Editor

Jul. 2025 – Oct. 2025

- Analyzed PBR attributes and authored base materials with packed ORM/AO maps, normal/parallax, and parameterized roughness/metalness.
- Built material variants for **metal**, **plastic**, **wood**, **stone**; added tiling/triplanar options and detail normals to mitigate repetition.
- Implemented vertex/pixel shader logic in UE Material Editor; compared forward/deferred render paths.
- Shipped environment materials: **architectural** (concrete, glass, decals) and **natural** (terrain layer blends, foliage, water with refraction/fresnel).

Procedural World Generation | Houdini

May 2025 – Jul. 2025

- Built **HDAs** for terrain/biome authoring: height/slope/curvature masks, noise fields, and erosion-style shaping.
- Attribute-driven scattering of **foliage/rocks/props** with density, clustering, and avoidance rules.
- Wired UE5 landscape/mesh **materials** to Houdini attributes (vertex colors/material IDs) for automatic texture/biome assignment.
- Optimized runtime with packed primitives/instancing, LOD setup, and artist-friendly parameters (seed, density, biome weights) for repeatable builds.