

## Wanning (Catherine) Cheng

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### Education

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#### University of Pennsylvania, School of Engineering and Applied Science

*Expected. May 2026*

Master of Science in Engineering, Computer Graphics and Game Technology

#### University of Illinois at Urbana Champaign (UIUC), College of Liberal Arts & Sciences

*May 2023*

Computer Science & Math (GPA: 3.80/4.00)

Coursework: Computer Graphics, Computer Animation, 3D Modeling, Linear Algebra, Algorithm, Data Structure, Statistics and Probability

### Experience

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#### Interactive Engineer Intern | ByteDance | Beijing, China

*May 2024 – Aug 2024*

- Worked with GLSL to develop post-processing shaders for video transitions and visual effects launched in Douyin AR Mobile.
- Constructed composite visual effect shaders for effect templates and contributed to Douyin AR Desktop shader library.
- Developed scripts to automate asset migration process and resolve various compatibility issues.

#### Virtual Reality Developer | Health Care Engineering Systems Center, UIUC | Champaign, IL

*Jul 2022 – May 2023*

- Collaborated with nurses to create an immersive 3D educational platform simulating clinical experience with interactive human-like avatars.
- Built the 3D hospital environment and manipulated animation for the digital avatars using Maya and Unity.
- Implemented a voice interaction system within the VR environment by scripting in Unity to enable users to communicate with virtual avatars.

#### Course Assistant | CS519 Scientific Visualization, UIUC | Champaign, IL

*May 2022 – Aug 2022*

- Assisted in evaluating course materials including exams and coding homework to enhance the quality of the course content.
- Participated in the construction of new homework problems.

#### Backend Developer | One-Another Students' Social Networking Platform | Remote

*Oct. 2021 – Mar. 2022*

- Participated in the development of One-Another Oversea Students' Online Social Networking Platform.
- Employed methods to manage data content through Typescript and Google Firebase API.

### Projects

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#### 3D Environment Modeling, Texturing, and Rendering: Maya, Substance Designer & Painter, ZBrush, Unreal Engine, Arnold

- Worked with various DCC software to model, texture, and render scenes from scratch.
- Portfolio: <https://www.catherine-wanning-cheng.com/portfolio>

#### CUDA Path Tracer: C++ | [Link](#)

- Implemented a path tracer in C++ with CUDA for GPU support. Features include various materials (diffuse, mirror, emissive, and glass), mesh loading with texture and normal mapping, stochastic anti-aliasing, and denoising.
- Used stream compaction and material sorting to optimize the performance.

#### L-System Maya & Houdini Plugin: C++, MEL, Python, Maya, Maya Python API | [Link](#)

- Developed a plugin supporting both Maya and Houdini based on the concepts of L-System to procedurally generate branch-like models.
- The plugin additionally supports model instancing and interactive UI created by MEL scripts in Maya version.

#### Mini Minecraft: C++, OpenGL, GLSL, Qt Creator | [Link](#)

- Collaborated in group of 3 to create an interactive 3D world exploration and alteration program in the style of the computer game Minecraft.
- Contributed to terrain generation, block texturing, texture animation, procedural sky generation, and day-night cycle.

#### Mini Maya Application: C++, OpenGL, GLSL, Qt Creator, USD | [Link](#)

- Implemented basic Maya functionalities using OpenGL and Qt Creator, including loading \*.OBJ files with a half-edge data structure, employing Catmull-Clark mesh subdivision, enabling face extrusion, binding meshes to custom skeletons, and executing mesh skinning deformations.
- Developed an USD model exporter to convert the model in USD format.

#### Forward/Inverse Kinematics with Unity Plugin: C++, C#, Unity | [Link](#)

- Implemented both forward kinematics and inverse kinematics algorithms from the ground up, with the latter incorporating Limb-based and Cyclic Coordinate Descent (CCD) methods.
- Incorporated Limb-based inverse kinematics algorithm into Unity plugin.

### Skills

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- Programming: C++, GLSL, Python, C#, Java, JavaScript, MySQL, Bash
- DCC Software: Unreal Engine, Maya, Houdini, Substance Designer & Painter, Unity
- Tools: OpenGL, Git, Qt Creator, Perforce