

# Haolan Xu

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## EDUCATION

### University of Florida

Master in Computer Science; GPA: 3.88/4.00

Gainesville, FL, USA

Sept.2022 - Present

### Sichuan University

B.E. in Chemical Engineering and Technology; GPA: 3.75/4.00

Chengdu, SC, China

Sept.2018 - June.2022

## SKILLS SUMMARY

**Languages:** Python, C/C++, JavaScript, Julia

**Frameworks:** OpenGL, WebGL, Pytorch(3D)

**Tools:** Blender, Mitsuba, NeRFstudio, Cmake, L<sup>A</sup>T<sub>E</sub>X, GIT

**Platforms:** Windows, Ubuntu

## RESEARCH

### Rendering the smooth contours using point normal triangles

June. 2023 - Present

- Implemented **Point Normal (PN) triangles** with the **Gouraud shading**
- Identified contours using **orthogonality checks** between shading normal and the view direction
- Employed curved PN patches for the smooth approximation of surfaces, mapping smooth contours from flat triangles
- Constructed the entire contour using piecewise Bézier Curves derived from individual triangles

### Parametric modeling of smooth biological cells

Jan. 2023 - May. 2023

- Developed a deep understanding of the **Berstein-Bézier form** through practical implementation in Python
- Constructed axisymmetric spread cell models in 2D using the **cubic piecewise Bézier curve**
- Extended the 2D model into 3D by implementing a **rotation algorithm** around the central axis
- Adapted the 3D model based on constant mean curvature, enhancing the model's predictability and generalization

### Predict performance of organic photovoltaic materials using deep learning

Oct. 2020 - Oct. 2021

- Proposed a **language-like molecular descriptor(SMILES string)** as inputs
- Created **Bi-LSTM network model** for prediction
- Introduced the **attention mechanism** to identify the segments that are important to PCE

## PROJECTS

### Denoise in real-time ray tracing

Aug. 2023

- Denoted for per frame using the **Joint Lateral Filter**
- Implemented **Temporal Accumulation** with **Motion Vector** projection
- Accelerated the denoise with **A-Trous Wavelet**

### Precompute radiance transfer with spherical harmonics rotation

July. 2023 - Aug. 2023

- Implemented **Precomputed Radiance Transfer (PRT)** in the **Nori** framework
- Achieved **real-time** rendering of the Stanford bunny across various scenes utilizing spherical harmonics coefficients
- Enabled **dynamic light rotation** leveraging the **rotationally invariant** properties of spherical harmonics

### Implement soft shadow using PCF & PCSS

June. 2023 - July. 2023

- Implemented a robust hard shadow system using the two-passes approach
- Introduced **adaptive shadow bias algorithm** to solve shadow Acne
- Developed soft shadow using **Percentage Closer Filtering (PCF)**
- Further refined the visual fidelity of shadows by implementing **Percentage Closer Soft Shadows (PCSS)**
- Enabled the support of **multiple dynamic light sources**

### A tiny software path tracer rendering cornell box

May. 2023 - June. 2023

- Implemented a **path tracer** with **Russian roulette** and **Sampling light source**
- Rendered the Cornell Box with different samples per pixel (SPP)
- Optimized the path tracer by **Multi-threaded acceleration**, **Microfacet materials**, and **Perfect mirror reflection**

## HONORS AND AWARDS

University of Florida Achievement Award Scholarship

2022

Outstanding Graduates of Sichuan University

2022

The General Scholarship in Sichuan University

2019, 2020, 2021