

# Haolan Xu

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## EDUCATION

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### University of Florida

*Master in Computer Science; GPA: 3.88*

Gainesville, FL, USA

*Sept.2022 - Present*

### Sichuan University

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

Chengdu, SC, China

*Sept.2018 - June.2022*

## SKILLS SUMMARY

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

**Frameworks:** OpenGL, WebGL, Pytorch

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

**Platforms:** Windows, Ubuntu

## RESEARCH

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### Rendering the smooth silhouette using Point Normal triangles

June. 2023 - Present

- Implemented **Point Normal (PN) triangles**, leveraging principles of **Gouraud shading**
- Identified silhouette points using **orthogonality checks** between normal vectors and the view direction
- Employed **Berstein-Bézier form** and **barycentric coordinates** to render accurate silhouettes efficiently

### 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 a 2D model of axisymmetric spread cells 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 application to general 3D cell formations

### Predicting Performance of Organic Photovoltaic Materials Using Deep Learning

Oct. 2019 - Oct. 2020

- Creatively propose **a language-like molecular descriptor(SMILES string)** as inputs
- Predict the potential photoelectric conversion efficiency(PCE) of OPVs through **deep learning(Bi-LSTM network model)**
- Introduce **the attention mechanism** to identify the segments that are important to PCE, which can provide guidance for the design experiments of OPVs

## PROJECTS

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### 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**

### Use PN triangles to refine a self face model in OpenGL

Nov. 2022 - Dec. 2022

- Constructed a face model based in Blender, using **face builder**
- Applied a personal facial **texture** onto a 3D face model
- Implemented **Point Normal (PN) triangle tessellation** to enhance the smoothness of the model

## HONORS AND AWARDS

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Outstanding Graduates of Sichuan University

2022

Outstanding Student of the Year in Sichuan University

2019, 2020

The First Prize Scholarship in Sichuan University

2019, 2020

2nd Prize in Mathematics Competition in Sichuan University

2019