# Haolan Xu

Gainesville, FL 32611, USA
+1-352-721-1438 · jamesdemon923@gmail.com · jamesdemon923.github.io

## Education

**University of Florida** — Gainesville, FL, USA
*Master in Computer Science; GPA: 3.88* — *Sept.2022 - Present*

**Sichuan University** — Chengdu, SC, China
*B.E. in Chemical Engineering and Technology; GPA: 3.75* — *Sept.2018 - June.2022*

## Skills Summary

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

**Frameworks**: OpenGL, WebGL, Pytorch

**Tools**: Blender, Cmake, LaTeX, GIT

**Platforms**: Windows, Ubuntu

## Research

**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

**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

**Build a robot arm and interact with it** — Oct. 2022 - Nov. 2022

- Apply **Transformation matrices** to enable keyboard-based interaction with the robot arm in **OpenGL**
- Construct a **Blinn-Phong model** in OpenGL to illuminate the whole scene
- Implement the **Color picking** to allow the selection of individual parts of the robotic arm

## Honors and Awards

| | |
|---|---|
| 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 |