Haolan Xu

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Education

- **University of Florida** — Gainesville, Florida, USA
  Master in Computer Science; GPA: 3.88 — *Sept.2022 - Present*
- **Sichuan University** — Chengdu, Sichuan, China
  *B.E. in Chemical Engineering and Technology; GPA: 3.75(**Rank:19/158**)* — *Sept.2018 - June.2022*

Languages: *Python, C++, JavaScript, Julia;* ***Tools:*** *Blender, Cmake, LaTeX, GIT;*
Framework: *OpenGL, WebGL, Pytorch;* ***Platform:*** *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