

Haolan Xu

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EDUCATION

University of Illinois Urbana-Champaign
Visiting Student in Electrical and Computer Engineering

Urbana, IL, USA
Sept. 2024 - Present

University of Florida
Master of Science in Computer Science; GPA: 3.83/4.00

Gainesville, FL, USA
Sept. 2022 - May 2024

Sichuan University
Bachelor of Engineering in Chemical Engineering and Technology; GPA: 3.74/4.00

Chengdu, SC, China
Sept. 2018 - Jun. 2022

RESEARCH EXPERIENCE

Physics-based rigging for 4D generation Sept. 2024 - Present

- Developing a physics-based rigging framework based on Material Point Method simulations to learn driving velocity and material properties (Young's modulus, Poisson's ratio) from videos to generate physically accurate motions
- Building a 4D non-parametric animatable model that surpasses Score Distillation Sampling-based neural frameworks and traditional rigging-based methods, creating diverse and physically accurate 4D virtual assets

Inverse rendering meets GANs for 3D object editing Aug. 2023 - Jan. 2024

- Adopted a physics-based inverse rendering framework based on Mitsuba 3 and generated SVBRDF representations (Albedo, Normal, Roughness, Specular) using pretrained StyleGAN2-Ada
- Finetuned the unified framework based on the rendering loss, resulting in the high-quality reconstruction and relighting

Smooth contour rendering using point normal triangles May. 2023 - Aug. 2023

- Employed curved point normal patches based on cubic Bernstein-Bézier interpolation for smooth approximation of surfaces to bypass more complex methods like Powell-Sabin construction
- The method's computational efficiency and adaptability allow for seamless integration into any outline rendering pipeline

PROJECT EXPERIENCE

🌀 Denoise in real-time ray tracing Aug. 2023 - Sept. 2023

- Denoised per frame using the joint bilateral filter with A-Trous wavelet for acceleration
- Implemented temporal accumulation with motion vector projection for smoother transitions

🌀 Precompute radiance transfer with spherical harmonics rotation Jul. 2023 - Aug. 2023

- Implement precomputed radiance transfer (PRT) by calculating spherical harmonics (SH) in the Nori framework
- Achieved real-time rendering of the Stanford bunny across various scenes by PRT
- Further enabled dynamic light rotation leveraging the rotationally invariant properties of SH

🌀 Implement soft shadow using PCF & PCSS Jun. 2023 - Jul. 2023

- Used the adaptive shadow bias algorithm to solve shadow acne to implement a robust hard shadow system
- Developed soft shadow using percentage closer filtering (PCF) and percentage closer soft shadows (PCSS)
- Extended to the multiple dynamic light sources scene

🌀 Tiny software path tracer May 2023 - Jun. 2023

- Built a path tracer using Russian Roulette and light source sampling, optimized by multi-threaded acceleration
- Explored various microfacet materials with different bidirectional reflectance distribution functions like mirror reflection

SKILLS SUMMARY

Programming: Python, C/C++

Tools: PyTorch(3D), NeRFStudio, Mitsuba, Warp, Blender, L^AT_EX, GIT

Language: English (fluent), Mandarin (native)

HONORS AND AWARDS

Achievement Award Scholarship in University of Florida 2022

Outstanding Graduate of Sichuan University 2022

Annual Scholarship in Sichuan University 2019, 2020, 2021