My passion for computer graphics has directed my academic path. I am particularly excited about your research on Neural Representations and Rendering for 3D Reconstruction, which aligns closely with my current interests and experiences. I am writing to inquire about potential opportunities to contribute to your lab's work as a 2025 summer research intern.

Currently, I am fortunate to be mentored by Professor Wang Beibei from Nanjing University through the GAMES Graphics Rising Stars program. My focus lies in 3D reconstruction of real world objects. I began by replicating the *3DGS* pipeline,which not only deepened my understanding of differentiable rendering but also inspired me to extend my learning by studying Structure-from-Motion, Multi-View Stereo principles.

Previously, I conducted the Optimization on Instant-NGP: A Video-to-Mesh Pipeline project when I was attending the MIT Winter Research Program. My team and I improved the Instant-NGP pipeline to transform videos into high-quality meshes. We first studied the paper of *NeRF* and Instant-NGP. We improve the image filtering and mesh smoothing processes to boost the speed and accuracy of 3D model development, expediting the entire 3D modeling process. Additionally, I successfully replicated the Instant-NGP pipeline, using its multi-scale hash grid to enhance rendering speed while also managing custom datasets for training and validating video inputs and mesh outputs, which improved the overall project efficiency.

In the process, we tried to use python opensource library for image filtering and automation, and the application of the Laplacian smoothing algorithm, as well as made a comparison of standard NeRF and Instant-NGP. This training enriched my knowledge of 3D reconstruction and helped me see its vast potential in practical use. I am more than delighted to see the combination of traditional graphics pipeline with SOTA deep learning methods. The success of this project was highlighted at the MIT xPro conference, which displayed a great balance of smoothness and feature retention.

The research poster can be found here.

Throughout this work, I recognized the importance of having a strong theoretical foundation, so I went back to self-study rendering theories and techniques. This later led to my focus on physically based rendering. I found synthesizing and manipulating a realistic scene in real time particularly interesting. Using the glfw library for OpenGL context creation, I built a Physically-Based Renderer from scratch to render models from 3D model websites such as Sketchfab. The key part was to implement the metallic-roughness workflow, following real world physics law, and develop an Image-based lighting system in order to enhance light effect realism. Through this, I had a better understanding of Physically Based Rendering (PBR) principles and their actual application, as well as further honed my C++ skills.

My academic journey has taught me the powerful synergy between deep learning, computer vision, and graphics. To broaden my perspective, I explored various projects: using Gradient Boosting Decision Trees to predict second-hand car prices, employing image segmentation techniques to identify tumors in medical images. These diverse experiences allowed me to grasp how AI can intersect with traditional graphics to address complex real-world challenges.

Recently, a friend invited me to collaborate on a large language model project under the mentorship of Wotao Yin in Alibaba DAMO Academy. Although my primary interest is in graphics and I didn't have prior experience in LLM, I agreed to join because I was momentarily stuck for new ideas in my own field and hoped a fresh perspective might inspire me. Our work focused on addressing the challenge of hallucination in mathematical reasoning by developing a "verify-then-self-correct" pipeline called Auto-Verify. This plug-and-play framework enables stepwise verification and error correction for math reasoning tasks at inference time without needing additional training of reward models.

Initially, our experiments showed promise, but we soon realized the results did not meet the standard we aimed for. This was a disappointing moment, as it highlighted how crucial a solid skill set is for achieving success in advanced research. However, the experience turned into a vital lesson in perseverance and self-reflection: I had spent a year building my knowledge in graphics, and I recognized the importance of seeing that journey through rather than switching fields prematurely. This LLM research journey ultimately strengthened my determination to continue in computer graphics. It also taught me that setbacks and failures are inherent to research and that I should remain steadfast in my chosen area, continually refining my skills and knowledge base. Our research paper can be found here.

Looking ahead, I am eager to bring this background and perspective to your research efforts. I would be deeply grateful for the opportunity to collaborate with you and your team while continuing to grow as a researcher under your mentorship.

Thank you for considering my application. I look forward to the possibility of discussing how my background and interests align with your research in meeting.