EE/CprE/SE 4920 SPRINT REPORT 3

3/1/25 - 3/14/25

Group number: 40

Project title: Hybrid Relightable 3D Gaussian Rendering

Client: Jackson Vanderheyden & Brian Xicon

Advisor: Simanta Mitra

Sprint Summary:

	Sprint Tasks	**Accomplished Tasks**	**Tasks for Next Sprint**
Ethan	-ML: Start first version of gaussian optimizer (work with Brian) -ML: Test Gaussian optimizer -ML: Integrate Video to Images for SfM	-ML: Integrate Video to Images for SfM -ML: Start first version of gaussian optimizer (work with Brian)	-ML: Continue first version of gaussian optimizer (work with Brian) -ML: Test Gaussian optimizer
Kyle	-Install ONNX on newest version of our code. -Turn current pytorch model into ONNX file. -Have pair programming session with Brian.	-Installed ONNX on the newest version of our code. -Started turning the current pytorch model into an ONNX file.	-Have a pair programming session with Brian. -Finish turning current pytorch model into an ONNX file. -Run ONNX file in Unity.
Jackson	-GP: Finish physically based lighting calculations -GP: Help Luke merge BVH into main -GP: hybrid rendering of ray Gaussian intersection	-GP: Restructuring of hybrid rendering of ray Gaussian intersection branch. Currently in development	-GP: Help Luke merge BVH into main -GP: hybrid rendering of ray Gaussian intersection

Luke	- Merge BVHs into main branch. - Research BVH generation for Gaussians	- Research BVH generation for Gaussians	- merge bvhs into main branch - BVH generation for Gaussians
Brian	-ML: Optimize camera angles for training ML models off our premade images. -ML: Create ML model and optimize it to work with different values of Gaussians like color, texture, etc.	-ML: Finished the retrieval and processing of our image data, images of point cloud are now optimized to match the truth images	-ML: Continue debugging current render -ML: Work on the first prototype of the Gaussian Point Optimizer model

<u>Ongoing Tasks:</u>

Graphics Programming (GP) Team:

- ☐ Merge BVHs into the main branch **[High Priority]**
- ☐ Write ray-gaussian intersection code **[High Priority]**
- ☐ Physically based lighting calculations **[High Priority]**
- ☐ Update necessary buffers on scene update **[Medium Priority]**
- ☐ Handle multiple paths per pixel **[Medium Priority]**
- ☐ Support Unity lights **[Medium Priority]**
- ☐ Add pathId as a unique identifier in getSeed() **[Low Priority]**
- ☐ Improve workgroup count **[Low Priority]**
- ☐ Remove bounce from Path struct and add a pathBounce counter buffer **[Low Priority]**
- ☐ Vary primary ray generation **[Low Priority]**
- ☐ Cube map background support **[Low Priority]**

Machine Learning (ML) Team:

- ☐ Prep point cloud data by removing noise and outliers **[Medium Priority]**
- ☑ ~~Create a ML model to convert a point cloud into a Gaussian point cloud.~~**~~[High Priority]~~**
- ☐ Test accuracy of Gaussian point cloud generation **[Low Priority]**
- ☑ ~~Modify SfM script to accept user selected paths~~ **~~[Low Priority]~~**

- [ ] Fix bug within SfM script with user selected paths having format issues**[HIGH Priority]**
- [x] ~~Video to images support for preprocessing **[Low Priority]**~~
- [ ] Extract original lighting from models **[Low Priority]**