EE/CprE/SE 4910 WEEKLY REPORT 8

11/1/24 – 11/7/24

***Group number:* 40**

Project title: 3D Gaussian Splatting With Dynamically Raytraced Lighting

Client: Jackson Vanderheyden & Brian Xicon

Advisor: Simanta Mitra

Team Members/Role:
Ethan Gasner - Documentation Manager.
Kyle Kohl - Communication Manager.
Jackson Vanderheyden - Graphics Scope Manager.
Brian Xicon - Machine Learning Scope Manager.
Luke Broglio - Schedule Manager.

- **Weekly Summary:**

This week the team primarily focused on the continuation of our prototypes in preparation for our lightning talk that we will present next week. This process also includes research on prototype-specific topics like libraries and additional papers.

- **Past week accomplishments**

Ethan Gasner: This week I did a code review for Luke's merge request. Then I tried to find Gaussian Point clouds data sets so I could start working on the material predictor while Brain was working on the optimizer when I found a Library that will greatly assist in Structure from Motion SfM.

Kyle Kohl: I reached a lightweight library that should be able to suit our needs for running a Pytorch model in a Unity Project. I plan on having a fully functional demo by the end of the sprint on Tuesday. After that, I will make a merge request to add my code to the code base.

Jackson Vanderheyden: Code review for two of Luke's Merge Requests (MRs). Read a new research paper just released on our senior design topic called 3D Gaussian Ray Tracing: Fast Tracing of Particle Scenes and took notes in the Context and Techniques document. Continued work on path tracer compute shaders.

Luke Broglio: This week I finished the files and parsers for storing 3D Gaussians. I also fixed and expanded the demos which render 2D cross sections of Gaussians with their centers on a 2D plane. I also updated my work last week based on feedback in the code review.

Brian Xicon: Deep dive into research papers in preparation for upcoming lightning talk speech. Continued development of Gaussian Point Optimizer with the inclusion of structure from motion.

- **Individual contributions**

NAME	Individual Contributions	Hours this week	HOURS cumulative
Ethan Gasner	Code review, Found and read documentation on a library for the Gaussian Point Optimizer to help with SfM	6	48
Kyle Kohl	Researched a lightweight library to run PyTorch models inside of Unity. Continued learning about Raytracers.	6	48
Brian Xicon	Dove into research papers for lightning talk speech, continued to work on the Gaussian Point Optimizer.	6	48
Jackson Vanderheyden	Code review on Luke's MRs, read and took notes on a new research paper, and continued work on path tracer compute shaders.	6	48
Luke Broglio	Finished the files and parsers for storing 3D Gaussians. Fixed and expanded demos which render 2D cross sections of Gaussians and updated my work last week based on feedback in the code review.	6	48

- **Plans for the upcoming week**

Ethan Gasner: This upcoming week I plan to start my own prototype independently of Brian for the Gaussian point optimizer to see if the library is worth using.

Kyle Kohl: By the end of the sprint (Tuesday) I plan on having a demo of running a PyTorch model inside of a Unity Project. Then I will research what it takes to create a Unity package and list it in the store. In addition, I plan on continuing expanding my knowledge of RayTrcers.

Jackson Vanderheyden: I will finish the two compute shaders needed for triangle intersections. Gaussian support will be added once the pipeline can render triangle meshes + pbr materials.

Luke Broglio: This upcoming week I plan to finalize the work I did on Gaussian files and parsers based on feedback from the group. In addition I am going to start write the algorithm which

generates the bounding volume hierarchy for the triangle meshes.

Brian Xicon: This upcoming week I plan to have a basic working demo of our Gaussian Point Optimizer.

- **Summary of weekly advisor meeting**

  We do not have a meeting with Professor Mitra this week. See Previous weekly report.