***EE/CprE/SE 4910 WEEKLY REPORT 3***

***9/27/25 – 10/03/24***

***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:**

For this third report, we continued to refine and modify our requirements to fit with the activities from class. Additionally, we started planning for our prototyping phase, with some team members conducting basic test projects to better understand how we will implement our project. This hands-on approach is helping us identify potential challenges early on. We also ensured that each team member has at least read and familiarize themselves with the techniques used in the papers

- **Past week accomplishments**

**Ethan Gasner**: This week I did a deep dive into some of the papers explaining the process to try and better understand the sequence of action used. I learned that in order to achieve the ability of re-lightability, the Gaussian points need additional parameters compared to original gaussians. This is where the Ai optimization comes into play. The Ai will produce the enhanced gaussian in which we can then apply lighting to. In addition, I also watched a youtube tutorial on pytorch which will help when the time comes to optimize the gaussians.

**Kyle Kohl**: Learned more about pytorch. Communicated with team members about roles and expectations

**Jackson Vanderheyden**: My tasks included continuing to analyze what needs to be done to do a ray-traced render in Unity. Looked into how to trace a scene composed of triangle

meshes and Gaussian. Continued to refine our definition of what physically based rendering is and the architecture of the ray tracer.

**Luke Broglio:** I read through two of the important papers on our topic to help understand the process behind what we will be doing specifically on the graphics side. I also started work on a traditional ray tracer created using Unity compute shaders to help get more familiar with them so I have experience when we start development.

**Brian Xicon:** This week I created a general list of all tasks that need to be completed for the AI aspect of the project. I also read through our crucial research documents to be able to better understand the project as a whole.

- **Individual contributions**

| NAME | Individual Contributions | Hours this week | HOURS cumulative |
|---|---|---|---|
| Ethan Gasner | Read and Interpreted Pre-existing research papers as well as use youtube resources to help learn pytorch and how I can use it in this project. | 6 | 18 |
| Kyle Kohl | Read the document containing the outline of our project along with pre-existing research papers and video resources. Learned more about the requirements of a raytracer. | 6 | 18 |
| Brian Xicon | Created a list of tasks for the AI aspect of the project, read through the two most important research documents to better understand the project. | 6 | 18 |
| Jackson Vanderheyden | Created a comprehensive document containing all relevant context needed for our project. This includes links to necessary research papers, my “spark notes” versions, information on traditional 3D polygon models and their vocab, and notes on physically based rendering (including the rendering equation). | 6 | 18 |
| Luke Broglio | Read through the important papers on our topic and started to work on a traditional raytracer in unity to practice with the tools we plan to use when creating our raytracer | 6 | 18 |

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|---|---|---|---|
| | with 3D Gaussians. | | |

- **Plans for the upcoming week** ·

  **Ethan Gasner**: Continue to learn more pytorch and attempt to find Datasets that we can use for our project both for Ai purposes and rendering purposes. I will also start to update the Team Website to include a problem statement.

  **Kyle Kohl**: I will continue to expand my knowledge of raytracer and graphics via books and programming. Along with continuing to communicate with team members to ensure concise and clear work expectations. Lastly, expand my general knowledge of PyTorch.

  **Jackson Vanderheyden**: More work will be done outlining the architecture for the 3D Gaussian ray tracer by identifying all necessary compute shaders, buffers, and Unity-specific inputs. More information about deliverables and timelines will be made available. Graphics team tasks will be made and assigned.

  **Luke Broglio:** I will continue to work on my practice traditional raytracer and I also will create a second small proof of concept raytracer which renders simple 2D Gaussians.

  **Brian Xicon:** This coming week I want to be able to look at our project with a closer perspective and research different code interpretations of some of the tasks I compiled.

- **Summary of weekly advisor meeting**

We were able to have our meeting with professor Mitra. In which we refreshed him with project details and how we are splitting into two main teams, those being Rendering Team and AI Team. Professor Mitra also described what his expectations were for our biweekly meetings. His expectations are that we perform a quick demo regarding our past week's accomplishments. He also suggested that we use the team website for this. Finally, he conveyed some concerns regarding the feasibility and computing power requirements for the AI team, but due to the vast amounts of public data this is not expected to be a problem for the scope of our project.