

Milestone Status Report

- Our overarching goal for this project is to implement a shader program for Minecraft that renders better visuals, in particular for: grass movement, shadows, lightings, water reflection, cloud, torch etc.
- During the time up till this checkpoint, we spent time understanding the structure of shader mod programs, particularly the specifics of the rendering pipeline used by Optifine. The pipeline of a shader program consists of many full-screen passes, a few block and entity rendering passes, and a shadow pass. There are several main components: Gbuffers are the main geometry passes; composite programs are fullscreen passes that happen after gbuffers; the final component is the last pass in the shader pipeline. The shader folder is comprised of 4 extension types of shader source files: Compute shader(.csh), Vertex shader(.vsh), Geometry shader(.gsh), and Fragment shader (.fsh).
- Since we expect to focus our work on shader programs that refine game graphics, we decided to use Optifine (a Minecraft optimization mod) in place of the default minecraft installer, because the default version does not incorporate custom shader programs.
- Up until the milestone checkpoint, we have finished implementing a shadow mapping model and understanding the rendering pipeline.

Preliminary Results:

We were able to produce shadows of objects and players when rendering scenes. However, there seems to be a bug with our lighting, where everything is darker than expected, and we are currently fixing this problem. Here is one example of what we created, where one can clearly see the shadows of trees, grasses, and other blocks.

Our shader	Default shader
	

Reflection on progress: Our progress has been slower than originally planned due to the complexity of shader programs for Minecraft. Sparse amount of documentation on the web for GLSL created roadblocks for understanding the rendering pipeline used in Optifine, the shader mod that allows us to inject shader files into the game. After much discussion based on our current progress and the given time restriction, a comprehensive shader program with many features will likely not be achievable within the given time. Our goal has shifted to implementing core additions such as high resolution light/shadow mapping, diffuse lighting, and terrain animation (grass/tree movement).

Slides Link:

<https://docs.google.com/presentation/d/1qo89xqMCUrXMmkFHrIBjxcuxWLXuKh1iQHyJGUu0DdM/edit?usp=sharing>

Video Link:

https://drive.google.com/file/d/1COsEHHbAtImURdJ4kFGtppr_guzFOdQe/view?usp=sharing