**RTGI TODO lists**

**Remember guys, our top priorities are reading papers and doing research work for this project. Not game engine programming☺!!!**

**Pick up whichever task you are interested in and feel free to add new research topics! Happy doing GI research!**

**Research TODO list** **(Priority, lower number is higher):**

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| --- | --- | --- |
| **Technique** | **Description** | **Priority** |
| Temporal Coherence | [Tokuyoshi 2012] uses it. If we want to compare our result with theirs, we have to implement it in our rendering framework. | 1 |
| Interleaved Sampling | Is G-buffer splitting necessary? Maybe we can follow SSDO’s technique, in which they do interleaved sampling in place. See SSDO for details. | 1 |
| Scene BV computation | We only want to voxelize and create global ray-bundles for the visible part of the scene, which means we can compute the visible scene BV by using G-buffer’s world position texture and compute shader. | 1 |
| Global ray-bundles | Investigate if it is possible generating ray-bundles using just voxel grid instead of the original scene. | 1 |
| Efficient GPU ray marching | Currently I am using a naïve ray marching, try to use an efficient 3D-mipmap or octree-based data structure to accelerate the ray marching procedure. | 2 |
| SVO for voxel grid | Cool technique worth studying | 2 |
| Specular indirect sampling | Do we follow SVO’s way sampling indirect illumination?  Or can we come up with a new idea using our framework? | 2 |
| VPL Shadow Maps | [Tokuyoshi 2012] uses it. If we want to compare our result with theirs, we have to implement it in our rendering framework. | 1 |
| HDR tone mapping | In order to create beautiful images, we should store intermediate data (colors) in HDR format, just as the SSDO demo. Then in the final image composition, we have to do a high quality tone mapping. | 2 |
| Geometric-aware filtering | Since we use interleaved sampling, we must implement a filter that removes the noises. | 2 |
| Adaptive Caustic Maps | Can we integrate an improved version of ACM into the framework using GPU per-pixel link list? | 3 |
| Sub-surface Scattering | Can we integrate an SSS into the framework? | 3 |
| Sub-rendering pass timing | We want to time all techniques mentioned above. | 1 |

**Engineering TODO list (Priority, lower number is higher):**

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| **Functionality** | **Description** | **Priority** |
| Support complex scenes | In our final demo, we want to render not only cornel box, but also a complex indoor scene with several dynamic objects and lights. Currently being carried out by Yong Piao. | 2 |
| Rendering API wrapper | Currently being carried out by Che Sun. The goal is to hide OpenGL API as much as possible from application level. Should be finished by the end of December. | 2 |
| Design material script and uber shader system. | Apparently this is a rendering engine problem | 4 |
| Support mesh animation | Say, a running elephant using GPU matrix blending. | 3 |