

# Final Demo - Ghost Busters

Real-time Rendering 2023, Submission 4

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## 1 Controls

- Enter : Restart the scene.
- F1 : Toggle Wireframe rendering.
- F2 : Toggle backface culling.
- F3 : Toggle FPS counter.
- F4: Toggle Omnidirectional Shadow Mapping.
- F5: Toggle Volumetric Lighting.
- F6 : Toggle normal mapping.

## 2 Technical Basis

We use the C++/OpenGL framework from CG course from SS 2021 Cough of Duty: Covid Mode by Victor and his partner for the course Georg. Following libraries were used:

- irrKlang [1]
- GLEW [2]
- EnTT [3]
- Bullet [4]
- assimp[5]

In the Resources folder, there is a settings.ini file where the resolution can be changed.

### 3 Development Status

We have finished implementing following effects: Volumetric Lighting for Pointlights, Omnidirectional Shadows with PCF. Not all pointlights have volumetric lighting, to lower computational cost.

### 4 List of Effects

#### 4.1 Mandatory Effects

- Omnidirectional Shadowmaps [6]
- Volumetric lighting [7, 8]

#### 4.2 Optional Effects

- Normal mapping
- Environment mapping
- Shadow mapping with percentage-closer filtering

### 5 Assets

We have used the following assets:

- Abandoned House 3D Model [9]
- Background Music [10]
- Spooky tree [11]
- Lantern [12]

### 6 Hardware

We have tested our scene on an Nvidia GTX 1080/1060 6GB as well as an Nvidia RTX 3060Ti card

### References

- [1] “irrKlang - audio and sound library for C++, C# and .NET.” <https://www.ambiera.com/irrklang> [Last Accessed 2022-10-12].
- [2] “Glew: The opengl extension wrangler library.” <https://glew.sourceforge.net/>. (Accessed on 11/26/2022).

- [3] M. Caini, “Gaming meets modern c++ - a fast and reliable entity component system (ecs).” <https://github.com/skypjack/entt> [Last accessed: 2022-10-12].
- [4] “Bullet Real-Time Physics Simulation — Home of Bullet and PyBullet: Physics simulation for games, visual effects, robotics and reinforcement learning..” <https://pybullet.org/wordpress/> [Last Accessed: 2022-10-12].
- [5] “assimp/assimp: The official open-asset-importer-library repository. loads 40+ 3d-file-formats into one unified and clean data structure..” <https://github.com/assimp/assimp>. (Accessed on 11/26/2022).
- [6] A. Cech, “Revision course: Omnidirectional shadows,” *TU Vienna*, 2021.
- [7] A. Cech, “Revision course: Volumetric lighting,” *TU Vienna*, 2021.
- [8] B. Iomiej Wronski, “Volumetric fog and lighting,” *GPU Pro 360*, 2018.
- [9] “Low-poly furnished abandoned house - download free 3d model by neokg (@neokg) [ab6c142].” <https://sketchfab.com/3d-models/low-poly-furnished-abandoned-house-ab6c142e1c494c8e84dd82c852138501>. (Accessed on 01/13/2023).
- [10] “Royalty free background music downloads - fesliyan studios.” <https://www.fesliyanstudios.com/>. (Accessed on 11/26/2022).
- [11] “Spooky tree - download free 3d model by marissa menlove (@rissymenlove) [3f05064].” <https://sketchfab.com/3d-models/spooky-tree-3f050640e5d245ccb458aa5184f241e7>. (Accessed on 01/07/2023).
- [12] “Lantern - download free 3d model by linsort (@linsort) [24c99e7].” <https://sketchfab.com/3d-models/lantern-24c99e7b17774718a0b0b793a8c11ede>. (Accessed on 01/13/2023).