

# EZG18 - Haunted Castle

---

## Story

---

The user finds herself/himself in a medieval dark room and can barely identify the objects around him/her. Suddenly torches catch fire as if by ghost hand. He/She takes a look around the room and sees different things moving: A chair that is moving forward, chess figure starting moving ([Fool's Mate](#)), torches move to an upright position and paintings falling down. All ends with the wardrobe falling on the user.

## Scene

---

Medieval room with torches on fire, knight armors, chairs with chess desk, stone walls, paintings and closet.





## CONTROLS

---

### ALWAYS AVAILABLE

Key(s)	control
F1	Help / Show Controls
F2	Frame Time on/off
+/-	Ambient Light up/down
Page up/Page down/Pos1	Speed up/down/reset (The speed of the sound is not changed. Therefore it gets out of sync)
C	Debug Mode on/off
ESC	Quit Game

### JUST IN DEBUG MODE

Key(s)	control

F3	Wire Frame on/off
F4	Textur-Sampling-Quality: Nearest Neighbor/Bilinear
F5	Mip Mapping-Quality: Off/Nearest Neighbor/Linear
F6	Viewfrustum-Culling on/off
F7	Normal Mapping on/off
F8	Fire and Shadows 1 on/off
F9	Fire and Shadows 2 on/off
F10	Bloom on/off
F11	Light Shafts on/off
W, ARROW UP	Accelerate
S, ARROW DOWN	Decelerate/Backwards
A, ARROW LEFT, MOUSE DRAG RIGHT	Pan left
D, ARROW RIGHT, MOUSE DRAG LEFT	Pan right
Q	Go down
E	Go up
MOUSE DRAG UP	Camera down
MOUSE DRAG DOWN	Camera up

## DEVELOPMENT STATUS

---

Implemented:

- Bling-Phong illumination model
- Loading all models with textures
- We perform view frustum culling.

- Debug camera ([Controls](#) see above)
- Automatic Camera Movement: The Camera is moving along a predefined [Cubic Hermite Spline](#)
- All [Effects](#) (See below)

## EFFECTS

---

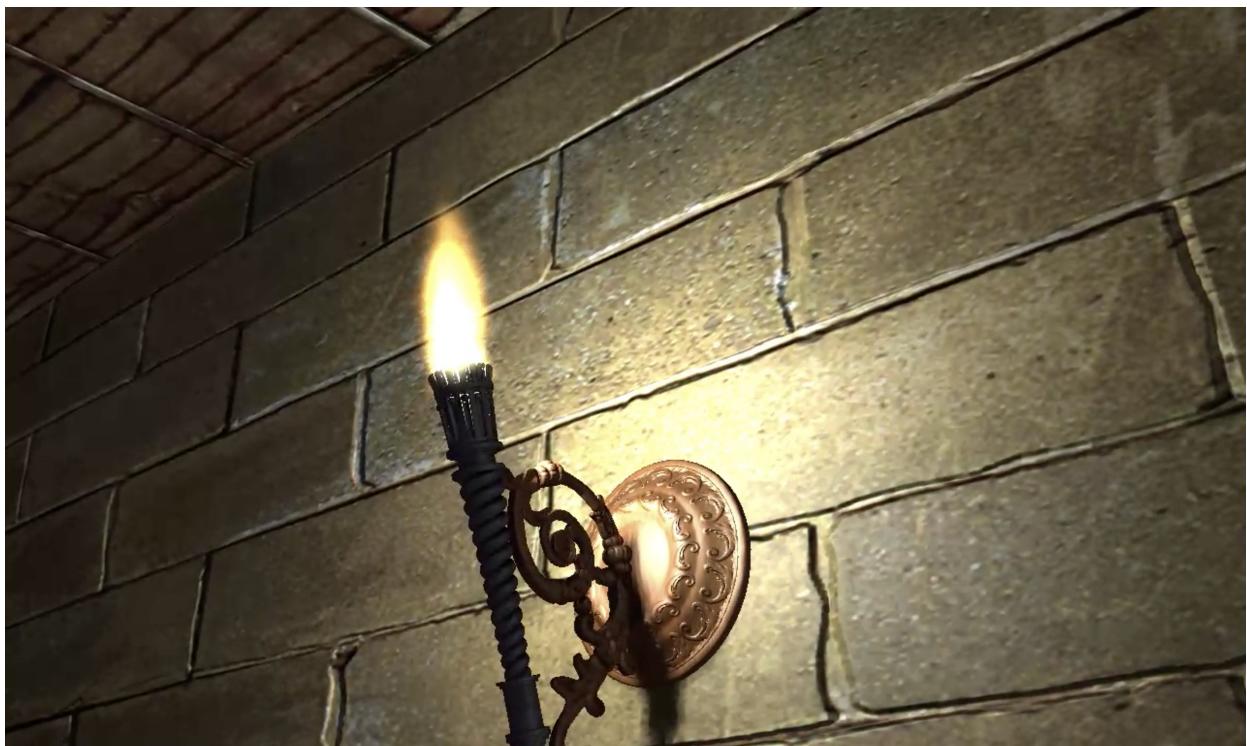
- Direction shadows with PCF (from the sun)
  - The Direction shadows can be seen at the floor. They represent the light of the sun falling in through the Window.
  - <https://learnopengl.com/Advanced-Lighting/Shadows/Shadow-Mapping>



- Bloom (Bright Window)
  - In the scene the Bloom effect is used in the Windows to simulate that it is very bright outside. This effect extracts the brightest parts of the image, blurs them in an extra shader and in a final step adds them to the original image.
  - <http://learnopengl.com/#!Advanced-Lighting/Bloom>



- Fire (Particle Effect)
  - The Fire is realized using Particle Billboards for drawing and Compute Shaders for position updates.
  - Revision Course Slides: Compute Shaders (2018W)
  - Revision Course Slides: Particle Systems (2018W)



- Omnidirectional Shadows

- The Omnidirectional Shadows are the Shadows of Torches. They are “flickering” because the intensity of the fire is irregular.
- Revision Course Slides: Omnidirectional Shadows (2018W)



- Normal/Bump Mapping (Wall)
  - The Normal Mapping can be seen on the walls. It makes texture look more like 2D
  - Lecture Slides: Shading (2018W)
  - <http://www.opengl-tutorial.org/intermediate-tutorials/tutorial-13-normal-mapping/>



- Volumetric Lighting (Light Rays from Sun)
  - Volumetric Lighting is visible as the light shafts falling in through the windows.
  - Revision Course Slides: Volumetric Lighting (2018W)



## IMPLEMENTATION DETAILS

---

# Requirements

- Windows
- OpenGL 3.3 Core Profile
- NVIDIA GTX 1060 (Tested on AMAROK PC in VisLab)

# Tools

- Visual Studios 2013
- Blender: <https://www.blender.org/>
- HitFilm Express: <https://fxhome.com/express>

# Libraries used

- Assimp: <http://www assimp.org/>
- FreeImage: <http://freeimage.sourceforge.net/>
- Glew: <http://glew.sourceforge.net/install.html>
- PhysX: <https://developer.nvidia.com/physx-sdk>
- fmod: <https://www.fmod.com/>

# Models

- Chessboard with figures: <https://free3d.com/3d-model/chess-table-18114.html>
- Chest of drawers: <https://www.turbosquid.com/3d-models/free-sideboard-3d-model/558818>
- Frame: <https://free3d.com/3d-model/frame-75994.html>
- Knight1 and Knight2: <https://free3d.com/3d-model/knight-84265.html>
- Door: <https://free3d.com/3d-model/medieval-door-16986.html>
- Torches: <https://www.yobi3d.com/q/3d-models-fire-torch>
- Wardrobe: <https://www.turbosquid.com/3d-models/classic-wardrobe-unwrap-model-1288182>
- Chairs: <https://www.turbosquid.com/3d-models/free-wooden-chair-3d-model/791045>
- Table: <https://free3d.com/3d-model/round-table-928375.html>

# Additional Textures

- Walls of Room: Stone(1)01 from  
[https://www.cg.tuwien.ac.at/courses/Textures/Total\\_Textures\\_V1/](https://www.cg.tuwien.ac.at/courses/Textures/Total_Textures_V1/)
- Ceiling of Room: Wood(2)09 from  
[https://www.cg.tuwien.ac.at/courses/Textures/Total\\_Textures\\_V1/](https://www.cg.tuwien.ac.at/courses/Textures/Total_Textures_V1/)
- Floor of Room: Wood(2)10 from

[https://www.cg.tuwien.ac.at/courses/Textures/Total\\_Textures\\_V1/](https://www.cg.tuwien.ac.at/courses/Textures/Total_Textures_V1/)

- Frame Image: <https://dermeister.at/evilmaster01.jpg>

## Music

- Spooky Music Instrumental - Ravensbrook: <https://www.youtube.com/watch?v=H9D8fAC6CoU>
- Sound Effects: <https://freesound.org>

## VIDEO

---

<https://www.cg.tuwien.ac.at/courses/Realtime/HallOfFame/2018/video/HauntedCastle.mp4>

## Authors

---

- Michael Pointner, 01427791
- Simon Reisinger, 01426220