

# ADVANCED GRAPHICS FOR GAMES

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## BINARIES

...are available in the "Binaries" folder.

## YOUTUBE VIDEO

Available here: <https://www.youtube.com/watch?v=HmmcYdPmeSk>

## CONTROLS

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### KEYS (BOTH MODES)

<b>F1</b>	Open menu
<b>F2</b>	Show performance stats (FPS, frustum culling etc)
<b>F3</b>	Reload shaders
<b>G</b>	Toggle show G-buffer
<b>Esc</b>	Back to the menu/exit

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### AUTOMATIC MODE KEYS

<b>Pause/P</b>	Pause scene advancement
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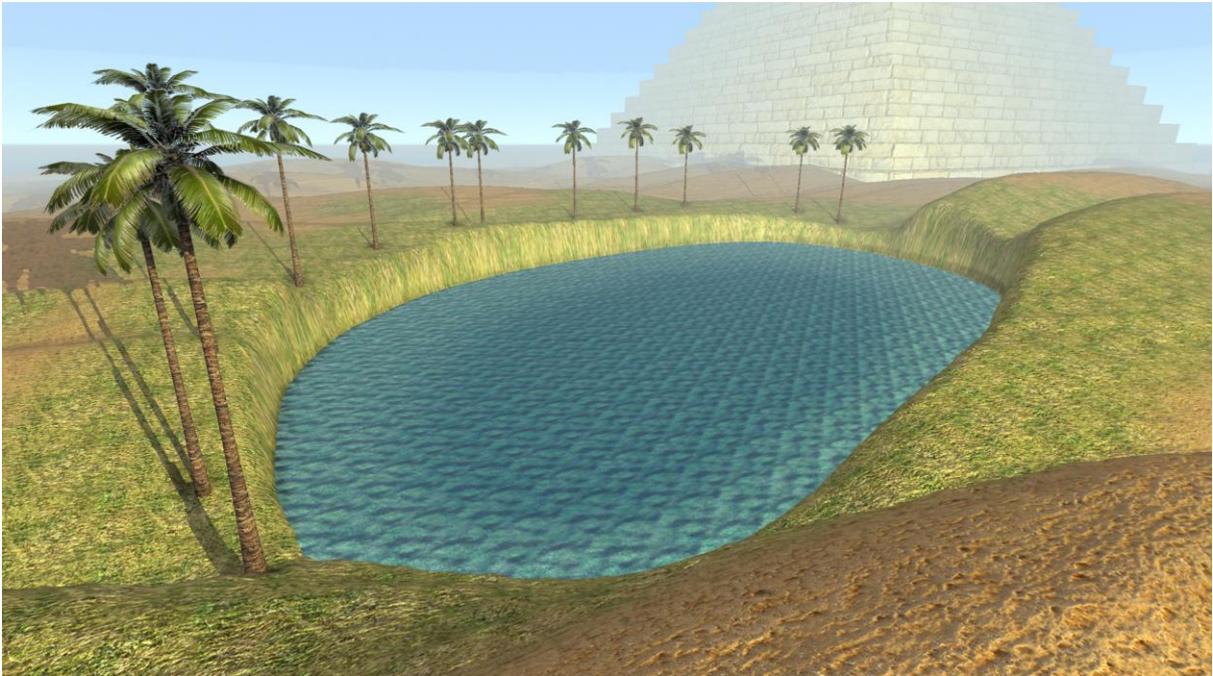
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### MANUAL MODE/PAUSED AUTO KEYS

<b>Left/Right Arrows</b>	Previous/Next scene
<b>WASD</b>	Movement
<b>Shift/Space</b>	Down/Up movement
<b>M</b>	Toggle mouselook

## SCREENSHOTS

### SCENE 1 ("DESERT OASIS")

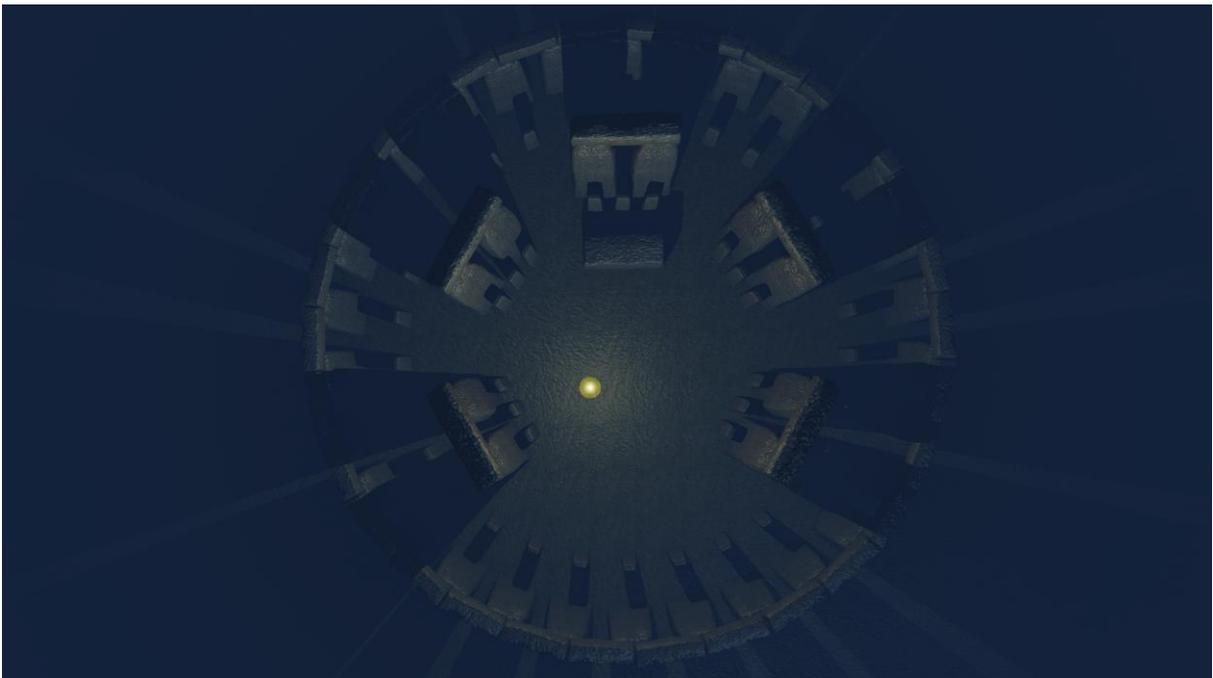


#### NOTABLE EFFECTS:

- Normal mapping
- Runtime heightmap generation from image file
- Multitexturing with texture selection map (oasis grass)
- Distance-based fog
- Screen-space ambient occlusion
- Omnidirectional shadow mapping (though only shown from sun)

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## SCENE 2 ("STONEHENGE")



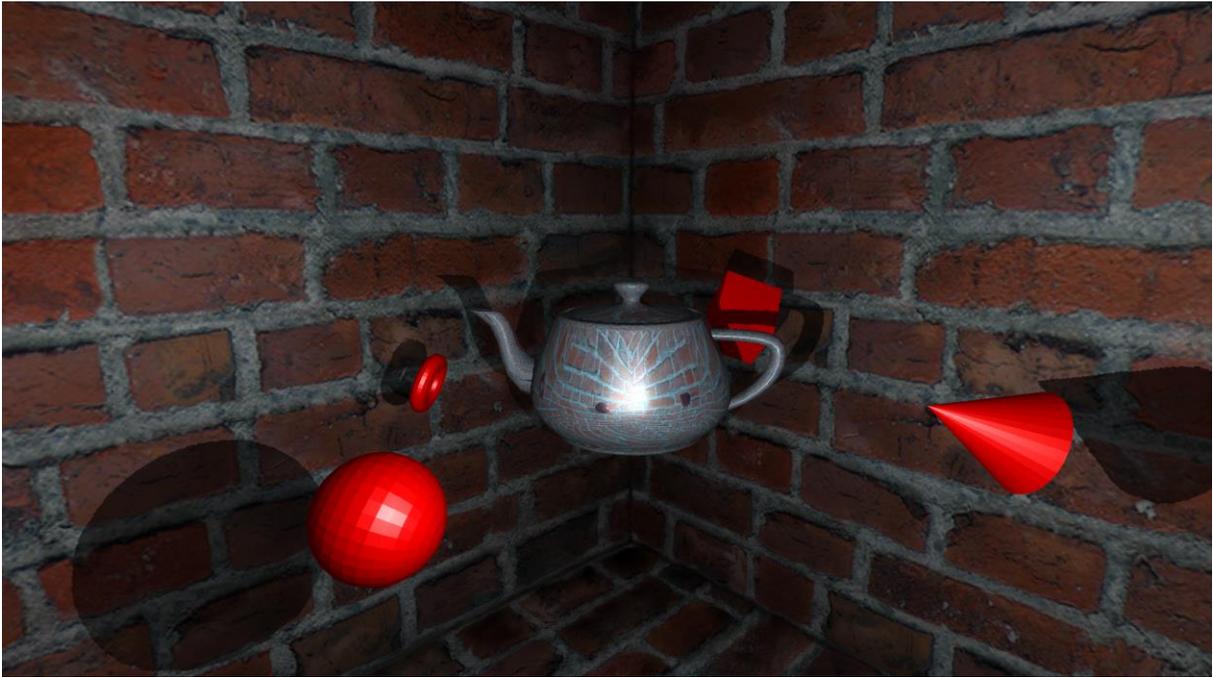
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### NOTABLE EFFECTS:

- Skybox
- Distance-based fog
- Screen-space ambient occlusion
- Omnidirectional shadow mapping
- Multiple point lights (moon and firefly)
- Moving firefly that affects shadows around the stonehenge

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SCENE 3 ("FX ROOM")



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NOTABLE EFFECTS:

- Dynamic environment that reflects not only surrounding walls but live moving objects
- Tessellated brick walls with heightmap applied
- Omnidirectional shadow map from single point light
- It has a teapot. What good is a graphics project without the Utah teapot?

## ACKNOWLEDGMENTS

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### ENGINE:

- An 'upgraded' and partially rewritten version of my custom Stage 3 Games Engineering engine with a new deferred renderer and improved/bugfixed SSAO implementation from my dissertation project. Some design choices were inspired by NCLGL (by Dr. Richard Davison).
- New GUI system courtesy of Dear ImGui: <https://github.com/ocornut/imgui>

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### SCENE ASSETS

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#### DESERT SCENE:

- Heightmap: <http://zero-k.info/Maps/Detail/7317> (edited by myself)
- Skybox: <https://opengameart.org/content/sky-box-sunny-day>
- Sand texture: <https://3dtextures.me/2017/03/23/sand-002/>
- Water normal map: <https://www.filterforge.com/filters/4660-normal.html>
- Pyramid: modelled and UV-mapped by myself in Blender
- Pyramid textures: <https://www.filterforge.com/filters/10014.html>
- Palm tree: <https://opengameart.org/content/palm-tree-v2>

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#### STONEHENGE SCENE

- Skybox: <http://www.custommapmakers.org/skyboxes.php>
- Model: <http://www.sharecg.com/v/77927/browse/5/3D-Model/Stonehenge>
- Stone textures: <https://opengameart.org/content/50-free-textures-4-normalmaps?page=1>
- Grass textures: <https://opengameart.org/content/3-seamless-grass-textures>
- Firefly texture created by myself

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#### FX ROOM SCENE

- Brick wall textures: <https://opengameart.org/content/brick-wall>
- The famous Utah Teapot - I used this version: <https://github.com/rbarril75/Scratched-Blue-Teapot/blob/master/teapot.obj>
- Other objects generated in Blender

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### SHADERS

- Omni-directional shadowmapping written with help of: <https://users.cg.tuwien.ac.at/husky/RTR/OmnidirShadows-whyCaps.pdf>
- Dynamic cubemapping written with help of: [https://www.youtube.com/watch?v=IW\\_iqrtJORc](https://www.youtube.com/watch?v=IW_iqrtJORc)