Изображение выглядит как искусство

Автоматически созданное описание

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| ***LEVEL 1 SUBMISSION – REPORT*** |

**OVERALL**

The outdoor 3d scene benefits from gradually changing day and nighttime, as well as separate sky spheres for both periods. The realistic effect is achieved thanks to light setup by using vertex and fragment shaders, ambient, directional, and specular light breathes life into the scene and fragment lighting enhances this effect where needed. Also, the crucial part is appropriate textures and normal maps with a little polish of exponential fog.

**Spotlight** – Spotlight uses per-fragment lighting with attenuation to provide a realistic look, as well as emissive light for the bulb itself.

**Shininess** – only 3 objects are affected by specular light. Lamps, as we discussed, are not natural but look good, for the main terrain a very low level of shininess, and a lot for a road as it’s icy.

**Terrain and road** - are made by using height maps, where one of them is a bit lower than the other, it could be redone, by just deleting everything apart from the road and taking the coefficient between the main map and road map, to get the proper position for road.

**Adjustments** - The house and Christmas tree have adjusted ambient light in the init function, it might be because of normal calculations for normal maps, and not enough information is loaded.

**Good to know (not a bug – a feature) -**Lights off not exactly at a time when the night is over but continues while directional light will not take place.

**INTERACTION WITH THE WORLD:**

* N – increase time 5 times with each press of the button, though I didn’t bother too much at this stage of the project, so it works a bit stupidly and when you press N it increases speed 5 times but changes the current daytime. float elapsedTime = glutGet(GLUT\_ELAPSED\_TIME) / 1000.0f \* timeAccelerator;
* M – Reset world back to speed 1, but again it resets time as well, I should save offset of time, but I hope it’s alright for the level 1 project.
* 1 & 2 – Are responsible for manual lamp controls, 1 works for all lamps from the left and 2 for all from the right side of the road, each switch has 3 stages {AUTO, ALLWAYS ON, ALLWAYS OFF}, when it’s auto light work according to the task (off at daytime, works at nighttime)

***Unfortunately, it’s not very intuitive – For example if Light is AUTO now, and it’s working, if you press the button, it will change nothing, but you switched from AUTO to ALLWAYS ON.***

**TECHNICAL**

**Main.cpp:**

* **TextureSetup()** -  setups textures
* **NullTexture()** – simple gray texture
* **init()** – loads 3D objects textures etc. to be used in the render function
* **setMatrix** – universal function to set objects using a scale, position, color etc.
* **CalcCurrentDayTime()** – the main function to calculate day circles, which will be used for directional light and rendering of skyboxes.
* **Directional()** – uses the previous function to get the time and set XY location of directional light, also as colour for directional light, to be 0 at the start of the day, 1 at peak and back to 0 at evening. Off during nighttime.
* **SkyBoxAndDayCalculation()** – uses CalcCurrentDayTime() to calculate ambient light for the sky sphere, as well as sphere rotation and changes between day and night. Also responsible for fog.
* **AmbientLight()** - just adds even ambient light to the scene.
* **streetLampFun** – creates a streetlamp and spotlight on a given location, and using an additional solid sphere creates the effect of emissive light.
* **renderScene()** – apart off using all previous functions, renders all 3d object, terrain and road by using height map

**Shaders**

Not much to say as it mostly copies and paste from your recipes, as an EXTRA directional light is per fragment light to see normal maps during daytime.