

Documentation

Group/Game Name: **Snapsquatch**

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Game description:

The gameplay consists of searching for a sasquatch in a deep forest and taking directly centred photos of it. After taking a photo the beast will disappear and the search must go on. After a certain amount of time the camera battery will die and the player is presented with his high score.

The game was created using OpenGL with Bullet Physics and Assimp to create a character controller that moves by force. The models were implemented so they can generate a collision shape that represents the model. By switching the hud and the fov of the camera the player is able to enter the camera view mode. The camera takes a picture by sending a ray in the direction of the player and increases the score if the sasquatch was hit. After a timer reaches the end, the accuracy of the player, from capturing photos of the sasquatch, and the score is presented.

Features:

Gameplay:

Mandatory:

3D Geometry:

- Non-trivial 3D objects like trees and the sasquatch with Assimp

Playable:

- POV Perspective Player Character
- WASD and Mouse Input (see Walk-through and Keylayout)

Advanced Gameplay:

- ADS (aim down sight) game mechanic with camera
- Take a foto game mechanic (bullet line trace)
- Collision with objects
- Get a Score and try to beat it (only if game was not closed in between)
- Game menus (start and end screen)

Min 60 FPS and Framerate Independence:

- Good performance fps < 60
- Every movement frame Independent. (test with debug mode and fps display on)

Win/Lose Condition:

- A round ends after 3 minutes and a score and an accuracy is presented. There is also the possibility to try again and crack your high score.

Intuitive controls;

- See Walk-through and Keylayout

Intuitive Camera:

- Possible to change camera to debug (flying mode) camera (see Walk-through and Keylayout)

Illumination model:

- Multiple light sources + assigned materials for each objects
- Flashlight to toggle (see Walk-through and Keylayout)

Textures:

- Textured models with mipmapping and trilinear filtering enabled

Moving Objects:

- Sasquatch movement (walks in a circle)
- Player movement

Adjustable Parameters:

- Default settings.ini

Optional:

Collision Detection (Basic Physics):

- Physic simulation with Bullet Physics
- Collision shapes for all models
- Moving collision shape for sasquatch and character
- Ray trace test for checking if sasquatch was photographed.

Heads-up Display:

- Multiple HUD Overlays for battery, camera, crosshair, current score and menus

Effects:

Animation:

GPU Vertex Skinning:

- Sasquatch with bone structure is fully vertex skinned and animated in the shader

Texturing:

Specular Map:

- For all models but the sasquatch model (see Walk-through and Keylayout to toggle)

Shading:

Simple Normal Mapping:

- For all models but the sasquatch model (see Walk-through and Keylayout to toggle)

Other features:

- Implemented Skybox without environment reflections
- Randomly generated forest

Walk-through and Keylayout:

Find Sasquatch while moving through the forest, once found center him in the crosshair and left click to take a photo. If the photo is taken successfully, the score in the bottom left gets updated. The timer is shown through the battery display in the top right and is 3 minutes long.

- Key F1 to toggle wireframe mode
- Key F2 to toggle culling
- Key F3 to toggle Physics debug mode
- Key F4 to toggle Specular Maps
- Key F5 to toggle Normals Maps
- Key F6 to toggle FPS display
- Key F7 to toggle DebugCamera
- Key ESC to close the game
- Keys W, A, S, D for movement
- Hold Shift to sprint
- Left mouse click to take a photo
- Right mouse click to look through the camera
- Key Spacebar to continue the game
- Key F to toggle Flashlight
- Key Tab for Key Layout

Additional libraries and sources:

Libraries:

- Bullet to achieve collision detection (<https://pybullet.org/wordpress/>)
- Assimp to load models (<http://assimp.org/>)
- GLText to render text on screen (<https://gltext.sourceforge.net/>)

Sources:

- [Assimp-tut]: <https://learnopengl.com/Model-Loading/Assimp>
- [VertexSkinning-tut]: <https://ogldev.org/www/tutorial38/tutorial38.html>
- [NormalMap-tut]: <https://learnopengl.com/Advanced-Lighting/Normal-Mapping>
- [SpecularMap-tut]: <https://learnopengl.com/Lighting/Lighting-maps>
- [Wood-textures]: <https://freepbr.com/materials/pine-tree-bark/>
- [Floor-textures]: <https://freepbr.com/materials/forest-floor1/>
- [Sasquatch-model]: <https://sketchfab.com/3d-models/lowpoly-bigfoot-a85b050494a14d8aa7a5a94c82a6176c>
- [Sasquatch-animation]: <https://www.mixamo.com>
- [Skybox-image]: <https://skybox.blockadelabs.com>