Transformers - Rendering

CS 475/CS 675: Computer Graphics - Assignment 2, Part 2

Due Date: 24/10/2014

1 Transformers

Transformers are robots that can transform into various kinds of vehicles, like cars, planes and helicopters. They originally are a toy line by Hasbro Inc.

As an example, you can see these:

`http://www.youtube.com/watch?v=veZck1MtX5g`

The overall aim of this entire assignment is to create a short film with a transformer of your own design. In this part of the assignment you will render the transformer, make the vehicle drivable add advanced lighting and camera motion.

2 Vehicle Modelling Requirements

In the previous part of the assignment you created the transformer robot that can change into a vehicle at the press of a key. In this part, you have to make the vehicle drivable.

In vehicle mode, pressing

1. the up arrow key must move your vehicle forward

2. the down arrow key should move it backward

3. the left and right keys should turn the vehicle while driving.

4. The wheels should rotate appropriately while driving and they should turn properly while turning the car.

3 Lighting and Texturing Requirements:

1. Create a overall environment to put your transformer in - the environment can be indoors i.e., a room. Decide the scale of the room with

respect to the transformer yourself. You are free to decide if the robot is huge like in the movie or small, like in Toy Story! The environment can also be outdoors - at minimum you must have a floor or ground plane, and a surrounding environment like walls or sky. Put appropriate textures on the sky, ground, walls - as necessary to make the environment realistic.

2. Add at least two directional lights to your scene to light your scene. You can add more if you want but at least two is compulsory. Add keys that can switch these lights on and off. Make sure the textures are lit properly and that the lighting works with the texture.

3. Add two headlights to your car using OpenGL spotlights - again assign keys to turn them on/off. Create geometry for these lights that also becomes appropriately brighter when the lights are turned on.

4. Make sure your robot and vehicle are appropriately textured.

4 Camera Requirements

1. Create 3 cameras and assign keys to toggle the current view between these three camera views.

2. The first camera should give a global view of the entire scene and can be static.

3. The second camera must be inside the vehicle and must give the driver's view of the world. The camera must move with the vehicle when it is being driven, but must stay in a fixed position relative to the vehicle. This is a first-person view camera.

4. The third camera must be above and behind the robot/vehicle, must follow the transformer around whenever it moves in any mode. Again, the camera must stay in a fixed position relative to the transformer. This is a third-person view camera.

5 Use of OpenGL and GLFW

You are free to use whatever OpenGL and GLFW functions you want. No external modeler like Maya or Blender should be used. All modeling is to be done in OpenGL.

6 Things to avoid:

1. Do not compile and produce an *a.out*. Learn how to use a Makefile.

2. Do not write code for non-inlined functions in header files.

3. Do not write untidy code - you will lose marks if you sprinkle your code with global variables, write code that is difficult to read and is unindented or write code that is not properly structured into objects, classes and files. Only the GLFW callbacks need not be encapsulated in any class and global variables are permitted only in the main program file.

4. Do not make a model that looks exactly similar to some other group's model from the class - both groups will then lose marks. This is an assignment where you have enough chance to show that all of you are original thinkers - please do not hesitate to be creative. So you are free to discuss solution strategies with your classmates but make sure that your code and your models are different.

7   Marking

- Making the correct driving controls with correct driving: 40 + 20 = 60 marks

- Correctly modelled and textured environment : 20 marks

- 2 Directional lights with switch keys: 20 marks

- Headlights with switch key: 30 marks

- 3 cameras : 60 marks

- Lighting working with textures: 10 marks

- Report showing progression of work : 10 marks

- Total : 210

- Deduction - I am expecting everybody to write properly formatted, indented and structured code from now on. Untidy code will be penalized.

- Late submission will follow a policy of graceful degradation with a 25% penalty for each day's delay (i.e., you get zero marks if the assignment is more than three days late after the due date.)

TO SUBMIT:

1. A Tar-Gzipped archive of the complete source code (and only source code). It should compile using the given Makefile on any Ubuntu system.

2. A link to a html report page on the assignment that should contain some details about what you implemented and images of some the results that you generated. Put the link in a README file in the archive you submit. Also, include all the keyboard bindings in your code that move/light/change the camera.

3. The submission will be through the submission portal.