Middle East Technical University | Department of Computer Engineering

CENG 477

Introduction to Computer Graphics

Fall '2012-2013

Programming Assignment 2

Due date: 28 November 2012, Sunday, 23:55

1 Objectives

This assignment aims you to get familiar with OpenGL programming and and transformations using the OpenGL API.

2 Specifications

In this assignment you will implement a basic punchbag simulation according to the following rules:

- In the environment, there will be a punchbag and two arms that moves with the camera on a large rectangular ground.
- The punchbag hangs on a vertical support that consist of a vertical cylinder pole and a horizontal cylinder pole on top of the vertical one. The punchbag will consist of a vertical cone and a sphere that resides at the bottom of the cone.
- Arms of the boxer will consist of a cylinder and a red sphere (boxing glove) on the edge of the cylinder. There will be 2 arms which reside in the bottom right and bottom left of the camera. Arms will move with the camera so that arm positions with respect to the camera will not change. Arm direction will always be same with the viewing direction.
- Camera will travel in the environment with keyboard keys with **a constant height** over the rectangular ground. That means camera will move with respect to the projection of the viewing direction on the ground. **'w'** key will move the camera to the projection of viewing direction. **'a'** key will move the camera to the left of the projection of viewing direction. **'d'** key will move the camera to the right of the projection of viewing direction. **'s'** key will move the camera to the back of the projection of viewing direction. Camera movement will continue as long as the keys are pressed. Up and viewing vector of the camera will not change by pressing these traveling buttons.
- Camera viewing direction will change with the mouse movement. Moving mouse forward will turn the viewing vector up. Moving mouse backward will turn the viewing vector down. Moving mouse left will turn the viewing vector left. Moving mouse right will turn the viewing vector right. Camera position will not change with mouse movement.

- Arms will move with the viewing direction with mouse keys. Pressing left mouse button will move the left arm forward and backward once with constant speed in viewing direction. Pressing right mouse button will move the right arm forward and backward once with constant speed in viewing direction.
- Punchbag will swing in the punch direction if the punch button is pressed and the moving glove touches to the punchbag. Punchbag will swing forward and backward once with respect to punch direction.
- Punchbag height will change with keys if the camera near to the punchbag vertical pole. You can arrange the maximum distance that punchbag height can be changed. Near the punchbag, pressing **'z'** button will reduce the vertical pole size in a constant speed while pressing **'x'** button will extend the height of vertical pole. The pole will shrink or extend as long as **'z'** or **'x'** button pressed respectively.
- The program will handle multiple keys at the same time. The program will exit with **Esc** key.

3 Submission

Submission will be done via COW. Create a .zip file named `hw2.zip` that contains hw2.cpp and makefile. **Note:** The submitted archive should not contain any directories! The following command sequence is expected to run your program on a Linux system:

```
$ unzip hw2.zip
$ make
$ ./hw2
```

You have a total of 7 late submission days for all homeworks, however each homework cannot be late by more than 3 days. You will get zero if you submit outside of these limits.

4 Cheating Policy

We have zero tolerance policy for cheating. Sharing code between each other or using a solution from the Internet are strictly forbidden. People involved in cheating will get zero from the homework and will be transferred to the disciplinary actions committee.