University of Southampton	***School of Electronics and Computer Science***	***Coursework (3 of 4) Instructions***
Module: COMP 3214	Title: Principles of Computer Graphics.	Lecturer: Dr. J N Carter
Deadline: 22 March 2015	Feedback: + 4 working weeks.	Weight: 5%

Instructions

Introduction

This coursework is designed to give you a little experience using the Bullet Physics Engine to bounce spheres, cubes and any other object around the inside of a cubic cell.

It is based entirely on your experience with coursework 1. You will find that most of the graphics component that you will need exist.

This is not a graphics project. There will be no marks for the graphics program demonstrating the moving, bouncing and colliding objects. However you are advised to generate such a program as it helps to be able to see what is happening when debugging the process.

On-line you will find an example program, which restricts motion to the x/z plane only, together with instructions on using this with the Bullet framework.

Deliverables.

The deliverables of this coursework are:

A program that bounces at least *2 spheres and one cube* around a cubic arena with gravity off and a coefficient of restitution of 1.0, i.e. perfect loss less bounces.

The program should use a header file called world.h which will allow the simulation to be easily build with different parameters

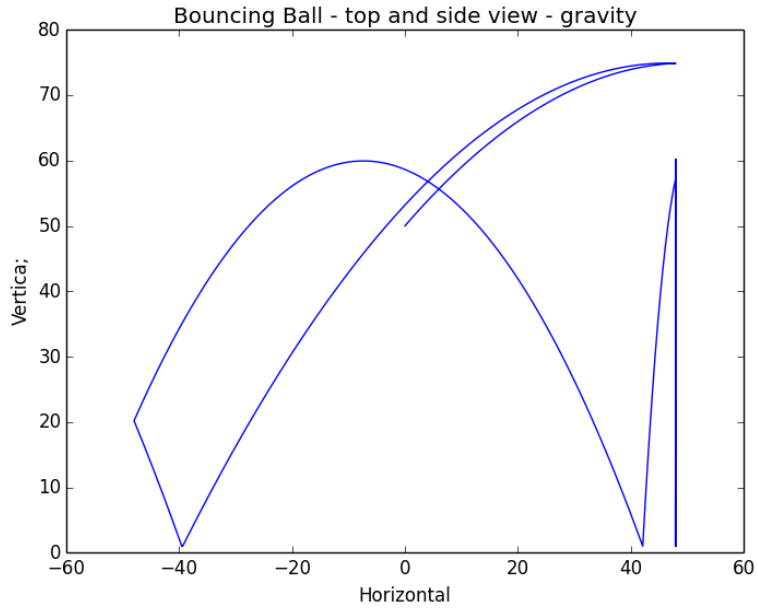
The file should look like this

```
/*
 * simulation parameters
*/
#define GAVITY -9.81
*/
 *Defined in the z direction
 *
#define COE 1.0
/*
* Coefficient of restitution.
*/
```

You may include any other global parameter as you see fit.

When run your program, it should output a text file containing the position of each object as the clock ticks. See the demonstration program for details of formatting.

Your work will be evaluated by inspecting the tracks of the objects graphically off-line.



The figure shows the trajectory of a sphere under the influence of gravity. The sphere is constrained to the plane defined by the vertical and horizontal.

Submission

You should submit your working source code via the hand-in system.

Relevant Learning Outcomes (LOs) – to be completed before week 6

1. Become familiar with the Bullet Physics Engine.
2. Show an understanding of how forces and collisions are implemented.
3. Demonstrate the ability to insert fixed shape objects and track them as they bounce around an arena.

Marking Scheme

Criterion	*Description*	*LOs*	*Mark/5*
Basic Program	A functional Program	1	1
Force & Collisions	Defining gravity, coefficient of restitution.	2	1
Spheres	At least two spheres	3	2
Non spherical object	At least one non spherical object such as a cube.	3	1

Late submissions will be penalised at 10% per working day. No work can be accepted after feedback has been given.
You should expect to spend up to 8 hours on this assignment. Please note the University regulations regarding academic integrity.