Computer Graphics Labs

Abel J. P. Gomes

LAB. 3

Department of Computer Science and Engineering
University of Beira Interior
Portugal
2020

LAB. 3

BASIC ANIMATION AND COLLISIONS

1. Learning goals
2. Example
3. Programming exercises

Lab. 3

BASIC ANIMATION AND COLLISIONS

In this lecture, we intend to learn the basics of animation and collision detection when objects move around a 2D scene.

1. Learning Goals

At the end of this lab **you should be able to**:

1. Use geometric transformations with variable parameters to animate objects within a 2D scene.
2. Detect collisions of moving 2D objects against the scene borders.
3. Detect collisions between objects in a 2D scene.

The number of milliseconds is a lower bound on the time before the callback is generated. GLUT attempts to deliver the timer callback as soon as possible after the expiration of the callback's time interval.

2. Example

A program displaying a bouncing square within a sub-domain with a basic collision detection of the bounding edges of such a sub-domain can be found at:

http://www.di.ubi.pt/~agomes/cg/praticas/bouncingsquare.zip

3. Programming Exercises

1. Write a program that moves a 20.0x20.0 square inside a 40x30 domain in $\mathbf{R}^2$. The corresponding viewport has 800x600 pixels. The square movement is carried out in steps of 0.1 in the x-direction and in the y-direction. The initial position of the square is at the origin (0.0,0.0). This program is the one given above, and can be found at:
   http://www.di.ubi.pt/~agomes/cg/praticas/bouncingsquare.zip
2. Change the program at http://www.di.ubi.pt/~agomes/cg/praticas/bouncingsquare.zip to animate two squares that cross in a perpendicular manner inside the box.
3. Change the program at http://www.di.ubi.pt/~agomes/cg/praticas/bouncingsquare.zip to not only move the square, but also rotate it of 2.5 degrees at every single step.

4. Write a program that moves a circle inside a square box. The circle is bounces back when it hits any side of the box. Let us assume that the reflection angle is 45 degrees in relation to the line perpendicular to any box side.
5. Write a program to roll a wheel on a horizontal line.
6. Write a program to roll a wheel on a bias line.
7. Write a breakout game with a ball, a paddle and a set of bricks.