

DMET 502 - Computer Graphics
Assignment II
Deadline: Friday, November 15th, 2019 at 11:59PM

Bouncing ball

In this assignment, you are required to build a 3D environment for a bouncing ball game using OpenGL. The main game idea is that there is a bouncing ball shot into a cuboid room. The room's walls are formed of differently colored bricks. The ball bounces between these walls with normal reflections, and free from any gravity or other forces than the initial shooting force. The following points are discussed in more details:

1. Room design.
2. Shooting station.
3. Controls.
4. Scoring method.
5. Camera motion.
6. Game information.
7. Bonus.

Room Design

1. The room consists of five walls, one to the left side, one to the right side, one to the top, one to the bottom, and an end wall.
2. All walls are allowing free bouncing, except for the end wall which is sticky.
3. Each wall is formed of adjacent bricks of different colors.
4. The bricks are to be of minimum four different colors.
5. The room is of a relatively large depth.

Shooting Station

1. The shooting station is located on the side of the missing wall of the cuboid room.
2. The most basic form of the shooting station is an arrow pointing to the initial direction of the bouncing ball before shooting.
3. The initial direction of the bouncing ball is straightforward, in case fired as is, the ball will only hit the end wall.
4. This initial direction could be changed, which would affect the bouncing behavior of the ball.
5. The directions could be updated in steps.

Controls

1. The game is controlled mainly by the keyboard.
2. The direction of the ball is to be controlled by four buttons that affect the shooting station as well.
3. There is a button for shooting the bouncing ball.
4. During the bouncing animation, the keyboard is disabled.
5. After the end of a shooting round, there is a button for repeating the same shooting round in slow motion.

Scoring Method

1. Based on the color of each brick the bouncing ball hits, the score is to be updated.
2. Each brick group of the same color affects the score the same way, given that there is a group which affects the score negatively.
3. The shooting round ends once the bouncing ball hits the end wall.
4. There are at least three separate shooting rounds.

Camera Motion

1. The simple camera mode is following the bouncing ball in the depth direction only.
2. The enhanced camera mode is giving the effect that the camera is rotating.

Game Information

The player should be informed about all game factors that would affect the game play. These factors are:

1. Left/right and up/down directions in terms of steps.
2. Each shooting round score.
3. The overall score.
4. The camera mode in action.
5. Also, any other factor of convenience.

Bonus

The bonus is divided into two groups. In order to get the full bonus marks, you have to implement one of the groups fully. In case of implementing some features of each group, the grade given will be based on the decision of the evaluator.

- **Group One:**

- More complicated room design, which affects the reflection behavior.
- Better shooting station model.
- Funny sound effects for each brick group.

- **Group Two:**

A bonus brick of a different color is to be added and introduces one of four magical effects:

- 3 times the score.
- Continue with two balls.
- Another two effects of your own invention.

The player should be informed about the magical effect in action.

Grading

1. Room design: 15%.
2. Shooting station: 20%.
3. Controls: 20%.
4. Scoring method: 15%.
5. Camera motion: 15%.
6. Game information: 15%.
7. Bonus: 5%.

Submission Guidelines

- This assignment is worth **7.5%** of the total **course mark**.
- Deadline: **Friday, November 15th, 2019 at 11:59PM**
- This assignment is to be solved by teams of 2 students.
- You should send your assignment as a compressed file before the deadline to graphics.dmet502@gmail.com
- The name of the submitted file should be: ID1_ID2_tutorial1_tutorial2.
- The subject of your e-mail should be:
 - [Assignment 2][name1-ID1-tutorial1] [name2-ID2-tutorial2].
- Emails without a subject will not be graded.
- Any late submission will not be graded.
- Any wrong submission will be discarded.
- Any submission to the personal emails of your lecturer or TA will be discarded.
- Any **cheating** case will get a **zero**.