VIDEO GAME DEVELOPMENT TECHNIQUES

Degree in Engineering and Development of Digital Games

Code: 15712

Main Scientific Area: Computer Graphics and Multimedia

Lecturer: Duarte Filipe Oliveira Duque

Language of Instruction: Portuguese

Regime: S2

Contact Hours: 60h Total Workload: 100h

ECTS: 6,0

Objectives

This curricular unit intends to present the basic concepts associated with the development of video games, namely modularization techniques regarding object-oriented programming, the update / draw architecture of a game, the problems in efficiency management, and some mathematical instruments more common in the development of video games (trigonometry and vectors).

It is also intended to provide the first contact with 2D graphics programming through a graphics framework.Students who successfully complete this curricular unit should be able to understand the structure of a game-oriented to the frame, structure a game as a set of independent objects, and apply mathematical concepts in the implementation of simple movements. They should also be able to use a 2D graphics framework for the development of a video game.

Learning Outcomes

Students who successfully complete this course should be able to:

Define details for a specific game, writing its Design Document;
Know the life cycle of a computer game;
Recognize the typical topology of a digital game;
Use the MonoGame Framework to develop 2D games.

Course Contents

1. Version Control as a tool to support game development

2. Programming concepts for a frame-based game:

- General structure of a game

- Starting and ending a game

- Update / Draw cycle for a game

- Efficiency issues associated with the frame-based approach

3. 2D drawing

- 2D Coordinates, Vectors, Rotation

- Design and movement of sprites

- Time management as a movement smoothing mechanism

- Construction of a generic camera

4. Input management

- Use of the keyboard and problems associated with different events

- Use of the mouse

5. Basic Physics

- Basic collision detection: circles and AABB

- Bounding boxes: AABB vs OBB

- Pixel collision detection

- Basic physical simulation

6. Use of Audio

- Sound Effects

- Music

7. Creation of support structures

- Menus - Transitions

Recommended Bibliography

- Pile, Jr., J. (2019). 2D Graphics Programming for Games. A K Peters/CRC Press.

- Pavleas, J., Keng-Wei Chang, J. (2013). Learn 2D Game Development with C#. Apress Publishing

- Madhav, S. (2013) Game Programming Algorithms and Techniques: A Platform-Agnostic Approach. Addison-Wesley.

- Miles, R. (2011) Microsoft XNA Game Studio 4.0: Learn Programming Now! Microsoft Press.

- Jaegers, K. (2010) XNA 4.0: Game Development by Example. PACKT Publishing.

Learning and Teaching Methods

The course contents include addressing the fundamental concepts of game development, in its theoretical and practical aspects. Initially are presented the basic concepts of digital game development, including writing a script for the game and basic theoretical concepts of MonoGame framework. These concepts are then extrapolated and gain complexity in the implementation of 2D digital games.

Assessment Methods

Learning and assessments are eminently practical, with emphasis on daily work of game programming in the classroom. The fundamental learning to achieve are:

- The knowledge of theoretical concepts of MonoGame framework;

- Knowledge of various approaches to the development of 2D video games.

The evaluation comprises three main components:

- Written test, with a weight of 40% in the final grade

- First practical project (remake of a tile-based classic game), with a weight of 25% in the final grade

- Second practical project, with a weight of 35% in the final grade.

Each component has a minimum grade of 9.5 values.

Practical projects will only be evaluated during continuous evaluation (dates to be defined with students).

Students that do not achieve a minimum grade in the practical project cannot do the written test.In examination epoch, students can only make their written theoretical evaluation (40%), keeping the practical part evaluation.