Tecnologias e Sistemas de Informação para a Web

COMPUTAÇÃO GRÁFICA – 2021/2022 – Project 01

Goals

The first project of Computer Graphics aims to develop the students algorithmic reasoning skills and demonstrate its capabilities of using the HTML5 canvas, SVG and CSS3 web 2D animations, by developing the arcade game **ASTEROIDS**[1].

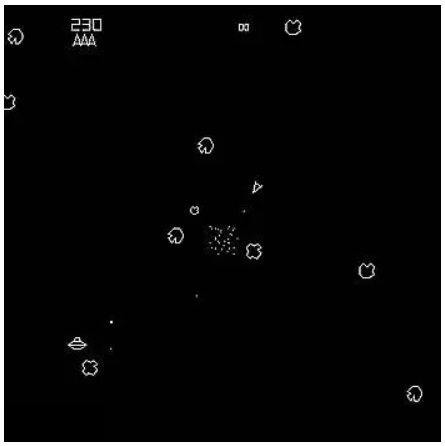
Asteroids is a space-themed multidirectional shooter arcade game released in 1979 by Atari. It was one of the first major hits of the golden age of arcade games.

Each level begins with a few asteroids drifting and floating in random directions across the screen. Periodically, a UFO appears on one side of the screen and moves across to the other side before disappearing. The player controls a single triangular spaceship that can rotate clockwise, anti-clockwise, and can fire shots forwards from its 'nose'. He/she can only move the ship in the direction it is pointing. The ship can also thrust forwards: as the ship moves, its inertia momentum slowly decreases, and the ship eventually stays standstill again if thrust is not applied.

The goal of the game is to shoot and destroy the asteroids and saucers, while not colliding with either, or being hit by the saucers' counter-fire. As the player shot asteroids, they shattered into smaller pieces that usually moved faster and were obviously more difficult to shoot. Smaller asteroids that are destroyed also scores higher points. The game becomes harder as the number of asteroids increases.

All in-game objects are wrapped around the screen edges, for example an asteroid that drifts off the top area of the screen re-appears at the bottom of the screen and continues drifting in the same direction.

Once the screen has been cleared of all asteroids (and flying saucers if any), a new set of large asteroids appear, usually denser in number than the last. Like most games of the era the game is endless and only ends when the player has lost all of his or her lives.



(WATCH VIDEO @ https://youtu.be/WYSupJ5r2zo)

[1] https://en.wikipedia.org/wiki/Asteroids_(video_game)

Considerations:

- the graphics must be created by the students, either through images or using Canvas drawing primitives;
- each group must think of a maximum of 3 **twists** to apply to the Asteroid game rules and mechanics described before, in order to **simplify** them.

Students must:

- develop the main game animation using JavaScript and the HTML5 element Canvas;
- implement an introductory animation, like the good old style of computer games, using SVG elements and animating them using CSS animations and transitions;
- the introductory animation must have at least 5 seconds;
- at least one SVG element has to be created by the students (simple primitives don't count); the remaining primitives and other resources must be under Creative Commons licenses, and properly referenced.

Implementation

Students should implement the project **in groups of 3 elements**. The groups should identify themselves in the Wiki available in Moodle until the **29th of October**.
Students should concentrate on three components: **visualization**, **interaction** and **animation**.
The use of frameworks or other graphic libraries must be previously agreed with the professor. The use of external resources should be used as a source of inspiration or help in solving small algorithmic issues. All assets/code not developed by the students must be properly referenced. The work will be **disqualified** if plagiarism is detected and may trigger a **disciplinary process**.

Evaluation

The final evaluation of the project is based on the deliverance and overall quality of web game. The following penalties will be applied if some of these deadlines are not fullfilled:

- **1st delivery** – complete description of the goals the group expects to achieve, with the indication of the changes (simplifications) to be implemented regarding the Asteroids base rules: **-1 value**;
- **2nd delivery** - .zip file with the project code and a text file describing the features DONE, IN PROGRESS and TODO: **-3 values**;
- **In-class follow-up** – presence during the classes dedicated to project follow-up: **-2 values**;
- **2nd delivery** - .zip file with the project code: **-10 values**;

Deadlines

1st delivery: **1st November**
2nd delivery: **22nd November**
Final delivery: **2nd December**
Defense: **3rd December**

- Mandatory presence of all group members
- Absent students will not be evaluated