

School of Computer Science  
University of St Andrews  
2015-16  
CS4303  
Video Games  
Practical 1: Particle Command

This Practical comprises 20% of CS4303. It is due on Friday 2<sup>nd</sup> October at 21:00.

The deliverables consist of:

- A report
- The Processing source code for the video game you will write.

In addition there will be a **short demonstration** of your game to one of the module lecturers, to be scheduled following the deadline.

The practical will be marked following the standard mark descriptors as given in the Student Handbook (see link below).

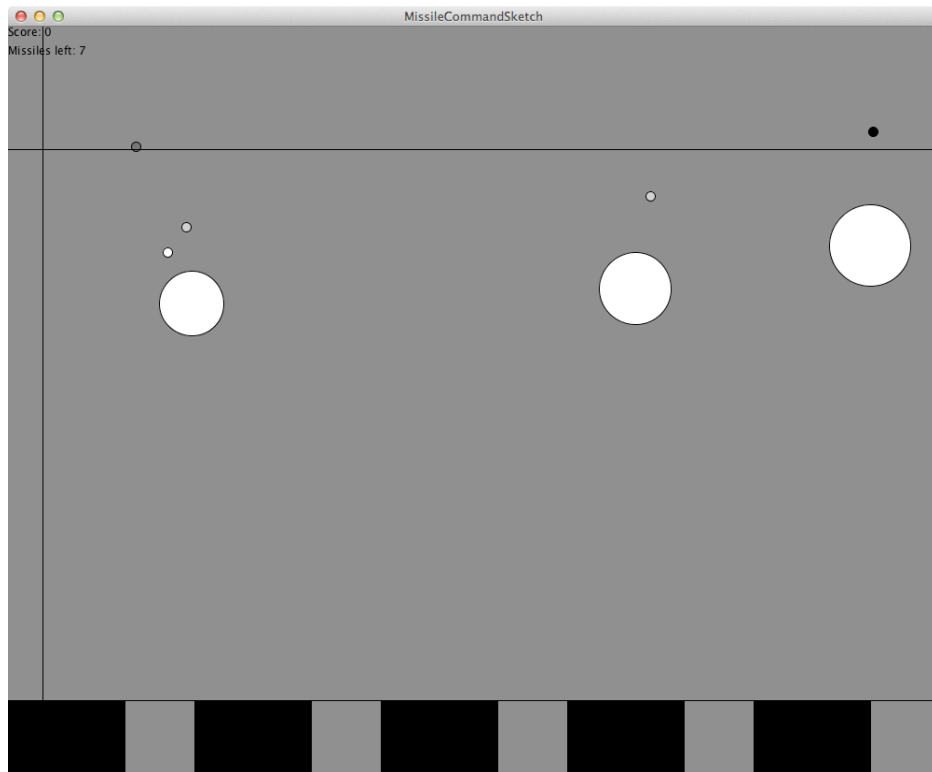
### Problem Specification

This practical is intended to give you the opportunity to learn the Processing language, and implement some of the concepts in the Physics component of the module.

The task is to implement Particle Command, a variant of the classic video game Missile Command, with the following gameplay elements:

- Instead of missiles, particles (think of these as rock projectiles, as in Starship Troopers) fall from the sky (the top of the play area). These particles should have a random initial velocity, and they **must** be affected by both gravity and drag as described in lectures. For ease of collision detection, it is suggested that you render these particles as circles. The number of particles in play at once is a design decision, which may vary by wave (see below), and should be justified in your report.
- At the bottom of the play area is the ground, which is occupied by a number of cities that are being defended by the player. The number and arrangement of these cities is a design decision for you to make, and again should be justified in your report.
- If a particle hits a city, the city is destroyed. If all cities are destroyed, the game is over.
- The player controls a missile battery with the mouse/trackpad. Aiming should be performed with the aid of a crosshair, and firing via a mouse/trackpad click. Firing a missile results in an explosion at the targeted area, with a blast radius that decreases over time. All particles caught in the blast radius are destroyed. You are not required to render the flight of a fired missile (although doing so would be a good extension activity). Each particle destroyed should result in the award of points in a scoring system of your design.
- The game should be organised into waves/levels. Within each wave, the number of particles and missiles is limited. At the end of each wave, bonus points may be awarded according to the number of missiles and cities remaining. One or more destroyed cities may be rebuilt. Again, the details are up to you, and these design decisions should be recorded in your report.

You have seen a simple mockup of this game in lectures. A screen capture from this mockup is presented below for your reference:



## Report

Your report should document the design and implementation of your game. Include screenshots that show your game in operation and illustrate its features.

In addition to the design decisions indicated in the Problem Specification above, your report should also include an account of your implementation of collision detection, and how you manage the organisation of your game into different phases (e.g. game over, mid-wave, end-of-wave).

## Extensions

There follows a list of possible extensions to your game. These are not required to gain a mark of 17, but at least one extension item (either from this list or of your own design) must be well implemented and documented to gain a mark above 17.

- In Missile Command, the incoming missiles will sometimes split into several child missiles, creating extra difficulty. Implement this feature in your game.
- Another feature of Missile Command is the bombers that fly across the screen and spawn missiles. Implement this feature in your game.
- Add sound effects!

## Pointers

Your attention is drawn to the following:

- Mark Descriptors:  
<https://info.cs.st-andrews.ac.uk/student-handbook/learning-teaching/feedback.html>
- Lateness:  
<https://info.cs.st-andrews.ac.uk/student-handbook/learning-teaching/assessment.html>
- Good Academic Practice:  
<https://info.cs.st-andrews.ac.uk/student-handbook/academic/gap.html>