# Creative Coding Report

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Module: Creative Coding 1

Project: P5 Solar System

# Introduction

For the Creative Coding particle system project, I chose a solar system. I chose a solar system after doing some research of different particle systems. I was interested in how each object works together to build a full system. I was interested in a solar system as I could have different objects come together to build one system.

The solar system is made of an array of planets rotating around the sun in the centre. It also has an asteroid made with an emitter to give an effect of it being on fire. The background is made of stars moving away to seem like the solar system is moving in space.

# Mathematical/ Physical principles

For the flames of the asteroid, I added a force that controls the angle of where the particles emit. This is important so that the particles don’t go in all directions. This is done by using a vector and giving it the values (0, -01). This makes the particles emit upwards. I also used another force called wind which sets the direction of the particles to emit. In the tutorial I watched they mapped the direction to the mouse X position. I chose to map it to the direction that it was moving by creating a variable called ’dir’ to control the direction.

The velocity force within the asteroid class moves the particles. When the update function is called it moves the particle by a specified number of frames. It moves in a direction that is specified using a vector.

These forces are both applied in a for each loop where a function ‘applyForce’ is called. I then pass through the force that I want to be applied.

To make the planets and Asteroids rotate I used the p5 rotate function. To move them I made a function called ‘orbit’. The orbit function adds the objects orbit speed and its angle.

For the star background, a star is created at a random position on the screen. Each star is given a speed value. The star then gets larger as it gets further away from its starting point and closer to the canvas edges

# Programming Methodology

Each planet in the solar system is an object in the planets array. I then gave each planet a distance, radius, position, angle, orbit speed property and an image chosen at random. The radius, distance, angle and orbit speed are chosen at random and rounded using p5’s Math.random and Math.round functions. I preloaded each of the planet’s images into an array named textures. Each image is given an index number. Each planet object is then assigned a random image from the texture array. In setup I created a loop to push a new planet into an empty planet array. It is done until there are 8 planets in the array. I then use a foreach loop in draw to call the show, and orbit functions for each object in the array

For the asteroid I used two classes to make it. I first made the asteroid in the asteroid class and gave it its functions such as render to draw it, update to move the particles, orbit to make it rotate around the sun and apply force to add the acceleration. It is then Instantiated in the emitter class and populates the emitters array with an asteroid array which contains the asteroid objects. The emitter class then calls the asteroids. Rather than emitting ellipses from the emitter, I used a semi-transparent texture loaded from my data folder. I then used tint rather than fill for the colour. Each particle is then given a lifetime. The ‘isFinished’ function iterates through the array and after a specific amount of time it is deleted from the array, and another is created. As the lifetime counts down lower the particles begin to fade in colour.

For the star background I created a white ellipse that is created a star at a random position between the width and height and the screen. Each star is given a speed and a z position to move away at from its position to the edges of the canvas. As the star approaches the edges of the canvas the radius goes from being 0 to 16 as they hit the canvas. Once the stars z value is equal to the width, its position and radius are then set back to 0 and random positions, causing it to loop. I also added a GUI P5 library to control the number of stars.

# Personal Reflection

I felt that I struggled a lot with the project, but I am happy with what I produced. I originally started in 2d then moved to 3d and was using webgl and following online tutorials on how to use it. I found Webgl was too difficult when I was making emitters and was limited a lot by my knowledge of how to use it. After having only made planets rotating around a sun in 3d / webgl and stuck with where I could go, I moved back to 2D. But after spending so much time on 3D I felt myself running out of time and as a result I think my project is a bit rushed and missing elements that I would have liked to have added. I wanted to add collision detection and exploding planets on collision with the asteroid but was short on time. I also couldn’t get collision detection to work after making many attempts.

I followed a video to make the star field but now looking back it made more sense to do it as an emitter and splice it from the array as it hit the edges of the canvas rather than they way I have it done in this project. However, I was too short on time to go back and do this.

I also would have like to also add more parameters to the Gui but ran out of time.

I do feel after doing the labs, in class tasks and this project that I have a good understanding of P5, objects, arrays, forces, and Object-oriented programming. However, I do think I need to work on time management and research. I found myself starting an idea and then finding out I don’t have enough knowledge to do it and then having to choose another idea.

# Sources

Shane Rupert

https://www.youtube.com/watch?v=HZoCplPBYjk

https://github.com/ShaneLee/Solar-System-Simulation

Michael Ruppe

https://www.youtube.com/watch?v=pgFnZyL8zEA

https://github.com/michaelruppe/art/tree/master/solar-system-p5

<https://space-facts.com/transparent-planet-pictures/>

Coding Train

https://www.youtube.com/watch?v=l8SiJ-RmeHU&t

<https://www.youtube.com/watch?v=dncudkelNxw>

https://www.youtube.com/watch?v=i2C1hrJMwz0&t

https://www.youtube.com/watch?v=uAfw-ko3kB8&t

https://www.youtube.com/watch?v=17WoOqgXsRM&t

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