Game Technologies Lab

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First Project

1. What is the line of inquiry of my first project?

As we used Unity3D to do game making last semester. I am very interested to this software. So, I am wondering how to make this type of game engines and could we make a simple one.

I googled my question on the Internet. The Wikipedia says, “The core functionality typically provided by a game engine includes a rendering engine for 2D or 3D graphics, a **physics engine** or collision detection, sound, scripting, animation, artificial intelligence, networking, streaming, memory management, threading, localization support, scene graph, and may include video support for cinematics.” (<https://en.wikipedia.org/wiki/Game_engine>)

I have impression about physics engine. Every time I add rigid body to an object, If I don’t set a platform to catch it, it will fall down away. This is because the Unity has physics engine. It simulates the real-world physics rules to the virtual world.

For this reason, I want to realize a very simple physics engine by myself.

1. The plan of exploration

I finally decide to use the coding language of JavaScript in P5.js. Because recently I am learning it, and it is better for me to have an uncomplicated way to know whether I am doing right through a visible canvas. I plan to introduce gravity and elastic force to the project and do some effect with two balls. If the balls move correctly, the physics engine is correct.

1. The results of my exploration.

I make a class of Balls to restore the property of every ball. The most important property are velocity, accelerate velocity, position, mass and size.

To make physics engine, we need to know well about physics, especially we need to know what formula should be used in A situation and what formula should be used in B situation.

Here are the most important formulas I was used in my project.

The relationship between velocity and accelerate velocity:

Vt = V0+a\*t

momentum conservation:

m1v1+m2v2=m1v1'+m2v2'

I create an collision detect function to activate momentum conservation formula, so we can see how two balls would move and interact with each other when we change the mass and velocity of balls. One of the most important thing is I have to create a Vector class, because most of calculation need to involve vectors.