Perception and Multimedia Computing

Physical Simulation

Friday 24th Nov 2017

1. **Physical simulation - a cannon ball moving under the influence of gravity.**

    a. Download the sketch.js file from learn.gold and run it - this is an example adapted from Theo's Audio Visual Computing class. What happens to the velocity of the object? How about the acceleration?

    b. Now change the code so that the ball always start from the middle of canvas, you might want to increase the acceleration and and also gives it a non-zero initial velocity. Try different values of the velocity and acceleration so that it looks like a cannon ball shooting horizontally or slightly upwards with a 45 degree angle - like the example we saw in the lecture.

    c. Now add some interactive features: pressing the space bar to shoot a new cannon ball, and using the position of the mouse to change the initial velocity.

    d. Now you've created the basics of a shooting game. Can you think about other ways to make it more interactive and interesting?

2. **Springs**

    a. Download the code from https://p5js.org/examples/simulate-spring.html and run in on your machine locally. When you change the parameters (M, K, D, R), how does the animation change?

    b. Add more springs with different parameters to your code so you can compare them side by side - you should first change the code using class.

    c. Can you think about more creative ways of using the springs to generate some interesting physical simulation effects?

3. **Particle systems**

    a. Download the code from https://p5js.org/examples/simulate-particle-system.html and run in on your machine locally. Recall that we introduced five steps in a particle system. How are these five steps implemented in this example? You might need to take a look at this video: https://www.youtube.com/watch?v=EyG_2AdHlzY if you are not familiar with the splice( ) function.

    b. [Optional, not marked] Change the parameter of the particle system to create the effect of snow, fire, or smoke. You can also try to make it interactive using mouse and keyboard input!