Assignment 2 - Interaction

TCSS 491 - Computational Worlds

Introduction

In this assignment you will work alone to create an animation of interacting agents or components.

Assignment

To carry out this assignment follow these steps:

1. **Select a Simulation of Interacting Components** - Implement one of the suggested ideas below or come up with your own interactive system using the principles of agent-oriented design, complex systems and emergence. The key element is that the animations should *emerge from the interactions* and not be *scripted*.
2. **Create a Webpage** - Create an HTML file and a JS file to create a canvas element and manage the elements in your animation.
3. **Animate the Interactions** - Implement the interactive components of the simulation and adjust the parameters so interesting behaviors emerge. You may use any available course code but you should develop your own interactive scheme and cite any code you use outside of the course code.

Interaction Ideas

- Upgraded physics engine.
    - Add mass calculations to the circles. Indicate mass with size increase.
    - Add gravity to the simulation and allow circles to bounce off the ground.
    - Add fixed rectangle obstacles.
    - Add moving rectangle obstacles.
    - Add moving/rotating rectangles with rotational momentum.
    - Add arbitrary polygon/curved obstacles.
    - Pendulum or multiple pendulums.
    - Create a stable orbit.
    - Create a cyclically stable three-body orbit.
- Implement agent interactions:
    - Follow the leader.
    - Flocking.
    - Stigmergic ant pathfinding. Agents leave trails that others follow.
    - Zombie swarm. Like tag, but start with one slow zombie.
    - Hide and seek. Requires ray tracing and obstacles.
    - Last man standing. Agents must aim and shoot one another and dodge bullets if they can.
- Cellular automata.
    - Implement the Game of Life. Add a some cool states like the Gosper Gun.

    - Implement a different one or two dimensional cellular automata. Wolfram has hundreds.
- Games
    - Animate multiple Goombas bouncing off each other (and the walls).
    - A simple pong or breakout AI.
    - Space Invaders AI.
    - Tank battle with turrets that turn to aim at each other while moving
    - Battle of two armies (or five) with simple agents that attack the nearest enemy.
    - Mario vs Goomba AI battle. Can Mario kill all the Goombas before they kill him?
    - Rocket Defence. AI tries to shoot random rockets out of the air by aiming and firing cannon.
    - Zombie massacre. A lone hero shoots to kill incoming zombies until they are devoured.

Grading

- 6 points - animation guided by interaction dynamics.
- 2 points - animation guided by interaction dynamics with emergent properties.
- 2 points - extras with a coolness factor. Some of the suggested ideas above have a coolness factor, but not all. Especially if you are just extending my circle physics.