

Boid Algorithm

❖ Description of the problem

- Name:
 - Boid Algorithm implementation
- Problem Statement:
 - The simulation of flocking behaviors through the use of agent based artificial intelligence.
- Problem Specification:
 - User can influence the Boids in real-time by the use of sliders controlling the 3 rules governing Boid logic

❖ Input Information

- Modifiable sliders each adjusting a different rule within the Boid logic
 - Rule 1 Slider -- Controls Cohesion
 - Rule 2 Slider -- Controls Separation
 - Rule 3 Slider -- Controls Alignment
- *Further detail on each rule in **System Architecture**
 - 'Toggle more Options' Button - shows additional options (the following)
 - Rule Sliders toggle button - making Rule slider visible/not visible
 - Border Slider -- Adjust the range the boids can move in 3D space
 - Velocity Slider -- Adjust boids max speed, not the speed in which they travel

❖ Output Information

- Boids are displayed to the screen acting in as if in a 3D environment

❖ User Interface

- Modifiable sliders dictating the rules of Boid logic (Cohesion, Separation, Alignment respectively)

❖ System Architecture

- 200 Boids are created in a 3D environment
 - All given a random position, direction, and Velocity
- User has the ability to modify Cohesion, Separation, and Alignment by sliding the Rule 1, Rule 2, and Rule 3 sliders respectively
- Cohesion
 - How Strongly agents move towards the perceived center of mass
 - Perceived Center of Mass - average positions of all agents, but not including the agent for which the calculation is being done
- Separation
 - How strongly agents push away from one another when they get within a specified distance
- Alignment
 - How strongly agents adjust their velocity relative to the velocity of the all the other agents
 - Averaging the velocity of all agents then applying a portion to the boid's pre existing velocity