

**Spike:** 14

**Title:** Emergent Group Behaviour

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**Goals / deliverables:**

- Code
- Report

**Technologies, Tools, and Resources used:**

- Latest Version of the Visual Studio Code or the Python IDE
- GeeksforGeeks: <https://www.geeksforgeeks.org/python-functions/?ref=shm>
- W3schools: [https://www.w3schools.com/python/python\\_classes.asp](https://www.w3schools.com/python/python_classes.asp)
- Computer/Laptop

**Tasks undertaken:**

- Download and install the latest version of the Python IDE or Visual Studio Code
- Download and install Git bash terminal
- Use the git bash terminal for configuring and running the code while the code is initialised in a folder
- The method cohesion calculates a steering force that directs an agent towards the centre of mass of its neighbouring agents within a specified distance. It iterates through neighboring agents, accumulating their positions and counting the number of neighbours within the defined range. If there are neighbours present, it computes the average position (center of mass) and generates a steering force to move the agent towards that position.
- The separation method computes a steering force that repels an agent from its nearby neighbours, preventing overcrowding or collisions. It iterates through neighbouring agents, accumulating vectors pointing away from each neighbour. The resulting force steers the agent away from its neighbours.
- alignment calculates a steering force that aligns an agent's direction with the average direction of its neighbouring agents. It iterates through neighbours, accumulating their headings and counting the number of neighbours within a certain range. If there are neighbors present, it computes the average heading and generates a steering force to align the agent's direction with that average.
- The update neighbourhood method updates the list of neighbors for an agent based on its current position and a specified neighbor distance. It

iterates through all agents in the world, excluding itself, and adds those within the defined distance to its list of neighbours.

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**What we found out:**

The outcomes that occurred were cohesion and neighbouring data and information were able to be printed in the terminal.

```
N key was pressed
Neighbour Distance: 50.0
Cohesion weight: 1.0
Separation weight: 1.5
Alignment weight: 1.0
Wander weight: 0.5
Neighbour distance: 50.0

S key was pressed
Added Separation Weight: 1.6

A key was pressed
Added Alignment Weight: 1.1

C key was pressed
Cohesion Weight: 1.1
Cohesion weight: 1.1
Separation weight: 1.6
Alignment weight: 1.1
Wander weight: 0.5
Neighbour distance: 50.0
```

**Open issues/risks:**

List out the issues and risks that you have been unable to resolve at the end of the spike. You may have uncovered a whole range of new risks as well.

- The graphical wasn't able to occur within the program
- The effects were not visible
- Only the terminal works