

AI Navigation in Unity with NavMesh - Assignment 2: Squad Behavior

Note: This assignment is open to change, so feel free to edit or make suggestions during meetings.

- After integrating the ReGoap architecture with the NavMesh system, we are now able to create squad movement behaviors. An external system from ReGoap will be made to access the agent memory of all agents in the game scene to determine squad behavior application. Agents must be within a set proximity of each other in order for the squad behavior system to administer orders. Agents will adhere to valid orders from the squad behavior system, as squad behavior goals will have an inherit/default higher priority.
- The squad behavior system will have roles to assign for agents. For example, an agent may be assigned captain and another will be assigned a subordinate role. These roles can be incorporated in specific squad behavior goals and administered with a priority by the squad behavior system; or the squad behavior system could flag an agent a role via a bool switch.
- There are two categories of goals: squad behavior goals & personal goals. Personal goals are strictly for a single agent's benefit. Meanwhile, squad behavior goals are goals that involve other agents. Note that involve is used loosely as agents do not necessarily have awareness of each other.

Tasks to accomplish:

1. Create a squad behavior system (SBS) or folder of C# scripts in which the SBS will have access to "read only" agent memory within the game scene. Additionally, the SBS will need to know if agents are within proximity of each other. This proximity can be simply defined by calculating the distance between the transform positions of the agents. The SBS could monitor the agents' transform positions at set intervals and calculate proximity. Sensors of the agents could also help too.
2. Define appropriate goals that can help accomplish squad behavior. The next behaviors are what we will be implementing.

Squad Behaviors:

Note: We can be very creative with this approach, below are just suggestions made on July 12 of 2023.

1. ***Squad Behavior Conga line:*** When two or more agents are within proximity, the squad behavior system (SBS) will assign one agent the role of captain and the other subordinate. In this case, the SBS can simply assign the priority value of specific squad goals for each agent. The subordinate agent will prioritize the Follow() goal to follow an agent, meanwhile, the captain agent being followed will prioritize the already implemented generic GoTo() goal. This demonstrates how squad behaviors can be really simple, and note that the roles are just formalities for us developers to identify agents in squad behavior scenarios.
2. ***Squad Behavior Breach:*** When two or more agents are within proximity of each other and an identified entrance, then they will prioritize the Breach() goal. Agents will

presume positions regarding the cover nodes along the entrance walls. Agents will navigate to the “cover nodes” (again the name is a formality) and await some time (pause). What can then happen is that the Conga line squad behavior may occur again in which the “captain” agent will prioritize the generic GoTo() goal again with the subordinate prioritizing the Follow() goal.

Objectives (shared via GitHub):

Develop a generic scene with a navigation plane of dynamic cost meshes. We may transfer the same scene from assignment 1. Add an entrance somewhere on the plane to enter a room (a door is not necessary, just a gap suffices). Set a destination within the room past the entrance, either by mouse click or player presence. Have at least two agents navigate toward the destination. At the start, the agents will spawn from separate locations and while navigating to their destination, they will eventually approach each other’s proximity. The squad behavior system will detect the agents’ proximity toward each other, then send a squad behavior command to both agents.

The squad behavior command will set the agents to travel in a single conga line. In this case, the captain will lead and the subordinate will follow. The subordinate will have the goal of following the captains while the captain continues to advance to the destination. Upon reaching proximity of an entrance, the squad behavior system will command the agents to breach the entrance with each agent positioning themselves along the adjacent walls of the entrance. There will be a brief pause, before each agent will enter the room one at a time.