1 Swarm Formation Algorithm

Assumptions:

- Distance and Angle relative to other robots in the swarm is known.

- A single robot is designated as the leader and remains stationary forming the starting point of the formation. The other robots form the shape around the starting point.

- The robots can distinguish the distance and angle belonging to the leader robot from those of the other robots

- The pattern of the shape and individuals spots is known to the robots

The algorithm is executed on an individual robot every time that robot receives a sound signal from one of the other robots. In the pseudo code below "Self" refers to this individual robot itself.

Algorithm 1 Swarm Algorithm

1: **if** Self is at final position **then**
2:     Updates Distances and Angles using distance and angle received
3:     Calculate which robots are closer to startpoint
4:     **for** Every robot **do**
5:         Calculate if closer to startpoint than self
6:     **end for**
7:     **if** distanceToStartpoint is smaller than interRobotDistanceValue **then**
8:         **if** robotsCloserToStartpoint is empty **then**
9:             Self is at final position is set to true
10:             Return
11:         **end if**
12:         **if** robotsCloserToStartpoint is not empty **then**
13:             Calculate available positions based on shape
14:             **for** Every available position **do**
15:                 Check which available position is closest to self
16:             **end for**
17:             return closest available position
18:         **end if**
19:     **end if**
20:     **if** distanceToStartpoint is bigger than interRobotDistanceValue **then**
21:         return startpoint location
22:     **end if**