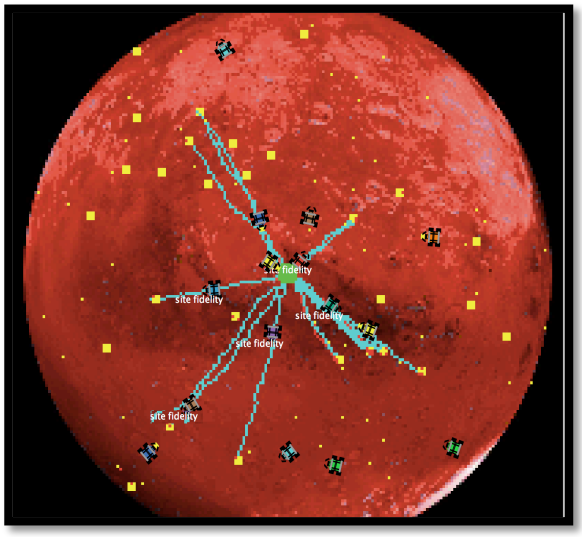
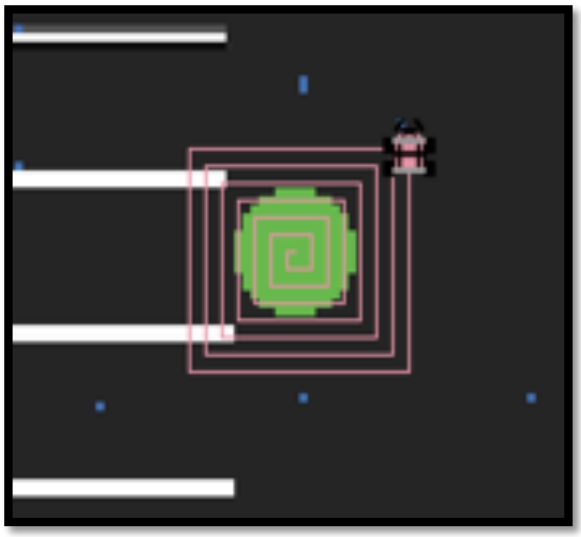
Swarmathon 2: Final Project

Introduction:

For this final project, you will build your own search algorithm for the robots by combining techniques introduced in Modules 1—4. You are encouraged to add your own ideas as well.





Project Overview:

We learned several ways in which a robot can effectively search for resources.

1. *Direct Recruitment (Collecting Rocks on Mars 2):*
   - **robots communicate directly with other robots**

2. *Pheromone (Collecting Rocks on Mars 3):*
   - **robots communicate through the environment by using pheromone trails** (*stigmergy*)

3. *Pattern Search (Swarmathon 1)*
   - **robots do not communicate, but move in a pre-determined way**

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Advantages and Disadvantages

Think about situations where each strategy performs well, and situations where the strategy does not perform well. Consider the distribution of resources, resource distance from the base, etc. When is it better to *not* have robots recruiting?

If you get stuck, try running each program back-to-back. Look at the behavior of the robots.

There are no right or wrong answers here. Think of this exercise as an idea generation tool to help you design an effective algorithm that combines different search strategies.

Recruitment	Pheromone	Pattern Search
Advantages	**Advantages**	**Advantages**
Disadvantages	**Disadvantages**	**Disadvantages**

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Put it Together

Recommendations

1. if statements are key. When you want a robot to change behavior, say from moving in a spiral to randomly searching, an if statement can describe when that should happen. Try using different combinations for your if statement. (Number of robots in-radius…, number of resources remaining, etc. The possibilities are endless.)

2. Don't do everything at once. It's hard to tell which strategy combination is working the best if you are putting together multiple strategies at the start. Pick one base strategy that you like (such as pheromone), then try combining behaviors with it (robots switch to spiral search if…, etc.). If you're not pleased with the results, try a different base strategy, or come up with one of your own.

3. It can seem really difficult to come up with your own behaviors for searching. **How do *you* search?** How can you use your human experience to come up with ways a robot might search?

A THOUGHT EXPERIMENT

Imagine that you have lost your keys. How do you look for them?
Do you go immediately to spots where you usually put your keys?
Do you search every inch of the area in front of you first?
What if you don't find them? Then what do you do?

Good luck and happy swarming!