## Purpose:

We want strategies for collecting particles at goal locations in vascular networks. This is hard because the particlesThis paper presents algorithms in a simplified 2D geometry.

## Collecting a Swarm of Particles

Assume the robots are in a 2D world populated either by freespace or obstacles, and that the freespace is connected (a particle can reach any freespace on the grid)

## Collecting a Swarm of Particles on 2D grid with global inputs when the particles can overlap.

1. Compare the amount of time between optimal and greedy policies for collecting a swarm of particles on a 2D grid with global inputs when the particles can overlap. (done) Output: a graph with number of free spaces vs time to compute: WIthOverlapOptimal/**solveCollectionWithOverlapBinSorted.m**
2. Compare different heuristics for greedy policies (should be collect random robots, should we collect the robots that are furthest apart? Closest? Etc.) Output: several different lines on a graph with number of free spaces vs time to compute. **WithOverlapGreedy/ collectingByPairwiseCombinationv2map.m**
3. Apply this algorithm to the leaf (use image <https://www.mathworks.com/matlabcentral/fileexchange/42892-drive-magnetic-micro-robots-through-a-2d-vascular-network> ) I’d like to do the comparison of greedy heuristics on subsets of this graph because it is a vascular network. We may need to edit this to make it connected. Do heuristics work better on a real vascular network?
4. Give code for moving the collected swarm to a goal location (trivial)

## Collecting a Swarm of Particles on 2D grid with global inputs when the particles cannot overlap.

1. Start with 10 robots in a world with 50 free spaces (less robots than freespace). Output: plot of how long this takes as a function of the # of robots. Try to use the same greedy policy of picking two points in two different connected components, have point A move tward point B, stop when the components containing A is the same as the component containing B are connected
2. Can we find an obstacle configuration where the robots cannot be collected into one group?
3. Give code for moving the collected swarm to a goal location (hard)