Heat Seeking Swarm Robots

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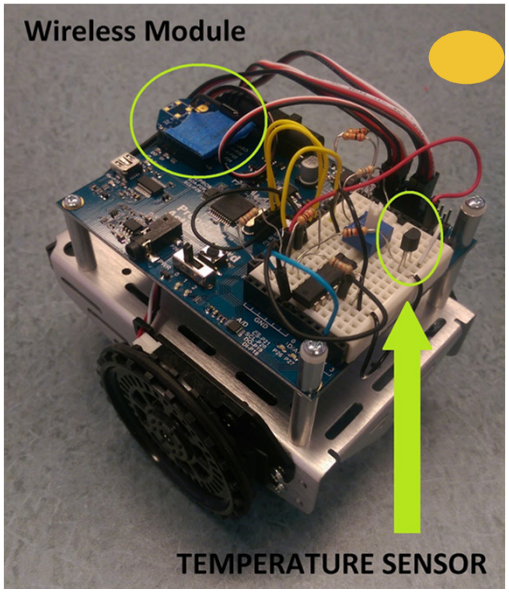
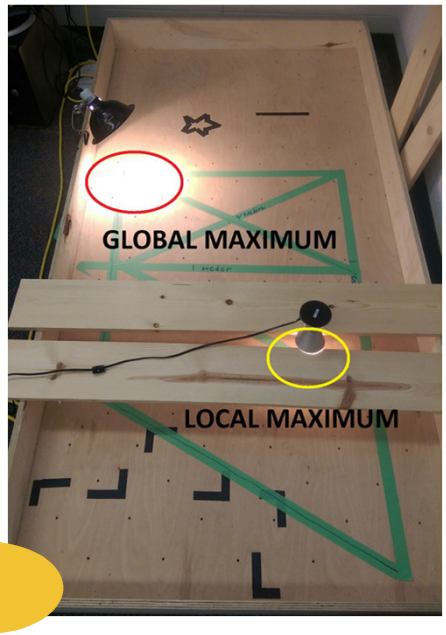
Objective

- **Find the location of maximum heat irradiance with robots acting as particles within the Particle Swarm Optimization (PSO) method.**
- **Test weighted coefficients of PSO algorithm for optimal values.**
- **Compare this algorithm's implementation on a computer simulation with real-life implementation.**





How does a robot know where to travel?

- Weighted vectors determine its direction
  - Current direction
  - Random value
  - Hottest location found by robot
  - Hottest location found by swarm

$$XDir = A * cos(\Theta_{Current}) + B * cos(\Theta_{Random}) + \Gamma * cos(\Theta_{Personal\_Best}) + \Delta * cos(\Theta_{Global\_Best})$$
$$YDir = A * sin(\Theta_{Current}) + B * sin(\Theta_{Random}) + \Gamma * sin(\Theta_{Personal\_Best}) + \Delta * sin(\Theta_{Global\_Best})$$

As a robot, my goal is …

- To find the hottest location!
- When I find a new hottest value in the arena, I will tell all the other robots where via wireless radio.

Preliminary Results

- Algorithm runs successfully
- Convergence to global maximum with three robots

Future Work

- Optimize forward drive length between each change in direction
- Vary the operating coefficients of the PSO algorithm depending upon degree of difference between personal and global best
- Continuously measure temperature while moving

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