Assignment 2

Out: Tuesday, 10 March 2015
Due: Thursday, 26 March 2015

Reading: Arkin, Chapters 4 and 6; Slides from robot architecture lecture

Problem 1:

Describe the difference between robot control using a horizontal decomposition and a vertical decomposition. Which architecture type uses horizontal decomposition? Which architecture type uses vertical decomposition?

Problem 2:

a. Describe the similarities and differences between the subsumption architecture and potential fields/schemas.

b. Have the programs that you’ve written so far in lab had qualities of either of these two reactive architectures? If so, how? If not, why not?

Problem 3:

Assume we have a round robot with 8 distance sensors, placed at N, NE, E, SE, S, SW, W, and NW.

a. What will happen if we have a program written to avoid obstacles that uses the “force” felt by each distance sensor to determine the amount to move away from the obstacle(s)? For example, imagine that we are using potential fields and each distance sensor will generate a vector to move 180 degrees in the reverse direction inversely proportional to how close an obstacle is to that sensor – if something is very close to the N sensor, a large vector in the S direction will be generated. If there is no reading (or a very far reading) on the N sensor, a small (or no) vector in the S direction will be generated.

b. What happens if one of the sensors breaks, continually returning the same value X? What will be the robot’s emergent behavior?