Homework #3
Dickinson College
Computer Science 364
Artificial Intelligence
Fall 2006

1. Create a WallFollowBrain2.py Brain for the pyrobot simulator that is able to follow walls that include outside corners. You can use the RoomWithAlcoves.py world from the Course CD for this exercise. Be sure to fully document your Brain. In particular be sure to use comments to describe each feature being extracted and to clearly explain the role of each action that is taken based on the features. Send your WallFollowBrain2.py Brain to me as an e-mail attachment.

2. Create a LineFollowBrain.py Brain for the Hemisson robots that is able to follow a line. Your Brain will need to use the downward facing IR sensors on the Hemisson. For best results the line will need to be approximately 1/2 inches wide and it should reflect significantly more (or significantly less) IR light than the underlying surface. (A chain of small post-it notes stuck to the lab table seemed to work pretty well though there are probably better choices.) You will want to assume that the robot always starts with both sensors over the line. This way, your Brain can read initial values for those sensors so that it can account for varied lighting conditions.

Be sure to fully document your Brain. In particular be sure to use comments to describe each feature being extracted and to clearly explain the role of each action that is taken based on the features. Send your LineFollowBrain.py Brain to me as an e-mail attachment.

3. Create a WallFollowBrain3.py Brain that performs wall following as an SR agent on the Pioneer robot. As compared to the WallFollowBrain1.py Brain, you will likely have to sense a wider range of features and use more complex reaction strategy to get the Pioneer to accurately follow the walls. Some things that might be helpful to sense and use in your reaction strategy are the angle of the robot to the wall and the distance of the robot from the wall. Be sure to fully document your Brain. In particular be sure to use comments to describe each feature being extracted and to clearly explain the role of each action that is taken based on the features. Send your WallFollowBrain3.py Brain to me as an e-mail attachment.

4. It is likely that even with a good bit of effort the Pioneer will not follow the walls perfectly. If your Brain does a good job of following the walls, there will very likely still be a few situations in which the Pioneer behaves in an odd or unexpected way. Explain at least one such behavior. If your Brain does not do such a good job of following the walls describe at least one situation in which it does not work well and try to explain the behavior you are observing. If on the off chance your Brain works perfectly, describe a situation that occurred during the development and debugging of your brain where it did not behave as expected, discuss the cause of that unexpected behavior was and explain how you fixed it.

5. Run the wall following Brain that you developed for the real Pioneer on the PyrobotSimulator. Is the behavior of the robot in the simulator qualitatively the same as it is on the real Pioneer robot? Are there any noticeable differences in the behavior? If so describe them and briefly discuss why they might be occurring.

BONUS: Create a WallFollowBrain4.py Brain that allows the Pioneer to follow walls that include outside corners. Be sure to fully document your Brain. In particular be sure to use comments to describe each feature being extracted and to clearly explain the role of each action that is taken based on the features. Send your WallFollowBrain4.py Brain to me as an e-mail attachment.