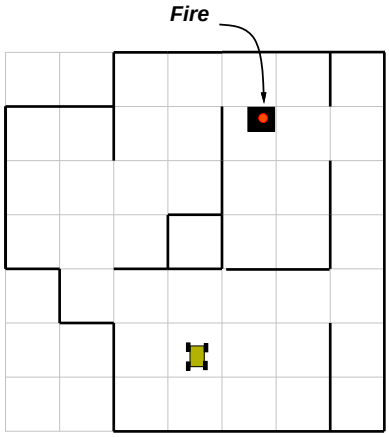
CSE 4360 / 5364 - *Autonomous Robots*

Project 2- Fall 2018

Due Date: November 28, 2017, 5:30 pm

Behavior-based Fire Alarm Robot

The goal of this project is to design a behavior-based fire detection robot that is able to move from an unknown position in an in-door environment to look for a fire, raise an alarm, and extinguish it. The robot should use a set of behaviors, including "wander" (search) and "wall following". The walls of the rooms are approximately 15cm high and the fire location will be indicated by a burning candle (in a glass candle holder) on top of a differently colored area the size of half a floor tile. There will be no door openings to the outside of the house. The following figure shows an example environment:



The behavioral repertoire of your robot should include "wander", i.e a behavior that enables the robot to move in freespace looking for either a wall or the fire, "wall following" which should permit the robot to move along the wall (you might want to implement only one direction, i.e. clockwise or counterclockwise wall following), "goal finding" which should allow you to detect the fire, and "extinguish" which should permit your robot to extinguish the fire. The goal of wall following is to permit the robot to find different rooms and cover most parts of the environment.

At the end of the project each group has to hand in a report and give a short demonstration of their robot. During this demonstration you should provide a short description of the robot and of the details of your behavior-based control system.

The Project

1. Build a mobile robot for this task.

   Using the parts in your robot kit, build a mobile robot for the task. (In this assignment the robot has to be able to detect and follow "walls" and to detect the fire. Robot localization,

on the other hand, is not important since the start location of the robot and the location of the fire will not be known. One way to perform "wall following" in the given environment would be to use two touch sensors to construct bumpers that can keep track of the wall.)

Your project report should include a short description of your robot design (including the critical design choices made).

2. Implement "wander", "wall following", and fire detection on the robot.

   To address the given task you have to implement a "wander" (search), a 'wall following", a goal finding and identification, and an extinguish behavior for your robot. "Wander" is intended here to move the robot through freespace to a wall, "wall following" is intended to permit the robot to move between rooms, and goal finding and identification is intended to locate the fire. To integrate these behaviors you also have to implement a behavior coordination mechanism (e.g. subsumption, weighted averaging, etc.). Once the fire has been found, your robot should indicate this by starting an alarm and it should then attempt to extinguish the fire (the easiest might be through a simple fan with the thrid motor).

   Your report should contain a description of the important components of your control system and the actual code for the robot.