CS 420 Problem #?: Human Replacements

Learning/Content Goals

- heuristic search

- knowledge representation

- planning

Description

A new ramen restaurant has opened in Easton and it aims to be cutting age and focus on the younger generation (18-40). The first item on the list is that there are no human servers. Just like many popular restaurants in Japan, there is a vending kiosk at the restaurant entrance. The kiosk displays the menu items and the prices. The patron/customer makes their selection, pays and then sits at an unocuppied space (or spaces if there is a group) - it's self seating. The customer scans the receipt (bar code) at her table.

Robot servers will be notified when an order has been prepared and they will bring the order (on a tray) to the customer. Assume that the restaurant is laid out with rectangular tables and seats on two sides. Each side can seat 4 people and there are 3 rows of 3 tables so the restaurant capacity is 72 persons. Your task is to develop a control, planning and navigation system for the robots so that (for a fixed number of robots):

- each robot takes an efficient path from (1) the waiting station to the order counter, (2) the order counter to the customer table, and (3) from the customer table to either the waiting station or the order counter.

- the number of potential collisions between robots is minimized,

- the tables are densely packed so the area between table seats and between rows will only one robot to pass through at any one time,

The Wrinkle

Business is booming at the restaurant and this has the unfortunate effect of making the wait for meals longer than the customers and management would like. They have "miraculously" managed to carve out some additional space at the other end (from the kitchen) and on one side. They are going to use the additional space to expand the kitchen and break down meal preparation into (1) ramen preparation in the original area, (2) desserts on the side and (3) drinks/refreshments at the opposite end. You can assume that there will be a signal sent from the kitchen when all 3 components are ready although not every meal will have every component, *e.g.,* someone might not want to have dessert. How will your system cope with the expansion?

The Additional Wrinkle

We have standardized the robots and the serving containers so that we consider each robot to have a carrying capacity of 4 units where a bowl of ramen takes up 2 units, a drink 1 unit and the dessert 1 unit. All the components of an order will still be ready at the same time but you now have additional flexibility in what each robot carries. How will your system cope with this expansion?