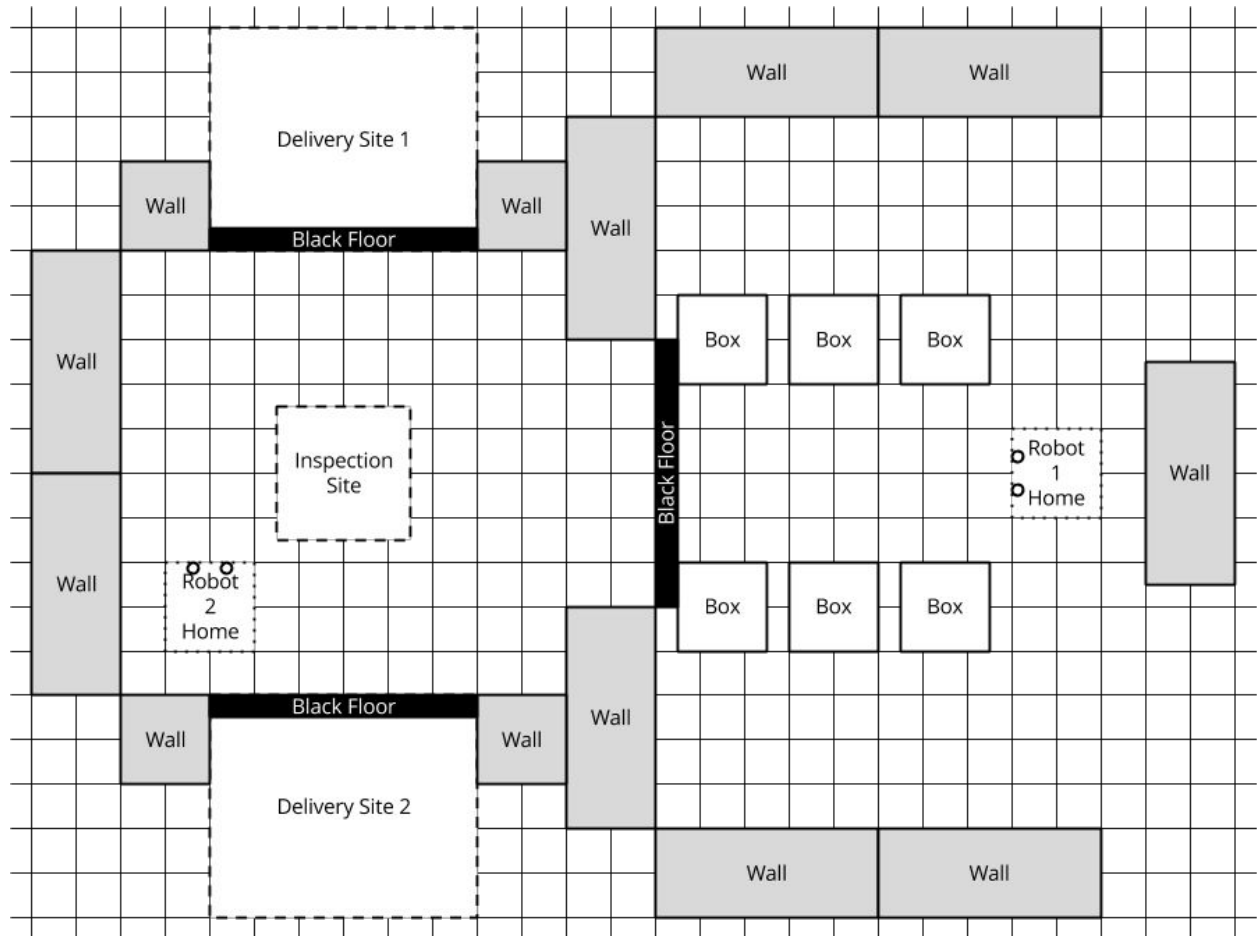


CS123 Project Proposal: Warehouse Package Sorting & Delivery

Problem Statement

- The map consists of four zones, each with vertical walls for localization:
 - A “warehouse” zone containing a pool of unsorted boxes. At the start of execution, there will be 6 half-size boxes (as was used in Assignment 2-2) placed randomly among a set of 6 pre-defined locations within this zone. Between 2 and 4 boxes, inclusive, will be entirely white; the remaining boxes will have a single face covered in black tape.
 - An “inspection” site to which boxes will be delivered from the warehouse. At most one box will be in the inspection site at any time.
 - 2 “delivery” sites to which boxes from the inspection site will be delivered. All boxes with a single black face will be delivered to the first site, and the remaining boxes will be delivered to the second site. By the end of execution, these two delivery sites should collectively contain all of the 6 boxes that were initially in the warehouse.
 - Vertical walls will be at least 8 cm tall and will be made of the 4x4x10 cm boxes, which may be placed either as vertical pillars or as stacks consisting of two horizontal boxes.
 - Floor boundaries between zones will be colored black.
- Robots 1 and 2 start at pre-set “home” bases in the warehouse and inspection zones, respectively. Robots will navigate the zones and localize as necessary. Each time a robot finishes delivering a box to a target site, it will return to home base.
- Each robot will have a PSD scanner mounted on it.
- Robot 1 has to deliver the boxes from the warehouse to an inspection site, one at a time, without interfering with Robot 2’s tasks. Robot 2 will inspect each box in the inspection site and deliver that box to the appropriate site.
- At no point should a robot move a wall. At no point should a robot cause any box to move any other box or wall.
- Robot 1 will connect to the computer before robot 2 connects.
- It is more efficient to use 2 robots that cooperate in accomplishing the overall goal of sorting and delivering the boxes from the warehouse than to use a single robot to do both tasks, as the robots can make independent progress on their own tasks simultaneously. Thus, this project makes good use of two robots.
- We will take at most three attempts to meet our requirements from our initial conditions.

Tentative Map



Tentative Implementation Details

- Robot 2 will navigate to each of four predefined positions to use the proximity IR sensors to determine whether the box in the inspection site has a black face. We plan to predefine the motion primitives it takes to accomplish this.
- Robot 2 will deliver boxes into each delivery site in a predefined order; each delivery site will have four predefined positions. We plan to predefine the motion primitives the robot can use. The robot will programmatically combine the primitives to deliver the box to the target position based on where it should deliver the box.
- Robot 1 will deliver boxes to the inspection site in a predefined order. We plan to predefine the motion primitives that the robot can use, and the robot will programmatically combine those primitives based on where it will navigate.
- If Robot 1 is about to deliver a box to the inspection site while robot 2 is still moving around, robot 1 will wait in front of the central vertical black floor stripe to avoid interfering with robot 2.

- We may adjust locations of walls and boxes if we find that we require larger margins of error to avoid hitting boxes erroneously.