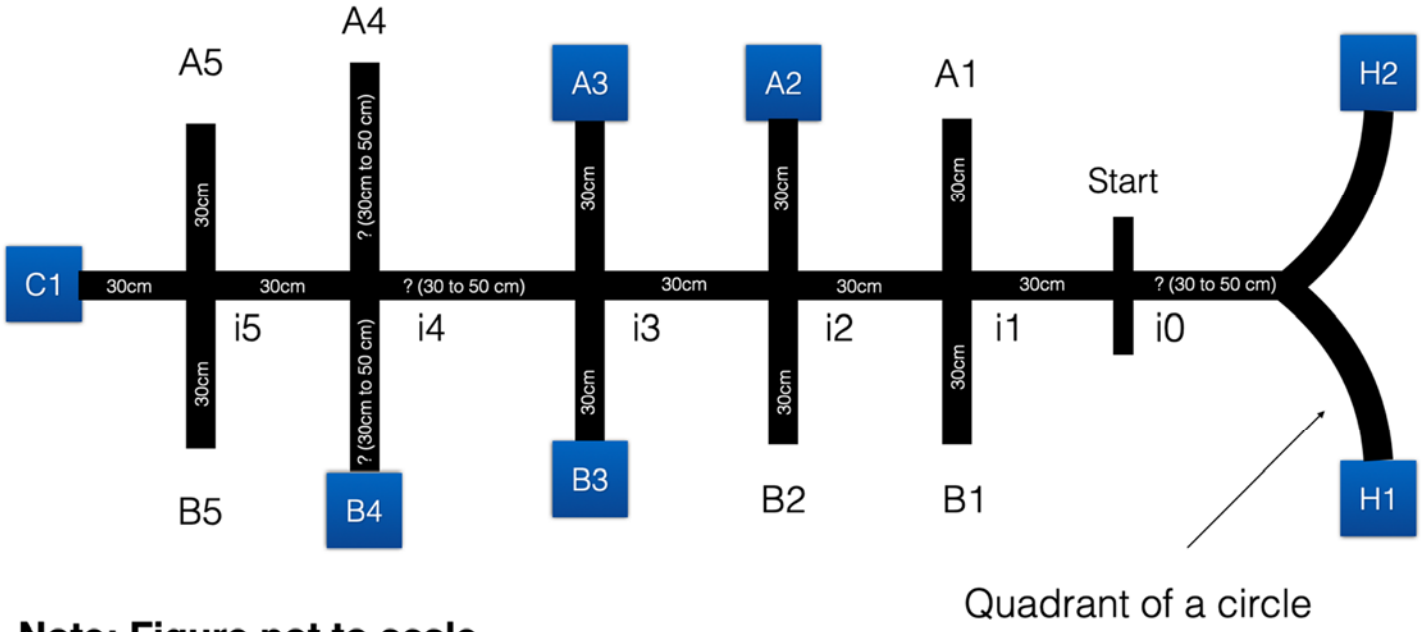
Arduino Project

Problem statement

COVID pandemic has disrupted normal life. Given these unusual circumstances, there is a need for a contact less delivery system that can allow a COVID test kit provider to drop off the test kits at desired locations in a parking lot. You're tasked with the responsibility of designing a robot that will be able to perform a set of tasks to accomplish our goals.

Describing the scenario



Note: Figure not to scale

Figure 1: The map of the Parking lot

- There are two home locations of the test kit provider, denoted by H1 and H2.
- The black tape represents the path in the parking lot. The width of the tape would be between 2.5 and 3cm.
- There are a total of 6 intersections labeled i0, …, i6; where i0 is the start point of the parking lot.
- There are a total of 11 parking spaces denoted by: A1, …, A5 on the right side of the intersections; B1, …, B5 on the left of the intersections; and C1 straight ahead.
- 5 spaces will be **RANDOMLY** assigned as occupied during your team's turn for demonstration. In Figure 1, the space occupied by a car is represented by a blue box in the map. In this example, we have assumed that cars are parked at A2, A3, B3, B4, and C1.
- The distances between the intersections and the distances of the object from the intersection are shown on the map. The distances marked with ? and a range will be arbitrarily assigned during the demonstration in the specified range.

- The minimum height of the objects used (as cars) will be 20 centimeters; and will be placed at the end of tape in the parking space.

Task descriptions

- You will be directed to place your robot at one of the home locations (H1 or H2).
- Your robot must always follow the path (black tape).
- Starting from the assigned home position, the robot must first reach i0 (start position) and should **NOT** look around for an object (car) at the start position.
- Next, as the robot continues along on the path, it must detect intersections and provide an indication of their detection by some means (e.g., LED, piezoelectric buzzer, LCD display, etc.).
- Upon arriving at an intersection (other than i0) the robot must look for objects (if any) on either side/ahead of the intersection.
- Upon detecting the object/objects, the robot must provide an indication of the object detection by some means (e.g., LED, piezoelectric buzzer, LCD display, etc.)
- The robot must then move towards the object to reach it, must stop for a few seconds within 5 to 8cms of the object, and must give an indication of reaching the object by some means (e.g., LED, piezoelectric buzzer, LCD display, etc.)

Deliverables and Grading (Total: 100 points)

1. Line following robot - **15 points**
2. Can the robot detect and indicate an intersection - **15 points (3 points per intersection)**
3. Can the robot detect and indicate when there are objects - **20 points (5 objects*4 points per turn)**
4. Can the robot reach locations of the object and provide an indication - **50 points (5*10 per object)**

Note

- IR remote control allowed only for deliverables 3 and 4
  (Max points = 70% of the points for those tasks)
- Autonomous control preferred (100% of the points)

For any questions, please feel free to reach to out the TA's:

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You may want to consider the following sensor for line follower:
https://www.pololu.com/product/961
https://www.pololu.com/product/4246