Task 1.2 - Problem Statement

Arena Description:

In this task, you have to use V-REP simulator and Visual Studio to program the robot that can traverse all different paths.

A) **Construction Materials (CM)**: The materials that will be picked by the robot for construction.

B) **Warehouse (W)**: The zone where the robot picks the Construction Materials from. There are total twelve (12) Warehouses in the arena represented as W1, W2, ……W12 as shown in Figure 1.

The following Construction Materials are present in the different Warehouse.

- Brick (B) - represented as Brown color block in the arena and available only in W1 and W2.

- Gravel (G)- represented as Green color block in the arena and available only in W3 and W4.

- Cement (C)- represented as Blue color block in the arena and available only in W5 and W6.

- Sand (S)- represented as Red color block in the arena and available only in W7 and W8.

- Electrical fittings (E)-represented as Black color block in the arena and available only in W9 and W10.

- Painting (P) - represented as Pink color block in the arena and available only in W11 and W12.

C) **House (H)**: The zone where the robot places the picked Construction Materials to. There are five Houses in the arena - H1, H2, H3, H4 and H5 as shown in Figure 1.

Arena Rules:

1. The location of Construction Materials in their respective Warehouses will always remain fixed as given in the Figure 1.

2. One House can require minimum of zero (0) CM and maximum two (2) CM.

3. Required CM can be from one or more Warehouses;

For example - a House H1 can require

- 0 CM or

- 1 CM of Brick or 1 CM of Painting or

- 2 CMs of one Electrical Fitting and one Cement or 2 CMs of one Gravel and one Painting or 2 CMs of two Sand etc.
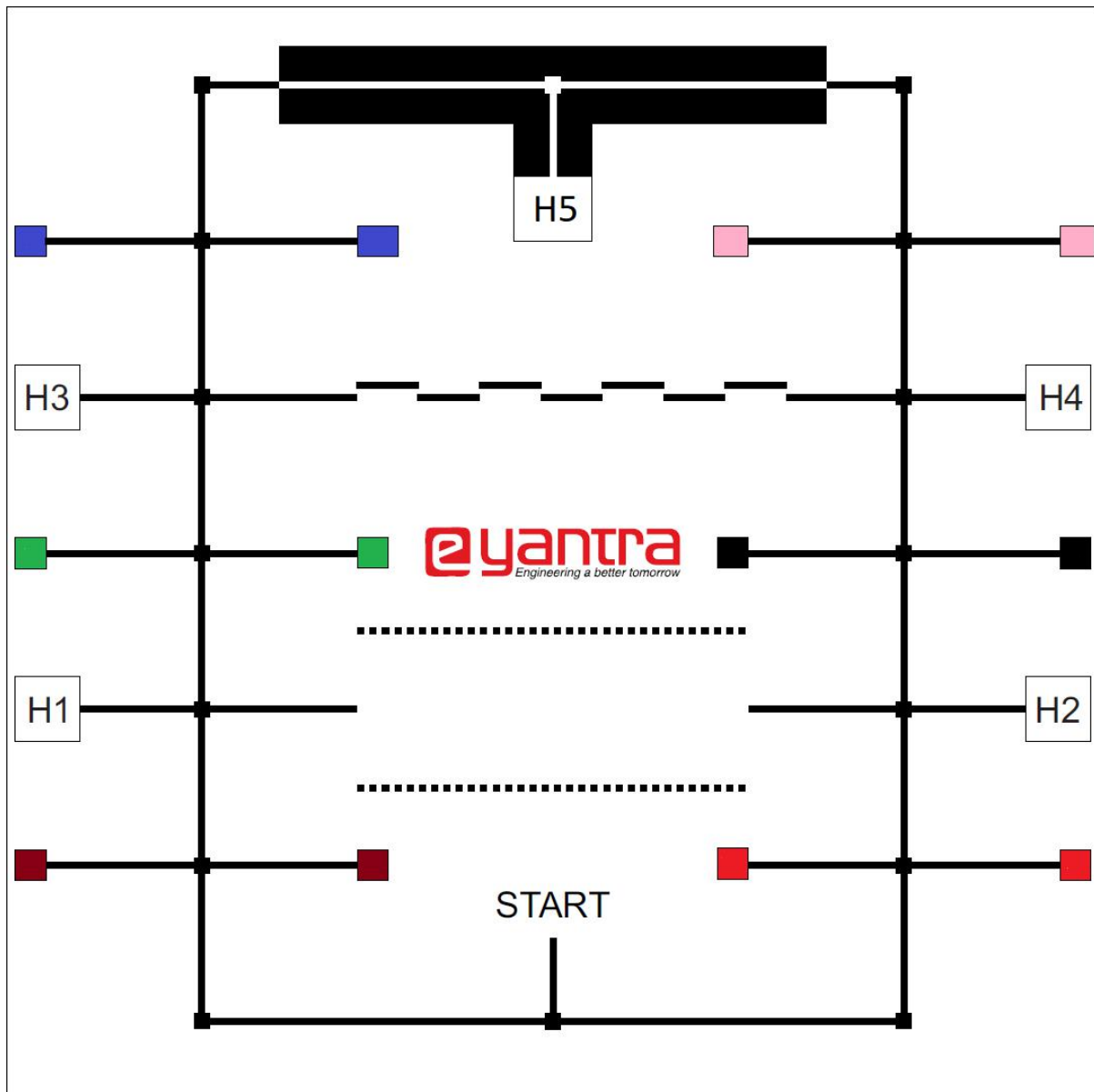

Figure 1: Arena

Problem Statement:

In this task, you are given a Configuration Image as shown in Figure 2 and a Configuration Table as shown in Table 1.

You have to program the robot to solve the problem where each House (H1, H2, H3, H4,H5) has a specific requirement of various Construction Materials from the Warehouses (W1, W2, …….W12).

For eg: In the Figure 2 below, H1 requires two Construction Materials which are Electrical Fittings (Black) and Painting (Pink) which are located at Warehouse (W7, W8) and (W11, W12) respectively. Robot should pick up materials from either W7 or W8 to fulfil the one of the requirements of H1 and either W11 or W12 to satisfy the second requirement.

You have to fulfil the requirement of each House by depositing the required Construction Materials as given in the Configuration Image and Configuration Table.

In order to complete the task within shortest possible time, you have to chose the different paths using different algorithms
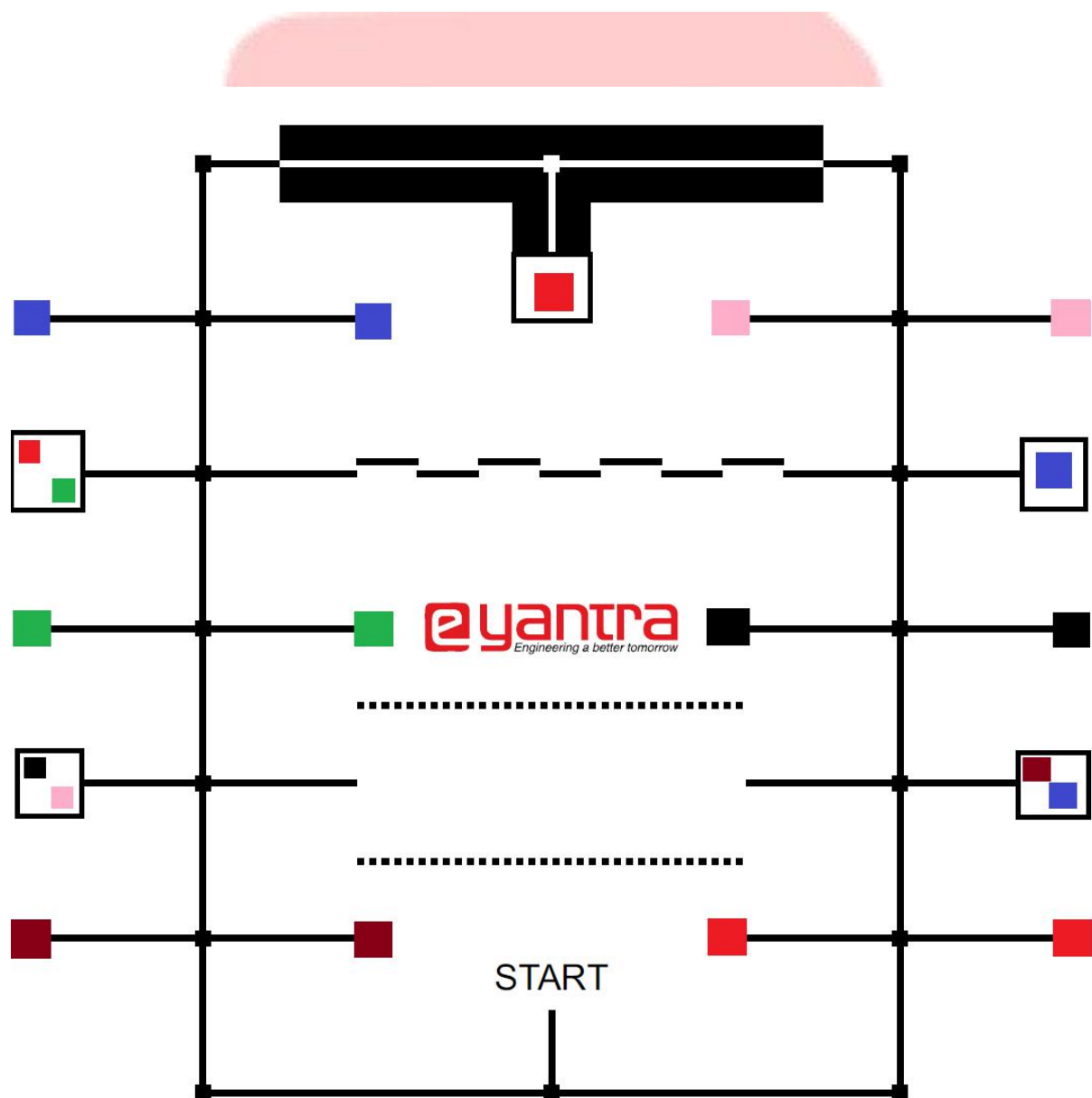
Figure 2: Example Configuration Image

Table 1: Example Configuration Table

House	Construction Materials	
H1	Electrical fittings	Painting
H2	Brick	Cement
H3	Sand	Gravel
H4	Cement	
H5	Sand	

Procedure:

- Open the *Task 1.2.ttt* file located in the same folder containing this *Problem Statement.pd*f

- Open the Visual Studio to program the robot to complete the task

- Robot should start from the START position.

- It should traverse to the Warehouse to pick up the required Construction Material as per given in the Configuration Image and Table.

- The picked up Construction Material has to be placed in its designated House.

- Follow the same procedure for other Houses.

Rules for the Task:

- ❖ You have to strictly implement a line-following, wall following, path planning algorithm. Submissions in which the robot goes off the track will not be evaluated.

- ❖ Construction Materials must be placed within the dotted square in House. If a house require two CMs then both blocks must be placed inside the dotted square.
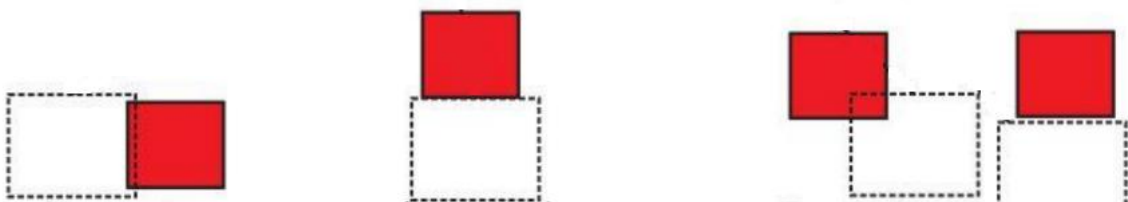
Figure 3: Incorrect Depositions

❖ The robot should return to the START position at the end of the run.

❖ Do NOT delete any components from the scene.

❖ Points awarded will depend upon the total time taken to finish the run.

❖ Points will be deducted for any collisions and/or incorrect placements of the Construction Material.

Final Configuration Image and Table

The above given Configuration Image in Figure 2 and Configuration Table in Table 1 are just an example for your consideration.

The Final Configuration will be revealed 48 hours before the Task 1.2 deadline i.e. on 0000 hours 24th November, 2019 (Sunday).