EE493 Conceptual Design Report – Taha DOĞAN

**Problem Statement**

* The problem is clearly stated.
* The design requirements, functional specifications, and measurable objectives are clearly identified.
* Technical details are provided and measurable performance criteria are defined.

In this project, carrying a long object through an open-top maze with two robots, which are not allowed to communicate each other directly, is aimed. The field that robots are carrying a long object is a maze. The maze specifications are given below.

* Maze streets are 250 mm wide
* There are , one entrance and one exit in presence
* Maze pattern is arbitrary However, there is no dead-end.
* Height of the walls: 100 mm. From the bottom of the walls, between 90 mm and 100 mm and the top of the walls are painted black, the rest is white.
* Width of the walls is 10 mm.

When solving the maze “follow the right wall” rule is chosen during the Standard Committee meetings. Although the maze definition is not a real maze due to no dead-end case,

Two robots are expected to carry a long object called *plank*. No sensors or no devices that is mounted directly to the plank is not allowed. Thus, determining and processing the collected data are handled with the devices and sensors that are on the robot itself. The specifications for plank is given below.

* The length of the plank is 500 mm
* Distance between two holders is 400 mm.
* Width of the plank is 50 mm
* Color of the plank is red.
* Plank is elevated 170 mm from the top of the maze platform to the bottom of the plank

According to plank specifications, these two robots cannot handle the *U-Turn* at once. In order to turn *U-corners*, robots will perform indirect communication. Thus, the main problem of this project is that observing and determining the other robot’s next move so that two robot can collaboratively proceed in the maze.

Robots are not allowed to communicate each other directly. Thus, during the maze solving operation, our robot X-Cali performs *sensing*. Both active and passive sensing approaches are applied on X-Cali.

According to aforementioned physical constraint, the X-Cali maze solver robot proceeds on the path. The interpretation and handling of the path are explained under the Solutions section, in detail.