Implement a Finite State Machine allowing Marrtino and the UR10 manipulator robot to cooperate with each other in order to fulfill the total Challenge.

The Finite State Machine is simply a set of ROS actions and services letting the two robots communicate their states (e.g., the docking behavior is completed) and cooperate according to these states. Thus, the student will start the total behavior and, after the Start, the two robots have to complete the Challenge in an autonomous mode. The human intervention is not allowed after the Start, apart from unloading the pieces from the top of the mobile robot (when in the docking station) and advise this robot that this unload is completed.

The total Challenge follows:

- The professor will ask the group to fulfill one and only one of the tasks of Figure 1
- Students can Start their Finite State Machine giving as inputs the names of the objects composing the assigned assembly task
- In an autonomous mode, Marrtino and the UR10 manipulator robot have to
  - Detect the objects
  - Pick the objects
  - Place the objects on the mobile robot, previously docked in the docking station near the manipulator robot (inside the black lines in the real setup)
- Navigate inside the arena until reaching the second docking station (inside the black lines in the docking station)
- From the docking station, a student can unload the pieces from the top of the mobile robot and advise that the unload is done
- The routine has to be repeated until all pieces of the assigned assembly composition have been carried to the final docking station
- Students have to assemble the pieces once everything has been transported.

Attention:

Pile the pieces on the top of the mobile robot in an efficient way: in the challenge, time is taken into consideration! The fastest team will win!

Time penalties for:
- Bumping on walls and obstacles: 2 sec/each
- Poor docking: 4 sec
- Damaging objects: 3 sec/each