

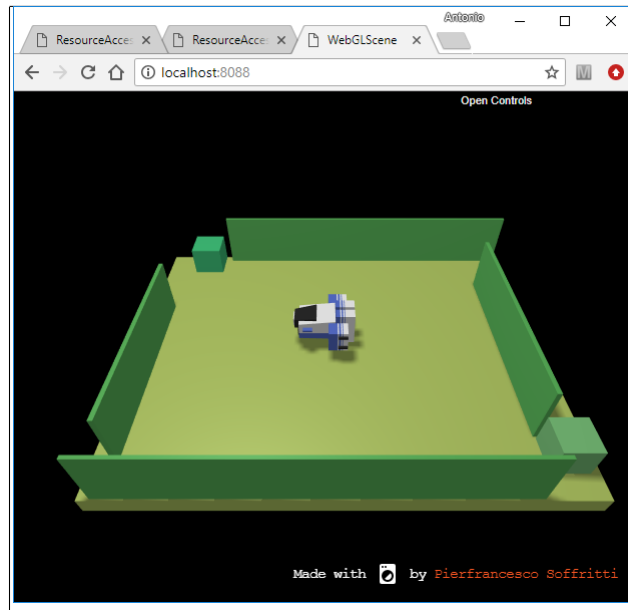
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## 8 Final task 2018

### 8.1 Requirements

In a home of a given city (e.g. Bologna), a **ddr** robot is used to clean the floor of a room (**R-FloorClean**).

The floor in the room is a flat floor of solid material and is equipped with two *sonars*, named **sonar1** and **sonar2** as shown in the picture (**sonar1** is that at the top). The initial position (**start-point**) of the robot is detected by **sonar1**, while the final position (**end-point**) is detected by **sonar2**.



The robot works under the following conditions:

1. **R-Start**: an **authorized user** has sent a **START** command by using a human GUI interface (**console**) running on a conventional PC or on a smart device (**Android**).
2. **R-TempOk**: the value temperature of the city is not higher than a prefixed value (e.g. 25 degrees Celsius).
3. **R-TimeOk**: the current clock time is within a given interval (e.g. between 7 a.m and 10 a.m )

While the robot is working:

- it must blink a Led put on it, if the robot is a **real** robot (**R-BlinkLed**).
- it must blink a Led Hue Lamp available in the house, if the robot is a **virtual** robot (**R-BlinkHue**).
- it must avoid fixed obstacles (e.g. furniture) present in the room (**R-AvoidFix**) and/or mobile obstacles like balls, cats, etc. (**R-AvoidMobile**).

Moreover, the robot must stop its activity when one of the following conditions apply:

1. **R-Stop**: an **authorized user** has sent a **STOP** command by using the **console**.
2. **R-TempKo**: the value temperature of the city becomes higher than the prefixed value.
3. **R-TimeKo**: the current clock time is beyond the given interval.
4. **R-Obstacle**: the robot has found an obstacle that it is unable to avoid.
5. **R-End**: the robot has finished its work.

During its work, the robot can optionally:

- **R-Map**: build a map of the room floor with the position of the fixed obstacles. Once built, this map can be used to define a plan for an (optimal) path from the **start-point** to the **end-point**.

Other requirements:

1. The work can be done by a team composed of **NT** people, with  $1 \leq NT \leq 4$ .
2. If  $NT > 1$ , the team must explicitly indicate the work done by each component.
3. If  $NT = 4$ , the requirement **R-Map** is mandatory.