72939 - Final task ISS-2019 Bologna

LabISS-lectures site

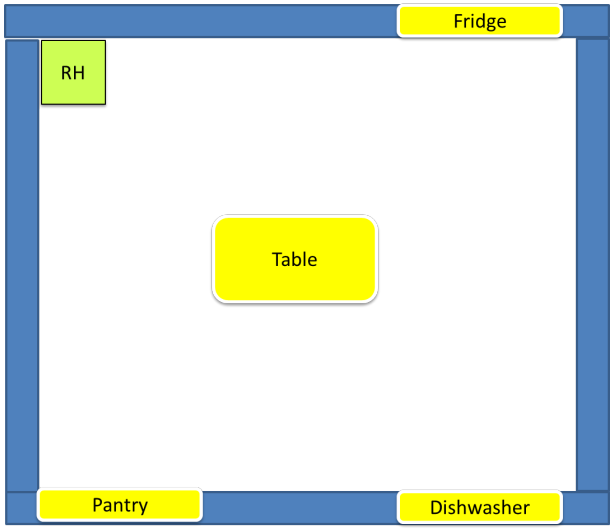
Overview

A room dedicated to support a **Standing Buffet Service** is equipped with a set of (smart and non-smart) resources including a *fridge*, a *dishwasher*, a *pantry*, and a ddr robot able to work as a *Room Butler* (called from now on **RBR** (Room Butter Robot).

The *fridge*, the *dishwasher* and the *pantry* are embedded into a wall of the room, so to exclude any protuberance from the wall itself.

A *Table* is put at the center of the room, so that a possible room configuration looks like that shown in the following picture:

Standing Buffet Service room



- *RH* : home location of the **RBR**
- *fridge* a 'Internet Thing'

For a possible virtual environment, see sceneConfig.js

The behavior of the Buffet Service is supervised by a *Maître de salle* (or simply **Maitre**) which can tell the **RBR** to perform a set of tasks, including:

1. *Prepare the room*. This task consists in putting on the *Table* dishes taken from the *pantry*, and food taken from the *fridge*. The set of items to put on the table in this phase is fixed and properly described somewhere.
2. *Clear the room*. This task consists in bringing non-consumed food again in the *fridge* and the dishes in the *dishwasher*.
3. *Add food* on the table. This task consists in bringing some specific food (if it exists) from the *fridge* to the *Table*.

Thus, the *fridge* is intended to be a smart device owning explicit knowledge of the food stored in it. Moreover, it should be able to answer (via **CoAP**) to questions about its content, asked by humans or machines.

The *pantry* and the *dishwasher* are (at the moment) non-smart resources.

Requirements

Design and build the software to put on board of the *fridge* and of the **RBR**. In particular, the **RBR** must be able to accept the following commands sent by the **smart-phone** of **Maitre**:

- *prepare*: the **RBR** must execute in autonomous way the *Prepare the room* task.
- *add food*: the **RBR** must execute in autonomous way the *Add food* task.

- *clear*: the **RBR** must execute in autonomous way the *Clear the room* task.

These tasks are normally executed in sequence, and the main scenario can be summarized as follows:

1. At start, the room is empty (i.e. no people is in it, besides the **Maitre**) while the *pantry* and the *fridge* are filled with a proper set of items. The **RBR** is in its **RH** location and the *dishwasher* is empty.
2. The **Maitre** sends to the **RBR** the *prepare* command and waits for the completion of the related task. At the end, the **RBR** is in its **RH** location again.
3. The **Maitre** opens the room to people. During the service, the **Maitre** can send to the **RBR** the *add food* command, by specifying a *food-code*. The **RBR** executes the task only if food with the given code is available in the *fridge*, otherwise it sends a warning to the **Maitre**. After the task completion, the **RBR** returns is in its **RH** location.
4. At the end of the party, the **Maitre Maitre** sends to the **RBR** the *clear* command and waits for the completion of the task. The **RBR** returns is in its **RH** location again.

However, the **Maitre** is able, at any time, to use his/her smart-phone to:

- *consult* the **state of the room**, e.g. to known what are the objects related to each resource; for example, the object currently posed on the *Table*, in the *dishwasher*, etc;
- *stop* or *reactivate* an activated task.

Finally, the **RBR** must be able to

- *avoid* the impact with mobile obstacles (e.g. the **Maitre** or other humans / animals present in the room).

The software to put on the *fridge* should make the device able to:

- *expose* its current content on the **Maitre** smart-phone;
- *answer* to questions about its content (e.g. if it contains food with a given code).

Non functional requirements

1. The ideal work team is composed of 3 persons. Teams of 1 or 2 persons (NOT 4 or more) are also allowed.
2. The team must present a workplan as the result of the requirement/problem analysis, including at least one TestPlan.
3. The team must present the sequence of SPRINT performed, with appropriate motivations.
4. The team must present (in synthetic, schematic way) the specific activity of each team-component.