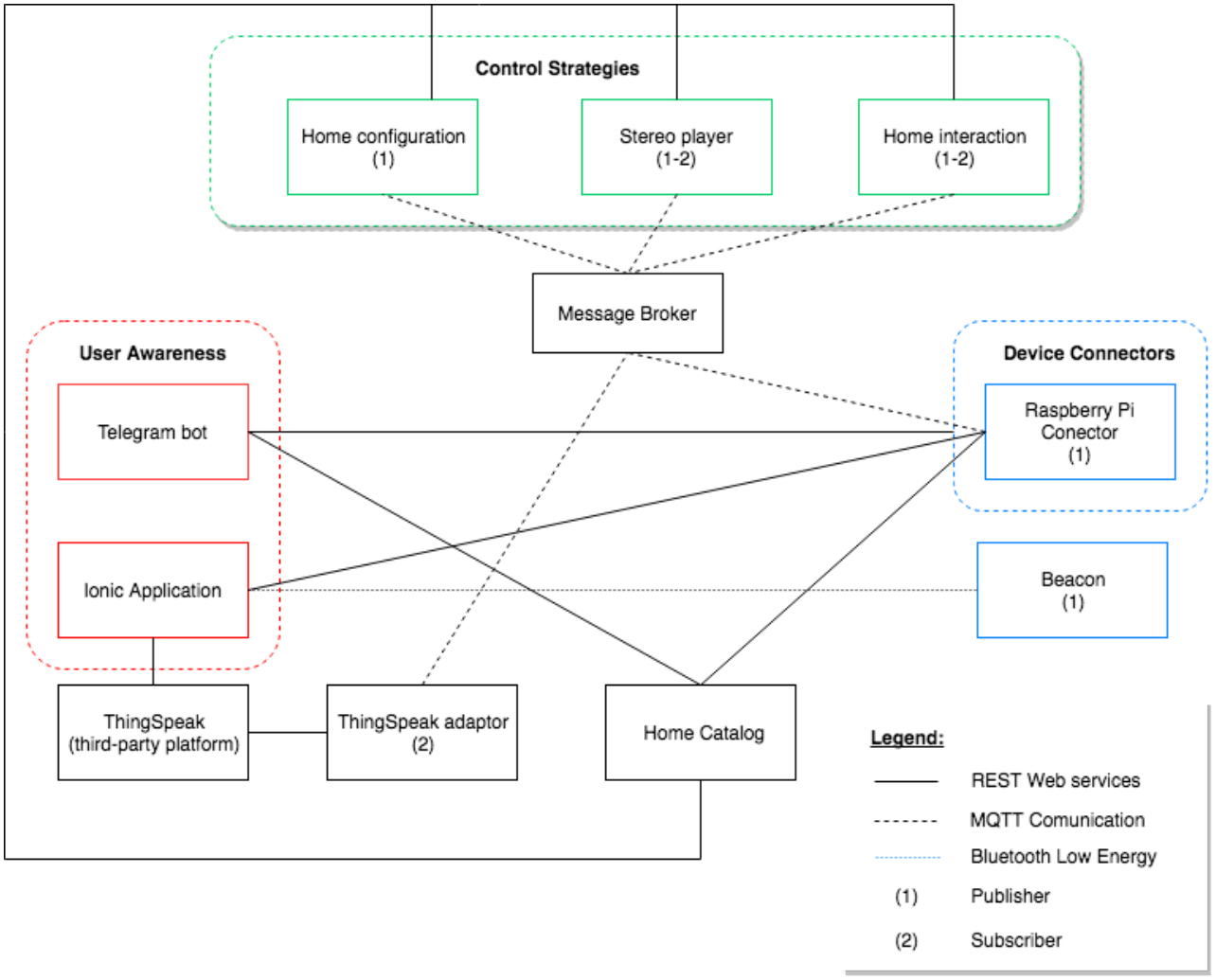
1 Name of Use Case

Name of the Use Case	**Smart house simulation environment**
Version No.	v1.0
Submission Date	13/12/2017
Team Members (with student ids)	Luís Carvalho (s250858) and Ricardo Lopes (s250859)

2 Scope and Objectives of Function

Scope and Objectives of Use Case	
Scope	The proposed project aims at creating a both modular and scalable smart house mobile application.
Objective(s)	The expected results consist on providing a tool for simulating a smart house.
Domain(s)	Smart house
Stakeholder(s)	Architects, designers, smart house's engineers, education institutions, private enthusiasts
Short description	- Define house divisions and properties, possible outputs and inputs and devices; - Measure humidity and temperature: alert and statistics; - Simulate a home stereo player; - Virtual localization and physical interaction with virtual simulation using beacons; - Home interaction such as motion and lights; - User friendly interaction through bot communications.

3 Diagram of Use Case



4 Complete description of the system

The proposed IoT platform for Smart Home follows the microservices design pattern. It also exploits two communication paradigms: i) publish/subscribe based on MQTT protocol and ii) request/response based on REST Web Services. In this context, 11 actors have been identified:

- **Message broker -** provides an asynchronous communication based on the publish/subscribe approach. It exploits the MQTT protocol;
- **Home catalog -** works as a catalog for all the actors in the system. It provides information about end-points (i.e. REST Web Services and MQTT topics) of all the devices, resources and services in the platform. It also provides configuration settings for applications and control strategies. Each actor, during its start-up, must retrieve such information from the Home Catalog exploiting its REST Web Services;

- **Raspberry Pi connector -** is an implementation of the Device Connector that integrates into the platform Raspberry Pi board. Each Raspberry is equipped with motion, temperature and humidity sensors to provide environmental information about the status of a room. It provides Rest Web Services to retrieve environmental information (temperature and humidity). It also works as an MQTT publisher sending information on user presence (when detected) and environmental data;
- **Beacon -** the Estimote Beacon has an API capable of given access to features such as beacon proximity detection (detects the beacon) and indoor location (room mapping by beacons without GPS need). Connects directly to Android applications through use of Bluetooth Low Energy.
- **Telegram bot -** is a service to integrate the proposed infrastructure into Telegram platform, which provides communication with a BOT. This Bot would assist and allow users sending actuation commands to IoT devices, exploiting REST;
- **Ionic application -** is an open source framework for building native mobile applications. It will be used to develop the Android application in order to retrieve data from the Raspberry Pi exploiting REST APIs, Thingspeak Web Services to import plots about environmental measurements, and finally to access beacons data through native APIs;
- **ThingSpeak -** is a third-party software that provides REST Web Services. It's an open-data platform for the Internet of Things to store, post-process and visualize data (through plots);
- **ThingSpeak adaptor -** is an MQTT subscriber that receives measurements on environmental measurements and upload them on Thingspeak through REST Web Services;
- **Home configuration -** is a control strategy with the function to create the house by dividing into rooms and giving each one possible functions and devices such as lights, stereo player or beacons;
- **Stereo player -** is a control strategy to manage the stereo player such as activation, deactivation and defining the music playlist, etc;
- **Home interaction -** is a control strategy to manage the possible interactions with the house and its devices.

5 Desired Hardware

Device Name	Quantity	Needed for…
Speaker	1	Simulating a home stereo player
Estimote location beacon	4	Simulating house mapping and localization and for displaying near objects information