An IoT application based on FIWARE

Y. R. Baca Gómez [(1)], H. Estrada Esquivel [(2)], D. Villanueva[(3,4)]

[(1)(2)(3)] INFOTEC, Centro de Investigación e Innovación en Tecnologías de la Información y Comunicación, Av. San Fernando 37, Toriello Guerra, Tlalpan, Ciudad de México, México
yolanda.baca@infotec.mx
[(4)] CONACyT Consejo Nacional de Ciencia y Tecnología, Dirección de Cátedras, Insurgentes Sur 1582, Crédito Constructor, 03940, Ciudad de México, México.

1. Introduction

The Internet of Things (IoT) is a collection of things embedded with electronics, software, sensors, actuators, and connected via the Internet to collect and exchange data with each other. There is a variety of common IoT applications, including smart home, smart city, smart grid, and smart health, among others [1]. Besides, the IoT provides connectivity for anyone at any time and place to anything at any time and place, therefore links real life and physical activities with the virtual world [2]. FIWARE[1] is an emerging IoT platform, funded by the European Comission (EU), which is pushing for an ecosystem providing APIs and open source implementations for lightweight and simple means to gather, publish, query and suscribe context-based, real-time "things" information [3]. The *FIWARE Catalogue*[2] contains the APIs, called Generic Enablers (GEs). The GEs offer a number of general-purpose functions, therefore, it facilitates the development of smart applications in multiple sectors [4]. Furthermore, FIWARE is based on the Open Mobile Alliance Next Generation Service Interfaces (OMA NGSI) Context Management standard to manage and exchange information [5]. One of the most important FIWARE GE is an API called Orion Context Broker (OCB). The OCB is essentially a REST API based on OMA NGSI, which technically consists of a MongoDB database with an NGSI REST API on top of it. It allows the creation of all necessary entities and does not require any database schema. All entities are stored in a normalized way in one MongoDB collection. A powerful feature of the OCB, is the capability to suscribe to events, this allows to react to changes in the data stored. Susbscriptions can be of different scope. For example, "inform me, whenever a new entity is created" or "inform me, whenever the temperature in room 212 exceeds 25 degrees Celsius". This facilitates the implementation of smart applications, based on IoT technology [6]. Nowadays, Mexico has an instance of the *FIWARE platform*[3] called *Mexican FIWARE Lab Node* hosted in the *National Future Internet Laboratory*[4]. In this sense, more than 100 European cities are already using FIWARE, most of them for mobility solutions, however, one of the main issues of FIWARE, as well as of most of current smart city platforms, it's that they are programming-based approaches, where solutions are generated starting from low design levels [7]. In this paper, we present an IoT application, base on FIWARE, of a smart plant called *Rachel*. This application, allows Rachel to communicate and modify her enviroment through some sensors (soil moisture sensor, temperature sensor, relative humidity sensor, infrared sensor and ligtht sensor photoresistor). Furthermore, we create an entity in the OCB, called Rachel based on the *AirQualiltyObserved*[5] FIWARE data model, taking into account the information generated by the sensors. The information retreived from the sensors is sent to Rachel entity. Most of the time, Rachel keeps a happy face, and, through the values obtained from the sensors, Rachel can turn on a ventilator if she feels heat, turn on a lamp if there is no light, show a sad face and turn on the irrigation system if she is thirsty. When she is not thirsty anymore her happy face come back, and if somebody comes to see her, her heart starts beating. In this context, it was necessary to create a subscription in the OCB to the Rachel entity, and when the values of the sensors change, the information is sent to the Green Route application [7, 8, 9]. The Green Route application is part of the SmartSDK[6] Project, and is focused to help the final user to determine the

[1] https://www.fiware.org/

[2] https://catalogue.fiware.org/

[3] http://infographic.lab.fiware.org/

[4] http://lanif.infotec.mx/

[5] http://fiware-datamodels.readthedocs.io/en/latest/Environment/AirQualityObserved/doc/spec/index.html

[6] https://www.smartsdk.mx/

best route, taking into account information about traffic, weather and air quality. Finally, all the values obtained from the sensors are visible in a LCD Display, and also are available in the OCB.