Internet of Things Demo

@Modtissimo February 2019

Francisco Sá Carneiro Airport // Porto

Portugal

The "Internet of things" (IoT) is revolutionizing not only industry, but also all the economic and social spectrum of our society. By giving "things" the ability to communicate, to share their state and to receive instructions, we are populating the manufacturing contexts with intelligent agents, and that is the foundation of the smart factories and the smart supply chains.

In a brief view of the concept, IoT is a network of devices like sensors that monitor industrial or business processes, extracting data that is stored probably in the cloud, data that is used by algorithms and, from those algorithms, reasoning and actions are identified. Finally, those actions are transmitted to actuators on the shop floor, like opening a valve, sending an email to a customer, or changing the destination of an AGV. This cycle goes on repeating, according to the goals defined for the processes and for the organization.

Viewing IoT as a system, it has broadly four main blocks or layers:

- Sensors and actuators – These are the "things", the devices that are deployed in the shop floor, monitoring processes and performing actions;
- Connectivity – This layer consists of all the secure communication infrastructure that allows the connectivity between sensors and actuators, and all the other layers;

- Data and Management – Databases where data is stored, probably in a cloud environment, in a secure way and available for others systems and applications. Also, here are the tools needed to manage the what it may be called as a digital mirror of the real world assets, like machines and sensors;

- Applications – Layer where systems and applications are found, like dashboards, data analytics tools, MES or ERP systems, and others.

With these four layers it is possible to conceive an information system, with a strong interrelation between humans and technology, able to sense the context, to operate within that context, to take the best decisions, most of them in real-time, and, in the end, enabling the organization to meet its goals.

IoT combines several technologies that, when orchestrated, gives you the ability to know how the "things" are functioning, order them to perform actions, and gets insights on your processes, products, organization and even your supply chain.

You should manage things as an asset and that is why you need an architectural view of the whole system. For this demo, we simplified the architecture to four layers and highlighted in each layer the elements that form our demonstrator.

This installation monitors the temperature and humidity in the interior of a box. A heater will increase the temperature inside, and a fan will lower it. By pressing the button, the system will turn on the heater for a short period, and then turns on the fan, turning off the heater. The sensors and the computational unity that is also inside, sends the data to the IoT cloud-based platform, and, on top of that, a dashboard will display the data in real-time.
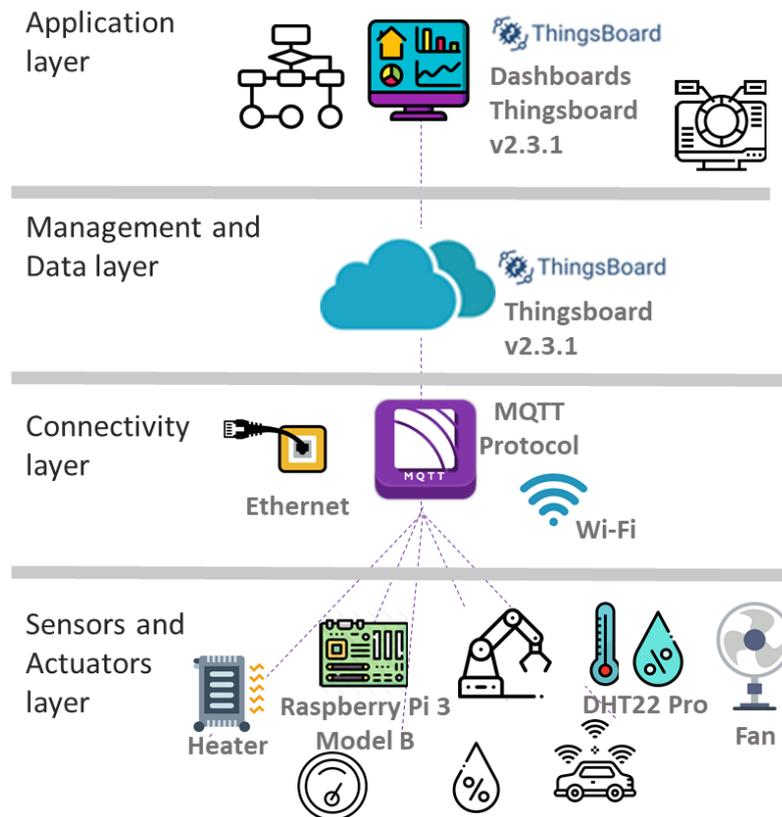
The most important goal of this demo is to highlight the layered view of IoT and how it was assembled with different components that, when changed or replaced, have lower or even null no impact on the other layers.

Contacts

Júlio Sá - jsa@citeve.pt

João Nuno Oliveira - joliveira@citeve.pt