



CERTIFIED WORKSHOPS FOR INDUSTRIAL ENGINEERING

IOT TRAINING WORKSHOP FOR THE INDUSTRY

Online based theoretical workshop with real practices.



Organized by Vester Industrial Training Center

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OVERVIEW

The presence of IoT devices is exponentially growing in the last years.

According to this trend, all systems will be virtually connected to the Cloud and the information will be managed by platforms hosted on Cloud Computing services.

The industrial environment does not escape this trend and it is expected, like in the rest of the fields, that the development of IoT solutions prevail in the coming years.

For this reason, it is of great importance that the industry professionals stay updated and learn about the implementation of IIoT solutions.

OBJECTIVES

With this training the participant will learn how to implement a project from start to finish under the concepts of IIoT.

To achieve this the workshop is divided into technical objectives focused on 3 fundamental aspects of IIoT: SWN (wireless sensor networks), WLAN and WLAN (wireless LAN and personal LAN), IIoT gateways and cloud computing services, tools that will give the participant the knowledge necessary to start using, designing and implementing IIoT solutions for the industry.

MATERIALS INCLUDED

- a. Manual and exercise guide in digital format
- b. Power Points with extra material
- c. Annexes in digital format
- d. Access to the virtual classroom and digital certificate

All the necessary material will be sent by email before the first day of the Workshop.

LEARNING ENVIRONMENT

The Workshop will be held online, in a virtual classroom where students will be able to interact with the instructor and among their companions at any time. It will be composed of explanations, Power Point presentations and practical exercises. It will be an open and friendly environment that facilitates discussion and participation. Attendees will be able to expose their own connectivity issues in order to learn from each other.

PRACTICAL EXERCISES

The workshop has a predominant focus on practical exercises that are structured in a sequence that allows the participant to design their own IIoT project from scratch. At the end of this training the participant will have implemented their own application.



WORKSHOP SYLLABUS

Subject 1. Fundamental concepts of IoT

- The IoT market today
- IoT products and services
- Verticals of IoT market
- Brands involved in IoT

Subject 2. IIoT Architecture

- Architecture diagram
- Sensors level
- Gateway and networks level
- Service level
- Application level

Subject 3. IIoT Networks

- Wireless networks
 - LAN · WLAN · WAN · PAN
 - WPAN · LPWAN
- ISM bands
- ZigBee
- 6LoWPAN
- LoRa
- SigFox
- Mobile networks
- WIFI
- Bluetooth

- Exercises:

- There will be 3 “IoT Ready” wireless technology sensors for measuring temperature, humidity and air quality, as well as an LPWAN network coordinator that synchronizes sensors. The objective is to configure the sensor network from the initial step
- The student can observe and participate in the configuration of sensors until they are operating
- This setting will be used for subsequent exercises

Subject 4. IIoT Gateways

- Data treatment
- Edge computing
- Protocol conversion
- Typical architecture
- IoT Gateway levels
- Exercises:

- Each participant will have a virtual machine that will have its own IoT Gateway installed. The student will connect the IoT Gateway with the previously configured sensor data
- Each participant can do data processing such as structures, analysis, scaling and historization

Subject 5. IIoT Application Protocols

- Protocols structure
- MQTT
- OPC UA
- REST API
- JSON format
- Exercises:

- Using the IoT Gateway configured in the previous point, each participant will make 3 configurations:
 - 1. Data output by MQTT, which will be tested with test tools that each student will have in their Virtual Machine
 - 2. Data output by OPC UA, which will be tested with test tools that each student will have in their virtual machine
 - 3. Data output by REST API, which will be tested with test tools that each student will have in their virtual machine
- 4. JSON file analysis



WORKSHOP SYLLABUS

Subject 6. IIoT architecture with classic industrial systems

- Industrial devices
- The cloud and the plant floor
- IIoT Gateway function
- Exercises:

- There will be an industrial PLC, the most traditional style of control systems in the industry
- Using the IoT Gateway, the PLC data will be connected to the IoT Gateway
- Conversion of plant protocol to IoT protocols will be checked

Subject 7. Cloud services

- Market data
- Services model
- Cloud computing features
- IaaS
- PaaS
- SaaS
- Edge computing services

Subject 8. Amazon IIoT Core example

- AWS IIoT diagram
- MQTT Broker
- Rules engine
- Device shadows
- Exercises:
- This exercise will previously require that each student creates a free AWS IoT Core account
- Using the IoT Gateway configured and connected to the Internet, we will make a connection to the Amazon IoT Core through the MQTT Broker that Amazon has in the Cloud

- We will check message reception on Amazon
- Once the messages have been checked, a data processing rule will be created
- Once the rule is created, a notification service will be sent via email. The participant can receive the data generated via email from Amazon

Subject 9. XaaS Example

- Architecture diagram
- EC2 Web hosting
- PaaS Cloud hosted platforms
- SaaS Software hosted in the cloud
- Exercises:
- There will be a PaaS platform hosted on Amazon. This platform will allow the student to perform the following exercises:
- 1. Send sensor data to the cloud
- 2. Historical data
- 3. Store and forward data
- 4. Create web display screens such as graphics, real-time data, etc.
- 5. View sensor data in a web page form a smartphone or any device with a web browser

