USEES7 - Data Management and Digital Transformation in Industrial Process Automation

Mis à jour le 05-07-2024

Code : USEES7

Unité spécifique de type cours

3 crédits

Responsabilité nationale : EPN05 - Informatique / Stefano SECCI

Présentation

Prérequis

- Academic training in fields related to engineering, industrial automation, computing, information technology or related disciplines.
- Basic knowledge of industrial automation principles and industrial processes may be required. Familiarity with concepts of data management, data analysis and digital transformation. Experience in the field of industrial automation or data management may be an additional requirement.

Objectifs pédagogiques

- Explain the different layers that can coexist in IoT architectures in the industrial environment.
- Know the main existing hardware solutions for data capture.
- Know the main wireless communication technologies that can be found in the industrial IoT.
- Know the possible functionalities offered by data integration platforms: ITCL BITAL

Programme

Contenu

Industry 4.0:

Raise awareness of the importance of data, of data analysis.

- Main sources of IIoT information:
  - Main data sources existing in industrial facilities. Functions that cover Aspects to take into account in the capture layer:
  - Programmable controllers.
  - Specific controllers, IoT probes.
  - HMI, SCADA, explain the differences and what each one covers

Layers and architectures

Describe existing layers and architectures. Expose the elements and functions they cover and the interrelationship between them.

- Sensory layer.
- Control layer.
- IT layer.
- Cloud.
- IT Architecture (Closed Bus, Open Bus, Open Bus+NAT).

Main protocols of each layer:

Describe the main protocols of each of the layers, characteristics, advantages / disadvantages.

- Analog/digital signals.
- Manufacturer-specific protocols: S7, FINS, MELSEC, METTLER TOLEDO, MARCHESSINE.
- Industrial standard protocols: PROFINET/PROFIBUS, MODBUS RTU/TCP, OPC UA.-DA
- MQTT, REST API…

Industrial IoT Gateways:

Explain the current state of some of the main commercial HW for protocol capture and adaptation, differences, advantages and disadvantages. VNODE, IBH, EWON, SIEMENS IoT2040

- New wireless communication technologies
  - Expose the main LPWA technologies, architectures, differences. Advantages and disadvantages. LORA, SIGFOX, NB IoT

Modalités de validation

- Contrôle continu
- Examen final

Description des modalités de validation

Continuous monitoring and exam.