Publication date : 02/05/2024

# Course : Internet of Things, developing connected applications in Java and C++

*Practical course - 5d - 35h00 - Ref. IBO*
*Price : 3570 CHF E.T.*

This training course will enable you to understand the typical architecture of an IoT network and to set up a complete IoT chain, from information feedback from LPWAN-connected sensors to Data Visualization, including Cloud/Big Data collection and operation in Java and C++.

## Teaching objectives

**At the end of the training, the participant will be able to:**

- Define a complete IoT architecture.
- Know the IoT networks available.
- Use different types of sensors and detection devices.
- Prototype using Raspberry/Arduino.

## Intended audience

Developers wishing to develop a project around the Internet of Things.

## Prerequisites

Good knowledge of Java. Experience of Java development desirable.

## Practical details

**Hands-on work**

A case study will enable the deployment of a complete IoT chain. Elements involving other programming techniques will be provided.

## Course schedule

### 1 Introduction to the Internet of Things

- Basic IoT concepts. Links with M2M. IoT architectures.
- Communication and energy issues.
- Offers and players.

**PARTICIPANTS**

Developers wishing to develop a project around the Internet of Things.

**PREREQUISITES**

Good knowledge of Java. Experience of Java development desirable.

**TRAINER QUALIFICATIONS**

The experts leading the training are specialists in the covered subjects. They have been approved by our instructional teams for both their professional knowledge and their teaching ability, for each course they teach. They have at least five to ten years of experience in their field and hold (or have held) decision-making positions in companies.

**ASSESSMENT TERMS**

The trainer evaluates each participant's academic progress throughout the training using multiple choice, scenarios, hands-on work and more.
Participants also complete a placement test before and after the course to measure the skills they've developed.

## 2 IoT architectures

- General architecture diagram, from sensors to servers.
- Operating systems adapted to IoT (Linux, Raspbian, Win10 IoT...).
- Links with various Clouds (MS Azure IoT...).
- The exploitation and indispensable correlation of data with Big Data tools.
- Data security and confidentiality, respect for privacy.

### Storyboarding workshops

Case studies (smart meters, etc.). Installation of dedicated IoT systems.

## 3 Networks and proximity detection

- Available technologies: WiFi, Bluetooth, NFC, RFID...
- Exchanges via Bluetooth and WiFi Direct.
- How RFID and NFC systems work. QR codes.
- The possibilities offered by Smartphones.

### Hands-on work

Use NFC tags. Use Bluetooth or Wifi direct.

## 4 The LPWAN network

- The specific features of IoT networks (distance, equipment positioning, autonomy).
- Characteristics of LPWAN networks. Study of SigFox and LoRaWan. What kind of programming?
- Available offers (operators).
- Securing an IoT network.

### Hands-on work

Exploitation de données remontées par un réseau LPWAN et utilisation des capteurs destinés au développement.

## 5 Prototyping

- Presentation of Arduino and Raspberry solutions.
- Arduino Harware capabilities (sensors, shields, GPIOs) and embedded programming.
- The environments available on Raspberry and the link with Arduino.
- Choice of operating system and development tools.

### Hands-on work

Mise en place d'une solution intégrant un capteur et plusieurs composants parmi ceux présentés.

## 6 Software operation

- Software communication platforms (Technicolor Qeo, Google Weave, etc.).
- REST APIs and development tools.
- Solutions for injecting data into a NoSQL BigData database.
- The different Clouds (Google Cloud Platform, ThingPlus...).
- Software tools for securing an IoT solution.
- Data visualization techniques (mobile and desktop).

### Hands-on work

Setting up communication from a sensor to a NoSQL BigData database.

**TEACHING AIDS AND TECHNICAL RESOURCES**

• The main teaching aids and instructional methods used in the training are audiovisual aids, documentation and course material, hands-on application exercises and corrected exercises for practical training courses, case studies and coverage of real cases for training seminars.
• At the end of each course or seminar, ORSYS provides participants with a course evaluation questionnaire that is analysed by our instructional teams.
• A check-in sheet for each half-day of attendance is provided at the end of the training, along with a course completion certificate if the trainee attended the entire session.

**TERMS AND DEADLINES**

Registration must be completed 24 hours before the start of the training.

**ACCESSIBILITY FOR PEOPLE WITH DISABILITIES**

Do you need special accessibility accommodations? Contact Mrs. Fosse, Disability Manager, at psh-accueil@orsys.fr to review your request and its feasibility.