



3-day course

Connecting Artificial Intelligence (AI) to Internet of Things (IoT)

September 1 to 3, 2021

Target audience

Top and middle managers wanting to learn the fundamentals and understand the latest trends of IoT technologies - including edge AI computing - and their industrial applications.

Requirements

The course will be given in English.

Dates and schedule

- Wednesday, September 1, 2021
- Thursday, September 2, 2021
- Friday, September 3, 2021

from 9 am to 6 pm

Certification

A certificate of attendance will be delivered at the end of the course.

Course venue

EPFL, Lausanne, Switzerland

Teaching approach

Afternoon demonstrations and sessions in the laboratory with experts on edge AI and Cloud computing using different IoT setups for industrial applications

Organization

- Embedded Systems Laboratory (ESL), Institute of Electrical Engineering, Ecole Polytechnique Fédérale de Lausanne (EPFL)

Overview

Nowadays, every organization needs to understand the opportunities and challenges offered by smart machine learning devices and IoT connected technologies. High-tech advances in miniaturized, ultra-low power embedded systems, in communication protocols and in AI techniques are leading to disruptive innovations. Established industries are deeply modified. Smart cities, eHealth or Industry 4.0 are part of the new revolution created by Internet of Things (IoT), which now includes smart intelligent sensors (also called edge AI computing).

This 3-day course will cover three main themes: Smart machine learning devices that enable edge AI in cloud-based IoT (hardware and software designs, AI technologies and power/energy requirements), Communication for IoT (latest protocols and standards) and complete examples of Industry 4.0, smart homes and wearable IoT devices (including practical case studies of edge AI devices and Cloud computing).

Objectives

- Get a comprehensive overview of latest IoT terminology, machine learning aspects and Cloud computing platforms
- Learn about the most up-to-date developments in edge AI systems including latest commercial solutions, embedded AI and energy management
- Understand main challenges related to communication in different IoT setups for different industrial applications
- Discover examples and case studies of application-oriented IoT designs (in medical, wellness, smart homes, logistics and Industry 4.0 applications)

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Register on www.formation-continue-unil-epfl.ch

Course fee

1900.- Swiss Francs
(includes course material, lunches and refreshments)
10% special discount for contributing members of EPFL Alumni

Registration deadline

June 18, 2021

Program Director

- **Prof. David Atienza Alonso**, Associate Professor of Electrical & Computer Engineering and Head of Embedded Systems Laboratory (ESL), EPFL

Instructors

- **Prof. David Atienza Alonso**, Associate Professor of Electrical & Computer Engineering and Head of Embedded Systems Laboratory (ESL), EPFL
- **Prof. Andreas Burg**, Associate Professor of Electrical Engineering and Head of Telecommunications Circuits Laboratory (TCL), EPFL
- **Mr. Marco Magatti**, Head of New Product Innovation and Design, Nespresso SA
- **Dr. Martino Ruggiero**, Head of Systems Architecture and Special Projects, PMI Science & Innovation
- **Dr. Marina Zapater**, Associate Professor – REDS Institute, HEIG-VD, HES-SO, Switzerland



Program

DAY 1: IoT AND EDGE AI COMPUTING - INTRODUCTION

- **IoT and edge AI computing terminology and concepts:** IoT trends, edge AI, basics of machine learning, etc. / *Case studies: Wearables (Shimmer, Apple Watch) and Industry 4.0 (AWS Zero Touch Kit, TI Sensor Tag, etc.)*
- **Edge AI systems optimization:** Techniques to optimize complete IoT systems thanks to edge AI computing concepts / *Case studies: TI Sensor Tag; Shimmer WBSN; Apple Watch, ST Jennic*
- **IoT Cloud platforms:** Cloud computing and Big Data AI solutions, overview of commercial platforms for deep learning in industrial applications / *Case studies: AWS IoT, Microsoft Azure and Google Cloud IoT*

DAY 2: COMMUNICATION FOR IoT & EDGE AI COMPUTING

- **Basics:** Latest trends and concepts in IoT communication protocols and standards / *Case studies: IEEE 802.15.4 (ULP IoT), 802.15.6 (Body Area Netw.), LoRA, SigFox, 5G, etc..*
- **Wireless communication stack:** Overview of different types of communication according to distance and amount of data to transmit / *Case studies: IEEE Zigbee and BT Low-Energy; ST NFC for IoT; Emerging M2M: NB-LTE, EC-GSM, NB-CIoT, LoRa, Sigfox, 5G*
- **IoT networks design:** *Case studies: Energy, performance and power comparisons between WiFi, WiFi LP, Bluetooth/LE, Zigbee, Z-Wave & En-Ocean, 5G*

DAY 3: APPLICATION-ORIENTED IoT DESIGNS

- **User interfaces vs. user experience in IoT products:** Exploration of edge AI devices and IoT characteristics to match market needs, lessons learnt from IoT product success stories / *Case studies: Smart Home Appliances, Smart Car Context and Wearable devices*
- **Blockchain and secure IoT setups:** Security goals and design of IoT networks for safe industrial systems with Blockchain and Cloud AI services / *Case studies: Encrypted general architectures for IoT devices in smart homes, wearables and Industry 4.0*
- **Interaction of edge AI devices and IoT Cloud services:** Google Cloud Platform, Microsoft Azure and Amazon Web Services (AWS) / *Case studies: AWS, Azure and Google Cloud secure data transmission and analysis*