

COMPUTER ENGINEERING (LM55)

(Lecce - Università degli Studi)

Teaching INTERNET OF THINGS

GenCod A005791

Owner professor Luigi PATRONO

Teaching in italian INTERNET OF THINGS

Teaching INTERNET OF THINGS

SSD code ING-INF/05

Reference course COMPUTER ENGINEERING

Course type Laurea Magistrale

Credits 9.0

Teaching hours Front activity hours: 81.0

For enrolled in 2021/2022

Taught in 2021/2022

Course year 1

Language ENGLISH

Curriculum PERCORSO COMUNE

Location Lecce

Semester Second Semester

Exam type Oral

Assessment Final grade

Course timetable

<https://easyroom.unisalento.it/Orario>

BRIEF COURSE DESCRIPTION

- + Description of the course
- + Introduction to Internet of Things and Web of Things
- + Introduction to WoT through use cases and practical approach
- + Introduction to Typescript and Node.js applications
- + WoT stack
- + RFID technology and Traceability
- + Bluetooth Low Energy and its evolution
- + Wireless Sensor Networks: IEEE 802.15.4, 6LowPAN, RPL, IPv6
- + Embedded Systems: Raspberry Pi, MT3620 and STM32
- + Layer 1 of the WoT stack: Access Layer
- + REST, CoAP, MQTT
- + Layer 2 of the WoT stack: Find Layer
- + Layer 3 of the WoT stack: Share Layer
- + Security in IoT and WoT, Blockchain, IOTA and Algorand
- + Layer 4 of the WoT stack: Compose Layer (Physical Mashup)
- + Introduction to Cloud Computing and Edge/Fog Computing
- + Introduction to AI applied to IoT
- + Domotics: KNX standard and practical use cases
- + Discussion of several use cases regarding smart environments

REQUIREMENTS

- + COMPUTER NETWORKS
- + SOFTWARE ENGINEERING
- + PROGRAMMING LANGUAGES (C, Java)

COURSE AIMS

The Internet of Things course aims to offer a complete vision on how to design and develop smart objects and smart services based on hardware and software technologies enabling the Internet of Things. Particular attention will be paid to the creation and testing of the so-called smart environments.

The Web of Things approach will be adopted which allows a total abstraction from the main physical technologies adopted in modern networks. The extended WoT protocol stack, composed of four layers, will be discussed, details on emerging enabling technologies such as RFID, embedded systems, WSN and Bluetooth Low Energy (BLE) will be provided. The REST architectural style and protocols such as CoAP and MQTT will be described. Several practical use cases focused on building smart environments will be discussed.

TEACHING METHODOLOGY

Teaching methodology adopted in the Internet of Things course is based both on theoretical discussion on emerging technologies enabling the IoT and practical discussion of use cases about the design and developing of smart environments. Furthermore, several external seminars focused on specific topics of the IoT will be organized involving important industrial companies.

ASSESSMENT TYPE

Discussion of a practical project or a research topic in the IoT field and oral exam on all topics analyzed in the course.

OTHER USEFUL INFORMATION

All didactic materials (slides, scientific papers, etc..) are available in the elearning repository of Unisalento: (<https://elearning.unisalento.it/course/view.php?id=911>).

FULL SYLLABUS

- + Description of the course
- + Introduction to Internet of Things and Web of Things
- + Introduction to WoT through use cases and practical approach
- + Introduction to Typescript and Node.js applications
- + WoT stack
- + RFID technology and Traceability
- + Bluetooth Low Energy and its evolution
- + Wireless Sensor Networks: IEEE 802.15.4, 6LowPAN, RPL, IPv6
- + Embedded Systems: Raspberry Pi, MT3620 and STM32
- + Layer 1 of the WoT stack: Access Layer
- + REST, CoAP, MQTT
- + Layer 2 of the WoT stack: Find Layer
- + Layer 3 of the WoT stack: Share Layer
- + Security in IoT and WoT, Blockchain and IOTA
- + Layer 4 of the WoT stack: Compose Layer (Physical Mashup)
- + Introduction to Cloud Computing and Edge/Fog Computing
- + Introduction to AI applied to IoT
- + Domotics: KNX standard and practical use cases
- + Discussion of several use cases regarding smart environments

REFERENCE TEXT BOOKS

- + Building the Web of Things: With Examples in Node.js and Raspberry Pi. Dominique D. Guinard, Vlad M. Trifa
- + Internet of Things for Architects: Architecting IoT solutions by implementing sensors, communication infrastructure, edge computing, analytics, and security. Perry Lea
- + Scientific papers
- + Web links