



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Intelligent Consumer Technologies

2627-2-F9103Q014

Aims

Knowledge and understanding

Students will acquire advanced knowledge of artificial intelligence, machine learning, communication technologies, and their integration in intelligent consumer applications. They will understand key concepts such as signal, image, speech and natural language processing, personalization, and privacy in connected systems.

Applying knowledge and understanding

Students will develop the ability to design, implement, and evaluate intelligent consumer systems using modern deep learning frameworks and tools. They will apply theoretical knowledge to practical scenarios such as smart home, healthcare, and IoT applications.

Making judgements

Students will be able to critically analyze the technological choices in intelligent systems, assess user-centered design approaches, and reflect on ethical and privacy-related implications.

Communication skills

Students will learn to effectively present and discuss technological solutions, design decisions, and project outcomes, both orally and in writing, using clear and technically accurate language in interdisciplinary contexts.

Learning skills

The course fosters the ability to autonomously deepen knowledge in the field of AI-powered consumer technologies, stay updated on emerging trends, and transfer acquired skills to new domains.

Contents

The course consists of a theoretical part and a practical part.

The theoretical part aims at exploring artificial intelligence, machine learning, communication technologies and consumer technologies. The practical part aims to deepen ICT ecosystem from an applied perspective by analyzing intelligent sensing applications in home environment, in healthcare etc.

The practical part consists in basic and advanced exercises using deep learning frameworks.

Detailed program

Course Modules:

1. Course Presentation: An overview of the course structure, objectives, and key learning outcomes.
2. Introduction to Intelligent Consumer Technologies: A broad introduction to the field, exploring its history, current trends, and future potential.
3. Signal Processing in Consumer Devices:
 - Speech Processing: Understanding how devices process spoken commands and interact vocally with users.
 - Image Processing: Techniques for enhancing, recognizing, and interpreting images by digital devices.
 - Inertial Processing: Exploration of how devices use inertial sensors to provide context-aware functionalities.
4. Personalization Technologies: Examining how devices use data to customize and adapt their functionalities to individual user preferences.
5. Communication Technologies: Insight into the technologies that enable devices to connect and communicate, including WiFi, Bluetooth, and NFC.
6. Privacy in Intelligent Consumer Technologies: Critical analysis of privacy issues, focusing on data security, user rights, and ethical design principles.

Learning Outcomes:

Upon completion of this course, students will:

- Understand the fundamental concepts of signal processing as applied to voice, image, and motion.
- Gain insight into how consumer technologies are personalized and how they communicate.
- Be able to identify and discuss the technological underpinnings of intelligent consumer devices.

Prerequisites

Fundamental of AI, Machine and Deep Learning, Fundamental of Communication Technologies, Fundamental of programming.

Teaching form

The teaching includes a part of theoretical lectures that will be held in the classroom, and a part of laboratory that will be held in the laboratory and/or classroom and will require the use of one's own PC. The two parts will be based both on delivery mode and interactive mode.

Textbook and teaching resource

- Scientific articles suggested by the teacher.
- Teachers' slides (<http://elearning.unimib.it/>)
- GitHub of the course:
 1. <https://github.com/paolonapoletano>
 2. <https://github.com/CeLuigi>
 3. <https://github.com/eduardstan>

Semester

First semester

Assessment method

The exam consists in the design and realization of a project assigned by the teacher (or self-proposed) about intelligent consumer technologies. The project can be developed individually or in collaboration with one colleague. The project will be discussed as an oral presentation and the teachers can ask questions about the theoretical and practical parts of the course.

Office hours

Paolo Napoletano, Monday from 14 to 16
Luigi Celona, Monday from 14 to 16
Ionel Eduard Stan, Monday from 14 to 16

Sustainable Development Goals

INDUSTRY, INNOVATION AND INFRASTRUCTURE
