

BLENDED INTENSIVE PROGRAMME PLAN

GENERAL INFORMATION			
Course title: From Smart Sensors to Industrial Applications: Standards, Networks, and Integration			
Dates for physical activity: 21/07/2025 to 25/07/2025			
Proposed period for virtual component: dd/mm/aaaa 1º online week – 07/07/2025 a 11/07/2025 2º online week – 14/07/2025 to 18/07/2025			
Location of physical activity: University of Beira Interior			
Target audience / Participant profile : Bachelor, Master and Doctoral students in Electrical Engineering or any similar area.			
No. of ECTS issued : 3			
Language of instruction and requirements : English			
Organizing board :			
Host university UBI – Portugal (Universidade da Beira Interior)	Partner 1 UNIBS - Italy University of Brescia	Partner 2 UNISA – Italy University of Salerno	Partner 3 UNIVG - Spain University of Vigo
Partner 4 UNIZG – Spain University of Zaragoza	Partner 5	Partner 6	
PROGRAM			
Short description: <p>This Blended Intensive Program (BIP) aims to bring together a diverse group of students and faculty from multiple higher education institutions (HEIs) to engage in a transdisciplinary and international learning experience focused on smart sensors technologies and industrial applications. The program aligns with the Erasmus+ KA131 goals, promoting blended learning formats, fostering digital collaboration, and encouraging innovative approaches to teaching and research. This BIP will emphasize the use of industrial standards and real-world sensor networks in various industrial</p>			

contexts, providing an opportunity to develop new skills, tackle societal challenges, and enhance long-term mobility prospects for students.

Proposed schedule:

A. Online Component (2 weeks)

This component will provide foundational knowledge, preparing students for in-depth, hands-on activities during the physical mobility phase.

Week 1:

Partners involved:

University of Salerno – 4h contact / 8h independent work

University of Brescia – 4h contact / 8h independent work

Content:

Introduction to Sensors and Industrial Applications (UNISA)

- Overview of sensor types (temperature, pressure, proximity sensors, etc.).
- Industrial use cases for sensors: manufacturing, automation, predictive maintenance.
- Signal conditioning, analogue-to-digital conversion, and integration.

Sensor Networks and Industrial Internet of Things (UNIBS)

- Wireless and wired sensor networks: basic architectures (mesh, star, point-to-point).
- Interface technologies for sensor systems in industrial contexts.
- Best practices for integrating sensors into automated control systems.

Activities:

Introduction to Sensors and Industrial Applications (UNISA)

- Pre-recorded lectures and digital content.
- Discussion forums and quizzes.
- Case studies on sensor-driven industrial applications.

Sensor Networks and Industrial Internet of Things (UNIBS)

- Virtual labs on designing basic sensor networks.

- Peer-to-peer discussions on practical challenges.
- Group assignment to design a theoretical sensor system for an industrial setting.

Week 2:

Partners involved:

University of Beira Interior – 4h contact / 8h independent work

University of Zaragoza – 4h contact / 8h independent work

University of Vigo – 4h contact / 8h independent work

Content:

Industrial Standards and Interoperability (UBI)

- Overview of key industrial standards for sensor integration and communication.
- The role of standards in ensuring interoperability among sensor systems and industrial applications.
- Best practices for implementing standard-compliant sensor networks.

Industrial Applications (UNIZA)

- Data collection and processing from sensors.
- Sensor systems in industrial monitoring and control systems.
- Design principles for real-time monitoring systems in industrial environments.

Advanced Sensor Systems (UNIVG)

- Focus on FPGA Implementation: An introduction to the implementation of complex processing and control algorithms in FPGAs, showcasing their application in sensor integration and data processing.

Activities:

Industrial Standards and Interoperability (UBI)

- Simulations on standard-compliant sensor setups.
- Collaborative assignments on real-world use cases for industrial standards.
- Industry case studies on the role of standards in automation and smart factories.

Industrial Applications (UNIVG)

- Interactive virtual labs: data acquisition and processing.

- Online assessment: quizzes and peer review of project ideas.

Advanced Sensor Systems (UNIZA)

- Group work: sensor system design for a real-world industrial scenario, emphasizing FPGA applications.

B. Physical Mobility Component (1 week) (25h)

The physical mobility week will be held at a University of Beira Interior and will focus on hands-on practical training, group collaboration, and site visits to industrial partners. Students will work in multinational teams, engaging in transdisciplinary projects that bridge the gap between sensor technology and industrial applications.

Day 1: Welcome and Program Overview

Activities: (6h)

- Orientation and program introduction. (0.5h) (UBI)
- Ice-breaker and team formation activities. (0.5h) (UBI)
- Keynote lecture on the future of sensors in industrial automation and the importance of digital networks for industrial communications. (1h) (TBD)
- Guest lecture on FPGA applications in industrial systems by a faculty expert. (0.5h) (TDB)
- Guided lab tour showcasing sensor integration in smart industry environments. (3.5h) (UBI)

Day 2: Hands-on Lab: Sensor Network Setup and Configuration

Content:

- Building and configuring a basic sensor network for industrial applications.
- Data capture and integration with industrial control systems.

Activities: (6h)

- Practical lab session on setting up standard-compliant sensor networks. (3h) (UNIBS ??)
- Troubleshooting and testing real-time data transmission. (3h) (UNISA ??)

Day 3: Implementing Industrial Standards and FPGA Applications

Content:

- Hands-on work on standard-compliant sensor networks.
- Standards-based configuration for interoperability.
- FPGA implementation of complex processing algorithms for sensor data analysis.

Activities: (6h)

- Guest speaker session: Industry expert on the role of standards in smart industries. (0.5h) (TBD)
- Workshop on sensor system configuration for industrial automation led by faculty experts. (1h) (UNIZA??)
- Group projects focusing on real-world sensor applications and systems integration, with an emphasis on FPGA solutions. (4.5h) (UNIVG??)

Day 4: Industry Visit and Group Project Work**Activities:** (6h)

- Field visit to an industrial partner implementing sensor-based solutions in a manufacturing or automation setting.
- Group project: Integrating sensors into a real-world industrial system, applying standards and best practices while utilizing FPGA technology.
- Team consultations and feedback from industry mentors.

Day 5: Final Presentations and Feedback**Activities:** 6h

- Final assessment: quizzes and project evaluations.
- Online submission and presentations of group project reports
- Peer feedback and evaluation.
- Individual reflection on learning outcomes.
- Panel discussion with academic and industry experts
- Peer review and feedback sessions.
- Closing ceremony and certificate distribution.

Objectives:

This program provides specialized content not typically available in traditional courses, focusing on the integration of smart sensor technologies into industrial applications using widely recognized industrial standards. By offering a blended format, students will gain new perspectives, with opportunities to engage in transdisciplinary, multinational collaboration, and hands-on problem-solving exercises related to industrial automation and smart factories. The BIP will:

- Leverage the expertise of faculty members in digital networks for industrial communications and wireless fieldbus technologies to enhance learning outcomes and ensure industry relevance.
- Incorporate knowledge on the implementation of complex processing and control algorithms in FPGAs, allowing students to explore advanced sensor integration techniques and real-time data processing for industrial applications.
- Encourage challenge-based learning with international, transdisciplinary teams.
- Develop competencies in sensor network design, industrial standards, and real-world applications.
- Facilitate exchange of teaching practices and innovative approaches between faculty from different institutions.
- Address societal challenges, such as energy efficiency and automation in smart industries.

Invited guests/speakers/experts (if any):

TND

APPLICATION PROCEDURE

Requirements :

The candidate should be student of any of the partner universities.