

ERASMUS+ BLENDED INTENSIVE PROGRAMME (BIP)

AI and IoT for Measurement Systems in Health and Energy Sectors 2026 – Second Edition

1. Program Overview

The Erasmus Blended Intensive Programme (BIP) titled "AI and IoT for Measurement Systems in Health and Energy Sectors 2026" represents a cutting-edge international educational initiative designed to address the accelerating convergence of digital technologies and advanced engineering metrology. Now in its second edition, this high-level academic framework provides an immersive platform for students, researchers, and professional lecturers to explore how the internet of things and artificial intelligence can be collectively harnessed. The structural architecture of the programme is meticulously divided into two integrated phases: a synchronous virtual component spanning four consecutive weeks, followed by a high-intensity, face-to-face experiential week hosted at the Department of Engineering of the University Niccolò Cusano in Rome, Italy.

The primary timeline for the online curriculum is scheduled on select Thursdays, specifically on the 24th of September, the 1st of October, the 8th of October, and the 15th of October 2026, with sessions running from 14:30 to 17:30 Central European Time. This preparatory theoretical framework acts as a vital precursor to the physical mobility phase, which takes place between the 26th and the 30th of October 2026. The physical week commences on Monday afternoon at 14:30 and concludes on Friday morning at 12:30, ensuring a well-rounded and compact period of intensive technical development. By blending distinct national expertise and academic backgrounds, the programme creates an ecosystem of shared knowledge that models real-world international research consortia, bridging the gap between foundational computer science, electronic instrumentation, and sustainable industrial application.

2. Introduction

In the current technological landscape, modern measurement systems are undergoing a paradigm shift driven by the rapid maturation of ubiquitous sensing and computational intelligence. Traditional metrology, which historically focused on isolated data collection and

localized calibration, is no longer sufficient to meet the challenges of highly dynamic environments such as healthcare infrastructure and localized energy grids. Today, systems rely on intricate sensor networks that generate continuous, high-dimensional data streams, requiring automated pipeline decisions to remain viable. The integration of Artificial Intelligence (AI) and the Internet of Things (IoT) provides the necessary infrastructure to transition from passive data aggregation to active, context-aware cognitive systems. This technological evolution is particularly critical in the health and energy domains, where the cost of system anomalies, sensor degradation, or operational downtime carries profound socio-economic and clinical consequences.

In the health sector, the rise of chronic illnesses and an aging global population necessitate a shift toward continuous, non-invasive ambulatory monitoring, which frees patients from rigid hospital infrastructures while ensuring a high level of diagnostic confidence. Simultaneously, the energy sector is facing an unprecedented transformation as conventional, centralized power grids are replaced by decentralized smart grids characterized by a massive penetration of volatile renewable energy sources. Managing such intricate systems demands advanced prediction algorithms, intelligent metering, and decentralized control mechanisms. This Blended Intensive Programme was established to address these critical societal needs, serving as an educational bridge that equips the next generation of engineers and scientists with the systemic, interdisciplinary vision required to navigate, design, and regulate these intelligent measurement ecosystems.

3. Objectives and Description

The principal objective of this Blended Intensive Programme is to provide higher education students with a comprehensive, multi-disciplinary understanding of intelligent measurement systems, explicitly focusing on the cross-pollination between artificial intelligence methodologies and internet-of-things physical architectures. Rather than analyzing these domains in isolation, the course is structured to demonstrate how physical sensors, microcontrollers, embedded AI, cloud infrastructures, and regulatory frameworks operate as a single interdependent chain. Students are guided through the entire lifecycle of a smart measurement system, starting from the physical and metrological characterization of a transducer, moving through the algorithmic conditioning of the data, and culminating in the operational deployment within an industrial or clinical workflow.

The core description of the curriculum revolves around five thematic pillars. The first pillar establishes the mathematical and physical foundations of smart measurement systems, emphasizing how statistical learning theory balances model complexity with generalization when extracting hidden patterns from noisy data. The second pillar explores advanced healthcare applications, focusing heavily on wearable and contactless sensors capable of recording non-invasive physiological and psychophysiological parameters. The third pillar targets energy applications, where the curriculum analyzes numerical modeling for smart

microgrids, vehicle-to-grid energy management, and real-time predictive optimization. The fourth pillar provides students with the practical tools required for physical prototyping, detailing computer-aided design, model-based simulation, and hardware-in-the-loop testing. Finally, the fifth pillar introduces critical perspectives regarding the ethical, legal, and operational dimensions of autonomous technology, ensuring that participants understand the societal impact of their technical innovations.

4. Methods and Results

The pedagogical methodology applied throughout this programme is rooted in the principles of project-based learning, peer collaboration, and interdisciplinary problem-solving. During the instructional phases, lecturers employ a hybrid of advanced theoretical expositions, code-driven demonstrations, and case-study analyses drawn from active European research initiatives. In the virtual component, statistical learning methods, distance-based and reconstruction-based anomaly detection models, and the mathematical tenets of non-linear chaotic systems are explored through interactive environments.

The face-to-face component pivots completely toward physical experimentation and collaborative laboratory design. Students are organized into international, multi-disciplinary teams tasked with addressing specific engineering challenges. Furthermore, advanced hardware interaction is introduced through virtual reality laboratory environments, enabling students to interact with complex or high-risk industrial safety training scenarios without physical danger.

The anticipated results of this intensive training manifest as technical prototypes, functional machine learning pipelines optimized for embedded edge-computing devices, and comprehensive team presentations that defend the metrological validity, operational feasibility, and regulatory alignment of their engineered solutions.

5. Main Learning Outcomes

Upon successful completion of this Blended Intensive Programme, participants will have developed a robust portfolio of technical, cognitive, and professional competencies. From a metrological perspective, students acquire the capability to properly characterize the performance, reliability, and confidence levels of both traditional and innovative sensor systems, including wearable and contactless arrays. They will possess a deep conceptual and practical understanding of how to select, train, and critically evaluate unsupervised and semi-supervised artificial intelligence models for real-world scenarios where labeled data are notoriously scarce. This includes the ability to deploy distance-based, tree-based, and time-

series anomaly detection workflows capable of separating sensor faults and system degradation from genuine concept drift or critical environmental events.

Beyond algorithmic design, the learning outcomes extend heavily into operational and systemic engineering. Participants learn how to operationalize complex AI and IoT systems, developing the skills needed to redesign manufacturing processes, manage stakeholder integration, and structure choice architectures that keep technology safely subordinate to human decision-making.

Additionally, students gain unique competencies in high-tech fields such as Egocentric AI, learning to interpret first-person video streams for human behavior analysis and human-object interaction anticipation within automated industrial domains. Crucially, from a legal and ethical standpoint, graduates of the programme will be fully versed in the core principles of the European AI Act. They will know how to adapt engineering methodologies to satisfy stringent requirements regarding data governance, risk-based classification, and transparency, transforming regulatory compliance into a driver of scientific quality and social trust.

7. Course Details

- **Course Title:** Erasmus+ Blended Intensive Programme (BIP): AI and IoT for Measurement Systems in Health and Energy Sectors 2026 – Second Edition
 - **Academic Year:** 2025/2026
 - **Total ECTS Credits:** 3 ECTS
 - **Instructional Language:** English
 - **Virtual Component Schedule:** 24 September, 1 October, 8 October, 15 October 2026 (Every Thursday, 14:30 to 17:30 CET)
 - **In-Person Intensive Week:** 26–30 October 2026 (Hosted at Niccolò Cusano University, Rome, Italy)
 - *Opening Session:* Monday, 26 October at 14:30
 - *Closing Session:* Friday, 30 October at 12:30
 - **Target Audience:** Advanced Bachelor, Master, and Ph.D. students in Biomedical Engineering, Computer Science, Industrial Engineering, Mechanical Engineering, Electronic Engineering, and applied Mathematics.
 - **Assessment Methodology:** Evaluation is continuous and based on a combination of online conceptual quizzes during the virtual phase, the performance of the developed algorithm/prototype during the practical laboratories, and a final group presentation delivered during the closing session on Friday.
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8. Participating Institutions

The implementation of this Blended Intensive Programme relies on a robust alliance of prestigious European higher education institutions. While the academic curriculum benefits from the scientific expertise and contributions of lecturers representing a wider network of excellence—including Italian institutions such as the **University of Tuscia**, the **University of Catania**, and **eCampus University**—the official institutional framework of the BIP consortium is structurally built upon long-standing Erasmus+ partnerships between the host university and its designated international counterparts. Dedicated to driving innovation in smart systems, engineering metrology, and advanced digital technologies, this official core network is proudly comprised of the following participating institutions:

- **Niccolò Cusano University (Rome, Italy) – Host Institution**
- **University of Córdoba (Spain)**
- **Hochschule Mittweida – University of Applied Sciences (Germany)**
- **University of Nova Gorica (Slovenia)**
- **Silesian University of Technology (Poland)**

9. Feedback and Contact

For more information, please contact:

- fabrizio.patane@unicusano.it
 - ilaria.mileti@unicusano.it
 - barbara.mendecka@unicusano.it
 - gennaro.ponticelli@unicusano.it
 - salvatore.monteleone@unicusano.it
 - erasmus@unicusano.it
 - laura.pecetta@unicusano.it
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OFFICIAL TIMETABLE & PROGRAMME FLOW

PHASE 1: ONLINE SYNCHRONOUS SESSIONS

Every Thursday (24/09, 01/10, 08/10, 15/10), from 14:00/14:30 to 17:15 (CET)

Thursday, 24 September 2026

- 14:00 - 14:30 | Welcome to the online sessions (*Organizing Team*)
- 14:30 - 15:45 | **Statistical Learning** (*Prof. Carlo Drago*)
- 15:45 - 16:00 | *Break*
- 16:00 - 17:15 | **Statistical Learning** (*Prof. Carlo Drago*)

Thursday, 1 October 2026

- 14:30 - 15:45 | TBD (*Prof. Simone Palazzo*)
- 15:45 - 16:00 | *Break*
- 16:00 - 17:15 | TBD (*Prof. Simone Palazzo*)

Thursday, 8 October 2026

- 14:30 - 15:45 | **Egocentric AI for Human Behavior Analysis in Industrial Domains** (*Prof. Francesco Ragusa*)
- 15:45 - 16:00 | *Break*
- 16:00 - 17:15 | **The importance of metrological rigor for AI applications** (*Prof. Juri Taborri*)

Thursday, 15 October 2026

- 09:00 - 10:15 | **Operationalizing AI Systems: Process Design for Production / Workflows and User Integration** (*Prof. Flaviana Tagliaferri and Dr. Marie Luise Heuschkel*)
 - 10:15 - 10:30 | *Break*
 - 14:30 - 15:45 | **Anomaly detection in measurement systems** (*Dr. Andrea Zingoni*)
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PHASE 2: IN-PRESENCE INTENSIVE WEEK

Location: Niccolò Cusano University, Rome (Italy)

Monday, 26 October 2026

- 14:00 - 14:30 | Welcome to the in-presence sessions (*Organizing Team*)
- 14:30 - 15:45 | **Statistical Learning** (*Prof. Carlo Drago*)
- 15:45 - 16:00 | *Break*
- 16:00 - 17:15 | **Statistical Learning** (*Prof. Carlo Drago*)
- 17:30 - 20:00 | **Welcome Cocktail**

Tuesday, 27 October 2026 (Parallel Sessions & Coworking)

- 09:00 - 10:15 |
 - **Track A (Health): Sensors and other non-invasive methods to measure and monitoring health issues** (*Prof. Pilar Aparicio Martínez*)
 - **Track B (Energy): IoT architectures for energy** (*Dr. Michela Longhi*)
- 10:15 - 10:30 | *Break*
- 10:30 - 11:45 |
 - **Track A (Health): IoT-based patient monitoring and telemedicine** (*Prof. Imre Cikajlo*)
 - **Track B (Energy): Carbon footprint monitoring and sustainability analytics** (*Dr. Barbara Mendecka*)
- 11:45 - 13:00 |
 - **Track A (Health): Wearable Sensors for Mechanical and Thermal Measurements: Bridging Metrology, Human Monitoring, and Smart Systems** (*Prof. Gloria Cosoli*)
 - **Track B (Energy): Smart grids and intelligent metering** (*Ing. Leonardo Federici*)
- 13:00 - 14:00 | *Lunch*

Wednesday, 28 October 2026

- 09:00 - 10:15 | **The European AI Act and its implications for research and innovation** (*Prof. Mariana Buenestado-Fernández*)
- 10:15 - 10:30 | *Break*
- 10:30 - 11:45 | **Designing and Developing VR-Based Labs: Applications in the Energy and Health Sectors** (*Prof. Enrique Yeguas-Bolivar*)
- 11:45 - 13:00 | **Introduction to Chaos Theory and its Applications in Security** (*Prof. Lazaros Moysis*)
- 13:00 - 14:00 | *Lunch*
- 17:30 - 20:00 | *Cultural visit*
- 20:00 - 22:00 | *Social dinner*

Thursday, 29 October 2026

- **09:00 - 10:15** | **Statistical Learning** (*Prof. Carlo Drago and Organizing Team*)
- **10:15 - 10:30** | *Break*
- **10:30 - 13:00** | *Coworking activities*
- **13:00 - 14:00** | *Lunch*
- **14:30 - 17:15** | *Coworking activities*

Friday, 30 October 2026

- **09:00 - 10:15** | **Test Examination** (*International Scientific Committee*)
- **10:15 - 10:30** | *Break*
- **10:30 - 11:45** | **Test Examination** (*International Scientific Committee*)
- **11:45 - 13:00** | *Lab tour and Closing greetings (Organizing Team)*

Organizing Team

Fabrizio Patané



Fabrizio Patané is Full Professor of Thermal and Mechanical Measurements with the Faculty of Engineering at the "Niccolò Cusano" University, Rome, Italy. He received a Mechanical Engineering degree at "La Sapienza" University of Rome in 2000, and PhD Degree at Padova University in 2004. At the "Niccolò Cusano" University, he is coordinator of both the Teaching and the Research Commissions and is member of the doctorate school teaching staff in Industrial-Civil Engineering. His scientific skills regard mechanical and thermal measurements, environmental and inertial measurements, motion-analysis systems for biomedical applications and robotic mechanisms for neurorehabilitation. Prof. Patané is author of more than 60 (peer reviewed) scientific publications and three patents.

Ilaria Mileti



Ilaria Mileti is an Associate Professor in mechanical and thermal measurements at the Department of Engineering, University Niccolò Cusano, Rome. She received the master's degree in biomedical engineering from Sapienza University of Rome, Rome, Italy, in 2015, and the Ph.D. degree in industrial and management engineering from the Sapienza University of Rome, in 2019. She is currently a member of Ph.D. Course Advanced Modelling, Materials and Technologies. Her research interests include measurements for experimental biomechanics, wearable systems, machine learning algorithms, and robotic devices.

Salvatore Monteleone



Salvatore Monteleone is an Associate Professor of Engineering in Computer Science at the Department of Engineering, Niccolò Cusano University, Rome, since September 2024. In 2014, he earned a Ph.D. in Computer and Communication Engineering from the Department of Electrical, Electronic, and Computer Engineering at the University of Catania, Italy. Prof. Monteleone is a member of the European Network of Excellence on High Performance, Edge And Cloud computing (HiPEAC), of the Association for Computing Machinery (ACM), and a senior member of the Institute of Electrical and Electronics Engineers (IEEE). His research mainly focuses on Cyberphysical systems and

Network-on-chip-based architectures, with particular reference to low-power design and applications. In this regard, Prof. Monteleone has contributed to a Network-on-Chip cycle-accurate simulator, Noxim. To date, Noxim has been employed as an experimental platform or as part of an experimental infrastructure in more than 500 scientific papers published in refereed international conferences and journals.

Barbara Mendecka



Barbara Mendecka is a Tenure Track Researcher at the Università Niccolò Cusano. She holds a PhD in Environmental Engineering from the Silesian University of Technology. Her research focuses on sustainable engineering, energy conversion and storage systems, electrified mobility, and hybrid renewable energy systems integrating batteries and hydrogen technologies.

Her work combines computer-aided and model-based design with experimental testing and system-level methodologies, including life cycle assessment (LCA), exergy analysis, and

multi-criteria decision-making.

She is currently the scientific coordinator of the HyAgroBox project, funded within the Mission Innovation framework by the Italian Ministry of Environment and Energy Security (MASE), focused on modular hybrid energy systems for decentralized agricultural applications. She is also coordinator in the Compact Tractor 4.0 project on electrified agricultural vehicles and acts as external expert for the ATHLETE project. She is co-author of one patent in the field of thermal and energy systems. According to Scopus, her bibliometric indicators include 771 citations, 51 publications, and an h-index of 18.

Gennaro Ponticelli



Associate Professor in Manufacturing Technology and Systems, Gennaro Salvatore Ponticelli holds the bachelor course of Management Production Systems and the master course of Advanced Manufacturing Technology at the Niccolò Cusano University. He has many years of experience in the transformation and characterization processes of both traditional and innovative materials. Activity documented through over 50 publications in international journals embracing the manufacturing engineering sector with the study of processes for the production of metal foams, the development of technologies for the surface finishing of metallic and non-metallic components, the development of systems for industrial degreasing, the study of laser processes, additive manufacturing, the fabrication of traditional and natural composites, the assessment of the life cycle costing and environmental impact of innovative solutions, the optimization of manufacturing processes through artificial intelligence-based soft computing techniques as fuzzy logic and genetic algorithms.

Lecturers

Andrea Zingoni



Andrea Zingoni is a Researcher in Computer Science at the Department of Economics, Engineering, Business and Society of the University of Tuscia (Viterbo, Italy), where he also teaches "Computer Science" and "Fundamental of Artificial Intelligence". He received the Master's Degree in Telecommunication Engineering and the PhD in Information Engineering at the University of Pisa (Pisa, Italy). Currently, he coordinates the Research Group in Computer Science of his Department that, in the last three years, has been involved in more than fifteen projects, both at a national and an international level, in partnership with other research centers, private companies and public administrations. Among his main research interests there are: artificial intelligence, extended reality, image processing, remote sensing, blockchain technologies, cybersecurity, numerical signal processing, and electro-optical sensors, often framed within interdisciplinary

contexts that encompass the areas of Education and Inclusion, Biomedicine, Nuclear Fusion, Sports, Economics, and Finance, and much more. He is also cofounder of the University of Tuscia spinoff "Tech4all", whose mission is to design, develop and spread digital applications for Education and Inclusion.

Lecture: Anomaly Detection in Measurement Systems using AI

Modern measurement systems in health and energy domains rely increasingly on complex sensor networks, continuous data streams, and automated decision-making pipelines. In such contexts, anomalies are not merely outliers or noise, but may represent sensor faults, system degradation, unexpected operating conditions, or critical events requiring timely intervention. This lecture introduces the foundations of anomaly detection for measurement systems, with a specific focus on Artificial Intelligence-based approaches. Starting from the characteristics and limitations of traditional statistical and rule-based methods, the lecture explores why AI techniques and, particularly, unsupervised and semi-supervised models, are well suited to real-world measurement scenarios, where labeled data are scarce and system behavior evolves over time. Key classes of anomaly detection methods, including distance-based, tree-based, reconstruction-based, and time-series approaches, will be presented from an intuitive and application-oriented perspective. Through examples drawn from health monitoring and energy systems, the lecture highlights practical challenges such as false positives, concept drift, interpretability, and the integration of anomaly detection into reliable measurement workflows. The goal of the lecture is to provide participants with a clear conceptual framework for understanding, selecting, and critically assessing AI-based anomaly detection techniques in measurement systems, enabling them to apply these concepts in interdisciplinary research and real-world applications.

Barbara Mendecka



Barbara Mendecka is a Tenure Track Researcher at the Università Niccolò Cusano. She holds a PhD in Environmental Engineering from the Silesian University of Technology. Her research focuses on sustainable engineering, energy conversion and storage systems, electrified mobility, and hybrid renewable energy systems integrating batteries and hydrogen technologies. Her work combines computer-aided and model-based design with experimental testing and system-level methodologies, including life cycle assessment (LCA), exergy analysis, and multi-criteria decision-making. She is currently the scientific coordinator of the HyAgroBox project, funded within the Mission Innovation framework by the Italian Ministry of Environment and Energy Security (MASE), focused on modular hybrid energy

systems for decentralized agricultural applications. She is also coordinator in the Compact Tractor 4.0 project on electrified agricultural vehicles and acts as external expert for the ATHLETE project. She is co-author of one patent in the field of thermal and energy systems. According to Scopus, her bibliometric indicators include 771 citations, 51 publications, and an h-index of 18.

Lecture: Carbon footprint monitoring and sustainability analytics

This lecture explores the intersection between Artificial Intelligence, energy systems, and sustainability analytics, focusing on the growing environmental footprint of digital infrastructures and the role of intelligent measurement systems in addressing it. As AI-driven applications rapidly expand across industrial and societal domains, data centres and computational infrastructures are becoming significant contributors to global electricity demand and carbon emissions. At the same time, AI technologies are increasingly recognized as key enablers for energy optimization, renewable integration, predictive maintenance, and carbon reduction strategies. The lecture frames this apparent contradiction as a measurement and systems-engineering challenge, where monitoring, data interpretation, and intelligent control become essential components of sustainable digitalization. The session introduces the principles of carbon footprint monitoring in AI-enabled infrastructures, including the energy architecture of modern data centres, IoT-enabled monitoring systems, smart metering, and sustainability indicators such as Power Usage Effectiveness, Carbon Usage Effectiveness, and real-time carbon intensity. Particular attention is given to the transformation of raw energy measurements into actionable sustainability analytics through AI-based forecasting, anomaly detection, and operational optimization techniques. Building on recent international energy reports and current European regulatory frameworks, the lecture examines how AI can simultaneously increase electricity demand while supporting decarbonization through improved grid management and intelligent control of energy systems. Critical challenges related to rebound effects, data reliability, transparency, and environmental accountability are also discussed. Through interdisciplinary examples from smart grids and intelligent energy systems, participants will develop a systemic understanding of how measurement science, AI analytics, and sustainability objectives interact within modern digital infrastructures.

Carlo Drago



Associate Professor in Economic Statistics at the University "Niccolò Cusano," formerly Expert at the European Commission (HORIZON Expert Group at JRC/ Joint Research Center European Commission). Carlo held a Ph.D. in Statistics from University "Federico II" in Naples. He was in their academic career senior researcher in Probability and Mathematical Statistics before and then a senior researcher in Economic Statistics at University Niccolò Cusano. Carlo's academic interests are methodologically in Machine Learning, both Unsupervised and Supervised Learning, and in applicate themes on Energy, Health, and Social Economic Themes such as Poverty. Carlo has recently published in top Internationals Journals, among others, on Scientific Reports, Energy Policy, Ecological Economics, Business

Strategy and the Environment, Technovation, Energy Research, and Social Science, Quality & Quantity, Journal of Sustainable Tourism, Socio-Economic Planning Sciences, Cliometrica. Carlo bibliometric indexes at 23/3/2026 are 2899 citations, and h-index 25 (Google Scholar), and 1581 citations and an h-index 19 (Scopus).

Lecture: Statistical Learning

The Statistical Learning course offers a comprehensive exploration of the theoretical and practical aspects of extracting knowledge from complex, high-dimensional data. It integrates concepts from statistics, econometrics, and machine learning into a unified analytical framework, emphasizing both supervised and unsupervised learning, with a focus on predictive accuracy and interpretability. The course begins with a formal introduction to statistical learning theory, covering key principles that shape learning algorithms, especially the balance between model complexity and generalization. Supervised learning is presented as a method for inferring relationships between observed variables and labeled outcomes, highlighting probabilistic foundations for prediction and classification, as well as the role of uncertainty in decision-making. Unsupervised learning is described as a way to uncover latent structures in data without predefined targets, emphasizing the representation of complex datasets and the identification of hidden patterns. This approach is considered essential for understanding high-dimensional information. The course places significant emphasis on evaluating and validating statistical models, including model assessment, comparison, and robustness across various data-generating conditions. It combines theoretical knowledge with computational techniques, preparing students to apply statistical learning methods to complex empirical problems and advance data-driven research.

Enrique Yeguas-Bolivar



Enrique Yeguas-Bolivar is an Associate Professor in the Department of Computer Science and a member of the Computer Vision Applications research group at the University of Córdoba, Spain. He received his Master's degree and PhD in Computer Science from the University of Granada. His main research areas include computer graphics, augmented and virtual reality, and artificial intelligence, approached from an interdisciplinary perspective, encompassing fields such as education, health, tourism, and psychology. He has authored high-quality contributions to artificial intelligence and computer vision, as well as virtual reality software, published in international journals indexed in the JCR. He is actively involved in several local, regional, national, and European research projects focused on virtual and augmented reality, computer vision, and artificial intelligence, aimed at building a more inclusive world.

Lecture: Designing and Developing VR-Based Labs: Applications in the Energy and Health Sectors

This lecture will present a practical and methodological overview of how virtual reality (VR) technologies can be designed and implemented as immersive laboratory environments for education, training, and research. It will explore the full development pipeline, from pedagogical and technical requirements analysis to VR lab design, interaction modeling, and deployment. Special emphasis will be placed on real-world applications in the energy and health sectors, illustrating how VR-based labs can simulate complex, high-risk, or resource-intensive scenarios safely and cost-effectively. In the energy domain, examples will include virtual training for power systems, renewable energy facilities, and industrial safety. In the health sector, the lecture will address VR labs for clinical training, rehabilitation, and medical procedure simulation. The session will highlight best practices, challenges, and future directions for scalable and impactful VR-based laboratory solutions.

Flaviana Tagliaferri



Flaviana Tagliaferri graduated in 2008 with the best score in Mechanical Engineering at Tor Vergata University, Rome (Italy). Between 2006 and 2009, she worked for IACOBUCCI HF Electronics S.p.A., a company operating in the aerospace sector. She achieved her doctorate in 2012 at the University of Naples, Federico II (Italy). The focus of her research was the application of statistical methods to optimize advanced manufacturing processes. From 2012 to 2017, she worked as a research fellow at the Department of Industrial Engineering at the University of Naples, Federico II. At the same time and until 2018, she was a research associate at the Institute for Machine Tools and Production Processes (IWP) of Chemnitz University of Technology (Germany). Her focus was on innovative cutting technology. From 2018 to 2024, she was a researcher at the Mittweida University of Applied Sciences (HSMW), under the chair for Systems Electronics, and a lecturer, teaching 'Industry 4.0 - Responsible Consumption and Production' in the frame of the European alliance EURECA-PRO. Since October 2024, she has been an assistant professor at HSMW for Responsible Consumption and Production in the frame of the NextGen project, financed by the German Federal Ministry of Research, Technology, and Space.

Lecture: Operationalizing AI Systems: Process Design for Production / Workflows and User Integration

Deploying AI/IoT measurement systems requires operational design across logistical, production, and organizational workflows as well as user contexts. This session examines how process architecture, stakeholder integration, and decision frameworks determine whether systems enhance efficiency and human capacity—or create friction and dependencies. Through use cases and interactive exercises, participants analyze how technically sound systems fail due to inadequate operational integration. Examples demonstrate failures in workflow design, stakeholder involvement, and organizational structures. Participants develop competencies in identifying operational barriers and structuring implementation pathways that preserve human judgment. Practical scenarios address: How must production processes be redesigned when integrating AI-based measurement systems? What organizational changes enable technology adoption? How does choice architecture influence user responses to technologies? The session builds awareness of operational consequences, mapping the influences that determine whether AI/IoT systems serve actual needs. Participants apply holistic thinking to identifying unintended consequences and designing frameworks where technology remains subordinate to human decision-making.

Marie Luise Heuschkel



Marie Luise Heuschkel holds a B.Sc. in Anthropology from Oxford Brookes University and an M.Sc. in Forensic Science and Engineering from Brandenburg University of Technology. She is a full-time researcher in Digital Forensics at the Faculty of Applied Computer and Biosciences at Hochschule Mittweida. Pursuing her doctorate in the BMFTR NextGen qualification program, her research focuses on biometric identification from video material, combining anthropological methods with forensic analysis and digital technologies, bridging research and practical application through interdisciplinary approaches.

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Francesco Ragusa



Francesco Ragusa is Assistant Professor (RTD-a) at the University of Catania. He is member of the IPLAB (University of Catania) research group since 2015. In March 2025, he obtained the National Scientific Qualification (ASN) – Associate Professor (II Level) – in the academic recruitment fields "01/B1 Computer Science" and "09/H1 Information Processing Systems". He has completed an Industrial Doctorate in Computer Science in 2021. During his PhD studies, he has spent a period as Research Student at the University of Hertfordshire, UK. He received his master's degree in computer science (cum laude) in 2017 from the University of Catania. He has authored one patent and more than 30 papers in international journals and international conference proceedings. He is involved in

the organization of different international events, the EPIC workshop series (since 2022), the EGO4D workshop series (since 2023), the ACVR workshop series (since 2024). He serves as reviewer for several international conferences in the fields of computer vision and multimedia, such as CVPR, ICCV, ECCV, NeurIPS BMVC, WACV, ACM Multimedia, ICPR, and for international journals, including IEEE Pattern Analysis and Machine Intelligence (TPAMI), Pattern Recognition Letters and IET Computer Vision. He has been an Associate Editor for the journal IET Computer Vision since 2024, and a Guest Editor for CVIU and for IJCV. He is member of IEEE, CVF e CVPL. He has been involved in different research projects and has honed in on the issue of human-object interaction anticipation from egocentric videos. He is co-founder and CEO of NEXT VISION s.r.l.

Lecture: Egocentric AI for Human Behavior Analysis in Industrial Domains

Wearable devices equipped with cameras, sensors, and on-device AI are increasingly adopted in industrial workflows, supported by the integration of Augmented Reality and intelligent assistance. By enabling continuous, context-aware, and multimodal perception, these systems provide a powerful platform for advanced AI and Computer Vision applications. Egocentric AI captures the environment directly from the user's perspective, offering privileged access to human behavior, including actions, attention, intentions, and interactions with tools and machines. In industrial domains, this viewpoint is particularly suitable for analyzing procedural tasks, supporting operators, and enhancing safety and efficiency. Recent advances in multimodal learning, large-scale egocentric datasets, and foundation models have significantly boosted capabilities in human behavior analysis and task-level reasoning. This talk presents an overview of egocentric AI for human behavior analysis in industrial domains, covering fundamental concepts, key challenges, and emerging applications for intelligent industrial assistance.

Gloria Cosoli



Gloria Cosoli received the B.S. degree in Biomedical Engineering (with honors) and the M.S. degree in Electronic Engineering (with honors) from Università Politecnica delle Marche (UNIVPM), Ancona, Italy, in 2011 and 2013, respectively. She received the Ph.D. degree in Mechanical Engineering from the same university in 2017 with a thesis titled “Study and Development of a Novel Radio Frequency Electromedical Device for the Treatment of Peri-Implantitis: Experimental Performance Analysis, Modelling of the Electromagnetic Interaction with Tissues and In Vitro and In Vivo Evaluation”. From 2023 to 2025, she was a research collaborator at DIISM; since May 2024, she has been an Associate Professor at the Department of Theoretical and Applied Sciences (DiSTA) of eCampus University, Novedrate, Italy. Additionally, since November 2024 she has been the Deputy Coordinator of the Bachelor and Master Degree courses in Information and Automation Engineering. She is the author of more than 45 articles, more than 55 conference proceedings, and two national patents. Her research interests include non-invasive physiological measurements, numerical modelling, mechanical measurements, signal processing, and NDT.

Lecture: Wearable Sensors for Mechanical and Thermal Measurements: Bridging Metrology, Human Monitoring, and Smart Systems

Wearable sensors are rapidly transforming the landscape of mechanical and thermal measurements by enabling continuous, non-intrusive monitoring of physiological and activity-related parameters. They can be applied in several application fields, such as comfort and well-being assessment, fitness, health, and sport. Each context has its own requirements in terms of hardware as well as metrological performance. Consequently, it is fundamental to design the system with a user-centric approach, properly characterizing its performance to use the measurement results with a certain confidence level. Examples on both metrological characterization of wearables and their application in different contexts will be provided. Attention will be paid also to processing pipelines for the extraction of features exploitable to train classification/regression Machine Learning models applicable – just as examples – to assess personalized comfort, to recognize emotions, or to depict the global physiological status of the subject. Indeed, recent advancements demonstrate that the fusion of physiological and environmental data enhances the accuracy of thermal sensation and comfort evaluation, bridging traditional metrological challenges with growing needs in personalized monitoring. This lecture will highlight emerging trends, relevant challenges, and future research directions where wearable sensing plays a relevant role, evidencing the strong interdisciplinary collaboration in smart systems and human-centred measurement science.

Juri Taborri



Juri Taborri is an Assistant Professor in mechanical and thermal measurements at University of Tuscia in Viterbo, Italy. He received the master's degree cum laude in biomedical engineering from the Sapienza University of Rome, Italy, in 2014. He received the PhD in Industrial and Management Engineering in 2017 with a thesis focused on novel solutions for human motion analyses performed through wearable sensors. His research interests include biomechanical measurements, validation and metrological characterization of innovative sensor systems, electromyography and muscle synergies, machine-learning algorithms for human motion identification and control of robotic devices for rehabilitation. He is involved in several national and international projects focused on the application of artificial intelligence for physical and psychological

assessments of humans.

Lecture: The importance of metrological rigor for AI applications

The exponential growth of artificial intelligence and machine-learning algorithms has significantly transformed clinical practice and experimental biomechanics. However, the actual translation of AI tools into daily clinical applications remains limited, primarily because ML predictions are treated as indirect measurements without a fundamental metrological characterization. To guarantee trustworthy decision-making, it is critical to address the distinction between predictive probability and measurement uncertainty. While predictive probability determines the classification likelihood (e.g., in injury risk assessment), it neglects the propagation of both aleatoric and epistemic uncertainties inherent in training datasets and model outputs. This lecture outlines the basic principles of metrology according to international guidelines (GUM), evaluating the combination of Type A and Type B uncertainties. Through specific case studies, such as sensor-based indices for anterior cruciate ligament (ACL) injury prevention in youth basketball players, we demonstrate how relying solely on classification accuracy without quantifying uncertainty can lead to misclassification and misguided clinical conclusions. Ultimately, embedding metrological rigor into the evaluation of AI models provides mandatory complementary information, laying the necessary foundation for the successful and safe implementation of trustworthy automated diagnostics.

Imre Cikajlo



Imre Cikajlo is a Full Professor of electrical engineering at the School of Engineering and Management at University of Nova Gorica and a lecturer for Methods of System Engineering, Internet of Things and Digital resource & document management. At the moment he is the Dean of The School of Engineering and Management, a Director of the Bachelor 's degree programme Engineering and Management and a Senior Researcher at University Rehabilitation Institute Soča. Imre Cikajlo received the Ph.D. degree in robotics and electrical engineering from the University of Ljubljana, Ljubljana, Slovenia. From 2003 until 2004 he was a post-doc Fellow at the Tohoku University, Sendai, Japan, and in 2007 a visiting researcher at University of Tokyo, Tokyo, Japan.

His research interests include biomechanics, integration of sensory information, control of machine and human movements, rehabilitation robotics and integration of virtual reality and artificial intelligence into robotics. He has published more than 100 high impact journal papers, chapters in esteemed books and serves as an associate editor of PloSOne and member of the editorial board of International Journal of Rehabilitation Research.

Lecture: IoT-based patient monitoring and telemedicine

The background addresses the increasing demand for digital healthcare solutions that support independent living, preventive care, and remote clinical supervision. Also presents an IoT-based patient monitoring and telemedicine framework that integrates smart home devices, wearable sensors, and cloud-based communication platforms to improve healthcare accessibility and quality of life, particularly for elderly individuals and patients with chronic conditions. The IoT systems enable continuous monitoring of physiological and environmental parameters, including heart rate, blood pressure, body temperature, mobility patterns, and indoor living conditions. Data acquired through interconnected IoT devices are securely transmitted to healthcare providers, enabling real-time monitoring, automated alerts, and timely medical interventions. Telemedicine functionalities further support remote consultations, digital health records, and communication between patients, caregivers, and healthcare professionals. The framework also incorporates findings from the REHA2030 telerehabilitation initiative, which demonstrated the importance of user-centered digital rehabilitation services, especially for post-stroke patients in rural environments. REHA2030 highlighted key factors influencing successful telehealth adoption, including usability of devices, accessibility of digital infrastructure, patient motivation, and personalized rehabilitation support. The project further emphasized that home-based rehabilitation systems should combine technological simplicity with continuous professional supervision to ensure long-term patient engagement and adherence. By integrating IoT technologies, telemedicine services, and telerehabilitation principles, the pilot projects contribute to the development of sustainable, patient-centered healthcare ecosystems that enhance safety, autonomy, and continuity of care while reducing pressure on conventional healthcare systems.

Lazaros Moysis



Lazaros Moysis received his B.Sc., M.Sc., and Ph.D. degrees from the Department of Mathematics, Aristotle University of Thessaloniki, Greece, in 2011, 2013, and 2017, respectively. His PhD studies were on the mathematical theory of systems and control. Since receiving his Ph.D., he has performed post-doctoral research at the Physics Department, Aristotle University of Thessaloniki, Greece, and at the Department of Electrical & Computer Engineering, University of Western Macedonia, Greece. As of September 2025, he is an assistant professor at the Centre for Information Technologies and Applied Mathematics, University of Nova Gorica. His research interests include the theory of control systems, descriptor systems, chaotic systems, and their applications. Example topics include observer design, chaotification, chaos-based encryption, and chaotic path planning. He has also written a textbook on the use of LaTeX. Complementary to his research and teaching, he maintains a YouTube channel, where he uploads educational content.

Lecture: Introduction to Chaos Theory and its Applications in Security

Chaos theory studies systems that showcase an extreme sensitivity to changes in their initial conditions. This means that solutions starting very close to one another will quickly diverge from each other, and follow very different trajectories. This property makes chaotic systems hard to predict over a long time horizon. Chaotic systems are abundant in nature, and appear all around us, in physics, engineering, economy, chemistry and elsewhere. Moreover, being easy to simulate in a computer, chaotic systems are now used in numerous applications that require unpredictability. For example, in chaos based encryption, chaotic systems are used as sources of randomness, to design algorithms for encrypting data. This lecture will explain the use of chaotic systems in security applications. The first part of the lecture will explain the basics of chaos theory, while the second part will be devoted to its applications.

Leonardo Federici



Adjunct Professor of the course Electrical Systems for Energy and Ph.D. candidate in Industrial Engineering (38th cycle). Master's degree in Engineering for Industry and Innovation. Currently specialized in numerical modeling and simulation of microgrids, with a research focus on sustainable mobility, vehicle-to-grid (V2G) and vehicle-to-home (V2H) technologies. Numerical simulations also in Power Electronics and Electrical Engineering/Electrical Systems. Actively involved in laboratory-based projects and experimental activities, including the integration and testing of electrolyzers, fuel cells, and bidirectional electrical loads for energy management applications.

Lecture: Smart grids and intelligent metering

The lecture provides an overview of modern microgrids, with a specific focus on smart grid architectures characterized by a high penetration of renewable energy sources. Particular attention is devoted to advanced Energy Management Systems (EMS), where Artificial Intelligence techniques may be employed to support real-time decision-making, optimization, and predictive control. The integration of AI-based EMS enables improved load forecasting, enhanced system flexibility, and more efficient coordination among generation units, energy storage systems, and demand-side resources, including electric vehicles operating in vehicle-to-grid (V2G) and vehicle-to-home (V2H) modes. The lecture discusses the benefits of AI-driven energy management in terms of system reliability, operational efficiency, and improved decision-making for the provision of electrical services, which are increasingly supported by ancillary devices such as Battery Energy Storage Systems and Electric Vehicles.

Mariana Buenestado-Fernández



Mariana Buenestado-Fernández is a lecturer and researcher in the Department of Education at the University of Córdoba (Spain), where she carries out her teaching activities in the field of initial and continuing teacher education. She has more than 50 scientific publications focused on digital education, artificial intelligence applied to education, and educational transformation, published in high-impact journals and academic publishers. She has participated in and led numerous competitive research projects and educational innovation initiatives related to the ethical and pedagogical use of emerging technologies in educational contexts. She has also completed research stays at prestigious national and international research centers, which have strengthened her academic profile and collaboration networks. Her work is characterized by an interdisciplinary approach that integrates innovation, research, and

knowledge transfer, actively contributing to the advancement of evidence-based educational practices and to the academic debate on the role of artificial intelligence in higher education.

Lecture: The European AI Act and its implications for research and innovation

The lecture focused on The European AI Act and its implications for research and innovation, analyzing how this new regulatory framework will transform the European artificial intelligence ecosystem. The speaker explained the key principles of the AI Act, especially the risk-based approach, and how these influence the design, development, and use of AI systems in research contexts. The direct impact on universities, publicly funded projects, and technology centers was highlighted, as they will need to adapt their methodologies to comply with requirements on transparency, data governance, and ethical assessment. At the same time, the lecture emphasized that regulation can become a driver of responsible innovation by fostering social trust and scientific quality. Administrative challenges and the need for clear guidance for researchers were also discussed. Overall, the session offered a balanced reflection on how the European AI Act may redefine the relationship between regulation, research, and innovation in Europe.

Michela Longhi



Michela Longhi, currently Research Fellow at the Niccolò Cusano University, Rome (RM), develops research activities on reconfigurable metasurfaces for beam-scanning antennas, including with the support of AI technologies. Her research interests have always been focused on electromagnetic fields, with particular attention to beamforming antenna arrays, to deep transcranial magnetic stimulation, to the study and design of radio frequency identification devices, to drones applications, and to the design, realization, and measurement of various types of antennas. Alongside her research, she teaches two courses in the SSD IINF-02/A at the Niccolò Cusano University, Rome (RM), respectively in the undergraduate degree L-8 and the master's degree LM-29. Michela Longhi is involved in numerous national and international research projects, with significant international collaborations: the

European Space Agency (ESA), the European Space Research and Technology Center (ESTEC), ETH Zurich, Advanced Science Research Center of New York (CUNY). She is also an Associate Editor for a prominent scientific journal. She is a member of the Italian Society of Electromagnetism (SIEM), the National Interuniversity Consortium for Telecommunications (CNIT), the Virtual Institute for Artificial Electromagnetic Materials and Metamaterials (Metamorphose VI AISBL), IEEE Women in Engineering Italian Section (IEEE-WIE), and the Inter-University Center for Advanced Studies on Blockchain, Innovation, and Labor Policies (LabChain). She is also a founding member of the Italy Section of URSI-Women in Radio Science (URSI-WIRS).

Lecture: IoT architectures for energy

This lecture explores how IoT architectures are transforming the energy sector by enabling a more continuous, distributed, and intelligent understanding of energy systems. Rather than considering energy infrastructures as static networks, the lecture presents them as dynamic ecosystems in which sensors, connected devices, edge computing, cloud platforms, and data analytics interact to support real-time monitoring and decision-making. Within this framework, IoT becomes a key enabler for improving efficiency, predicting faults, managing demand, and integrating renewable energy sources into increasingly complex grids. The lecture also introduces the emerging role of metamaterials in this context. Thanks to their engineered electromagnetic, thermal, or mechanical properties, metamaterials can open new possibilities for energy harvesting, wireless power transfer, advanced sensing, thermal regulation, and improved performance of energy devices. When combined with IoT architectures, these materials may contribute to smarter and more adaptive infrastructures, where physical components are not only monitored but also designed to enhance system responsiveness and sustainability. Through examples from smart buildings, smart grids, renewable plants, and distributed energy systems, the lecture will show how IoT and advanced materials can work together to support the transition toward resilient, efficient, and data-driven energy environments.

Pilar Aparicio Martínez



Pilar Aparicio Martínez is an associate professor and researcher from the University of Cordoba and Maimónides Institute of Biomedicine. She holds a Bachelor's degree in Nursing from the University of Córdoba, where she also completed a Master's in Translational Biomedical Research in 2018. She pursued a predoctoral stay at the Usher Institute of the University of Edinburgh, focusing on e-Health and digital health tools. In December 2019, she earned her PhD in Computer Science from the University of Córdoba, in collaboration with the University of Edinburgh, while simultaneously obtaining a Master's degree in Occupational Risk Prevention. Throughout her career, she has contributed to 32 scientific publications, delivered 45 conference presentations, received 15 national and international

awards, secured 3 research grants, and participated in 3 European projects and 4 social initiatives. Her research integrates healthcare, social, educational, and technological perspectives, with a strong emphasis on equality and inclusion.

Lecture: Sensors and other non-invasive methods to measure and monitoring health issues

This lecture focuses on current health challenges, including the increasing prevalence of chronic diseases, aging populations, and the growing need for early detection and continuous care. It emphasizes the importance of health monitoring as a key strategy for prevention (primary, secondary, and tertiary), timely intervention, and improved patient outcomes. The session then introduces non-invasive monitoring approaches that allow physiological parameters, such as heart rate, physical activity, sleep, and respiration, as well as psychophysiological indicators, including activation of the hypothalamic–pituitary–gonadal (HPG) axis, to be measured comfortably and continuously in daily life. Various sensor-based solutions, including wearable and contactless technologies, are presented as practical tools to support modern healthcare. Finally, the lecture highlights the role of Artificial Intelligence (AI) in analyzing health data, identifying patterns, predicting risks, and enabling personalized monitoring. Benefits for remote care and sustainable health systems are discussed, along with challenges related to data quality, privacy, and ethical use.