

Innovative Technologies for Sustainable Agriculture

Strengthening Scientific Cooperation Between Cabo Verde and Italy

10 June 2025, 10.30-13.00 Cabo Verde time (13.00-15.00 European time)

In person at the University of Cabo Verde

Online on Zoom- Connect to <http://tiny.cc/mz1m001> or scan



10.30 *Welcome and registration for in-person participants*

10.50 *Welcoming address and presentation of the workshop*

Paulo Borges, University of Cabo Verde

Eugenio Cavallo, Scientific Attaché at the Embassy of Italy in Dakar

11.00 **Massimiliano Gaffurini**, University of Brescia, Italy

"LoRa and LoRaWAN for Smart Agriculture: Efficient Connectivity for Sustainable Farming"

This presentation introduces the fundamentals of low-power and long-range communication technologies (LoRa and LoRaWAN) making them ideal for large-scale agricultural deployments to enable real-time monitoring of soil conditions, crops, and environmental factors, highlighting their differences and key advantages for Internet of Things (IoT) applications in smart farming. Current challenges related to network scalability, coverage, security, and integration with digital platforms will be discussed. Real-world use cases will be displayed demonstrating how these technologies can boost crop productivity while minimizing environmental impact.

11.20 **Stefano Rinaldi**, University of Brescia, Italy (online)

"Deploying Edge AI in Agriculture: A Case Study on Bird Pest Detection in Senegal"

This presentation explores the deployment of edge and artificial intelligence (AI) technologies in agricultural settings, focusing on a real-world case study of bird pest detection in Senegalese rice paddies. Bird pests, particularly quelea species, pose a significant threat to rice production in West Africa, leading to substantial yield losses. To address this challenge, we implemented an edge computing system capable of real-time bird detection using computer vision and acoustic models embedded on low-power, field-deployable devices. The system enables early warning and targeted mitigation strategies without reliance on cloud connectivity, ensuring reliability in rural areas with limited infrastructure.

11.40 **Guido D'Urso**, University Federico II of Naples, Italy (online)

“New Technologies for Efficient Management of Irrigated Agriculture”

The presentation introduces describe a mobile-accessible satellite-based irrigation support services designed to assist farmers with water management based on the integration of remote and ground sensors and agro-hydrological models. The system offers user-friendly access to remote sensing data, helping optimize irrigation practices. This initiative is developed within the broader context of Agritech, a research hub hosted by University Federico II of Naples, actively engaged in the development of innovative technologies for sustainable agriculture.

12.00 **Michela Janni**, Italian National Research Council (online)

“In vivo sensing technology to optimize water use in the 5.0 agriculture scenario”

The presentation describes the in vivo sensor developed by IMEM that, when inserted in the plant stem, enable to recover for the plant the physiological health status and allows to fine tune plants irrigation according to their real needs, ensuring water savings and a phenotyping print of their ability to overcome water shortage periods.

12.20 **Carlo Bisaglia**, Italian Council for Agricultural Research and Economics (CREA) (online)

“The era of intelligent machinery: how agricultural engineering could improve agro-techniques”

The presentation will briefly provide some examples of precision and ultra-precision agriculture applications in which agricultural mechanization has shown great progress and could be accompanied, in the not too distant future, by the total or partial robotization of some functions.

12.40 **Francesco Marinello**, University of Padua, Italy (online)

“Digital technologies to increase resilience in agriculture”

The presentation explores how the integration of remote and proximal sensing technologies can enhance resilience in agriculture. By combining data from multiple sensor sources, we can improve the accuracy and timeliness of information feeding decision support systems (DSS). These tools empower farmers and stakeholders to make informed, data-driven decisions, ultimately promoting sustainability and adaptability in the face of climate change and other challenges.

13.00 *Questions and answers*

13.15 *Wrap-up by the moderator*

For more info eugenio.cavallo@stems.cnr.it and WhatsApp +221 771031895

BRIEF BIOGRAPHY OF THE LECTURERS

Massimiliano Gaffurini, Department of Information Engineering of the University of Brescia, Italy

He received the M.Sc. degree in electronics engineering from the University of Brescia, Brescia, Italy, in 2023, where he is currently pursuing the Ph.D. in technology for health. He is working in the fields of industrial Internet of Things, Industry 4.0, and sustainable mobility. He is IEEE member.

Stefano Rinaldi, Department of Information Engineering of the University of Brescia, Italy

Associate Professor of Electrical and Electronic Measurement at the University of Brescia, Italy since 2021. He is an IEEE Senior Member, Instrumentation and Measurement Society, Industrial Electronic Society and Power and Energy Society. His main research activities are focused on industrial real-time network, wireless sensor network, communication and automation systems for Smart Grid, and smart farming technologies.

Guido D'Urso, Department of Agricultural Sciences of the University Federico II of Naples, Italy

Full Professor of Water Management and Remote Sensing. He has been working since early '90s in the field of Agricultural Engineering, developing new methodologies for Earth Observation data interpretation for water management in agriculture and related hydrological processes. He is also interested the development of agro-hydrological models for irrigation management and the estimation of soil water content by means of in-situ and remote active microwaves. He has developed operative applications of satellite remote sensing for land and water management and environmental monitoring.

Michela Janni, Institute of Materials for Electronics and Magnetism of the Italian National Research Council (CNR-IMEM)

She is researcher at IMEM. She worked on plant genetics and physiology in frame of the ongoing climate change, in the exploitation of plant phenotyping as strategy to select more adaptable genotypes for breeding. In recent years her research moved to the development and application of in vivo biosensors to improve water use efficiency in agriculture and to understand the mechanisms exploited by plants to overcome abiotic resistance.

Carlo Bisaglio, Research Center for Engineering and Agro-Food Processing of the Italian Council for Agricultural Research and Economics (CREA)

He is chief technologist at the CREA. His research interests are focused on the mechanization and automation in agriculture and livestock farming; safety and ergonomics in agricultural machinery; renewable energy production and use in agriculture.

Francesco Marinello, Department of Land, Environment, Agriculture and Forestry of the University of Padua, Italy

Francesco Marinello is a Full Professor of Agricultural Engineering at the University of Padova and Adjunct professor at the University of Georgia (Athens, USA), with internationally recognized expertise in precision farming and digital technologies applied to agriculture. Together with his research group, he has led numerous projects focused on the development of innovative sensors and technologies aimed at enhancing sustainability, particularly in the context of climate change. He is responsible for the courses in Agricultural Mechanics, Precision Farming, Applied Statistics, and Sustainable Resource-Efficient Food Production and Processing. He is vice director of the Master degree in Food and Health.