IEEE PoliTo Student Branch Distinguished Lecture

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CAS IEEE CIRCUITS AND SYSTEMS SOCIETY

Politecnico di Torino, Maxwell Room
May 17th, 2024 - 4:30 PM

Let the Plants do the Talking:

Smart Agriculture by the Messages Received from Plants and Soil

Bio

Danilo Demarchi is a full Professor at Politecnico di Torino, Department of Electronics and Telecommunications. Author and co-author of 5 patents and more than 300 scientific publications in international journals and peer-reviewed conference proceedings. Leading the MiNES Laboratory of Politecnico di Torino and coordinating the Italian Institute of Technology Microelectronics group at Politecnico di Torino (IIT@DET). Founder and Editor in Chief of the IEEE Transactions on AgriFood Electronics. Founder and Vice-Chair of the IEEE CAS Special Interest Group on AgriFood Electronics. General Chair of IEEE BioCAS (Biomedical Circuits and Systems) Conference in 2017 in Torino. Founder and General Co-Chair for 2017, 2019, 2020 and 2021 editions of the IEEE FoodCAS Workshop (Circuits and Systems for the FoodChain). TPC Co-Chair of IEEE ICECS 2019, IEEE BioCAS 2021 and IEEE BioCAS 2022 conferences. General Co-Chair of IEEE BioCAS 2023. Organizer of the 3rd Seasonal School on AgriFood Electronics. Member of the IEEE Sensors Council and the BioCAS Technical Committee. Associate Editor of the IEEE Open Journal on Engineering in Medicine and Biology (OJ-EMB). Senior Member of IEEE.

Abstract

As reported in "D. Demarchi, J. Georgiou, V. Grimblatt and Y. Shacham-Diamand, Guest Editorial Circuits and Systems for Smart Agriculture and Healthy Foods, IEEE JETCAS, vol.11:3, 2021", in the light also of the report recently issued by the United Nations (Intergovernmental Panel on Climate Change – IPCC Report 2021), the benefits that technology provides to a green and sustainable economy are highly appreciated and under intense research and development globally. Circuits and Systems (CAS), which are the base for any system, can bring the needed functionalities and performances for reaching eco-friendly, circular and practical solutions.

Precision Agriculture is a very fast-growing research field, where more controlled quality production, water use optimisation, and a lower spreading of pesticides and fertilisers are some key issues, serving the improvement of food quality, but also helping the respect of agriculture for the environment.

For reaching these targets, electronics are the perfect tool for interfacing the data sources, extracting the data and processing them, and obtaining the needed information along the whole food chain: from the farmer, professional stakeholders to the consumers.

In the Distinguished Lecture, an overview of electronics for precision agriculture will be presented, analysing the possible solutions that can bring important innovations, advancing the actual strategies based on remote or indirect measurements, by instead in-place measuring the plant and soil parameters (a.k.a. Let the Plants do The Talking), associated with more standard information derived from environmental conditions.

Application scenarios for crop monitoring, information communication and decision support will be presented. In particular, will be analysed technologies for reaching the needed levels of low power and low cost, describing the efficient solutions to be applied to AgriFood at the global scale, also supporting food security and sustainability.

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