ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

DET - Wearable Plant Sensors for Plant Monitoring and Climate'Smart Agriculture Resource Management

Funded By	Dipartimento DET
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Context of the research activity	Nowadays, indirect measurements are used instead of in-place measuring the plant and soil parameters. This new and disruptive technology, related to Wearable Sensors for Plants, the World Economic Forum has recently identified it as one of the “Top five technologies about to change the world”, indicating it as one of the key solutions to increase food production by 70% by 2050 to be able to feed the world population.
Objectives	The main objective of the research is to develop and implement an innovative, low-power, and cost-effective field sensor system capable of real-time in vivo monitoring of plant water stress and health status. This system will utilise, as the main sensing method, electrical impedance and intra-plant communication to provide direct and accurate assessments of plant conditions in various agricultural settings, enhancing decision-making in irrigation and resource management. Secondary objectives will be: (1) develop a data analysis algorithm to interpret electrical impedance and intra-plant communication measurements, identifying patterns of water stress and plant health in in orchard and vineyard crops; (2) optimize sensor design and materials to ensure biocompatibility and durability in field environments; (3) implement efficient communication protocols using low-power methods to ensure continuous and reliable data transmission across agricultural infrastructure, even in areas with limited coverage; (4) integrate sustainable energy management techniques to achieve energy autonomy in field conditions, reducing the need for maintenance and battery replacement.
Skills and competencies for the development of the activity	- Design and implementation of multi-sensor systems for Climate-Smart Agriculture - Design and implementation of PCB boards - Firmware development for IoT systems