

# ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

## PNRR/NODES - Smart systems for foodstuffs quality and safety

<b>Funded By</b>	HUB NODES: NORD OVEST DIGITALE E SOSTENIBILE SOCIETA' CONSORTILE A RESPONSABILITA' LIMITATA [P.iva/CF:12714360018] MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] Dipartimento DET
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<b>Context of the research activity</b>	<p>The research deals with the development of digital solutions for ensuring quality and safety of foodstuffs through the whole processing path. The quantities of interest that mainly affect the quality of foodstuffs will be identified and the measurement requirements will be defined. Then, distributed measuring systems will be developed and installed in order to monitor the processing path from raw materials to customer's shelf, with particular attention to a correct metrological management in order to ensure the measurement traceability.</p> <p>Progetto finanziato nell'ambito del PNRR M4C2, Investimento 1.5 - Avviso n. 3277 del 30/12/2021 - ECS00000036 Nord Ovest Digitale E Sostenibile (NODES) - CUP E13B22000020001</p>
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	<p>The research is framed in the field of agrifood chain with the aim of improving quality and safety of foodstuffs of animal and vegetable origin in the Italian North-West area. Initially, the quantities of interest that are mainly related to the quality of the final products will be identified by involving all the actors of the food chain, from farmers to consumers. Examples are the quantities related to the environment of raw-material warehouse and final-product warehouse, such as temperature and relative humidity, the quantities related to the transformation processes and, if of interest, the quantities that affect foodstuff quality and safety during the distribution. During this step, particular attention will be also paid towards ethic and ecological issues. Once the quantities to be measured have been defined, the next step consists in assessing the main measurement requirements in terms of expected range, resolution, uncertainty and sampling rate. In addition, the expected range of the in-field influence quantities have to be identified since</p>
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**Objectives**

expected range of the in-field influence quantities have to be identified, since they can affect the choice of instruments and measurement methods that will be implemented.

The information related to the quantities to be measured will represent the input data of the design of a distributed measuring system, which will be based on a wireless architecture. Other key characteristics of the measuring system are low cost, low consumption, scalability and flexibility, and power autonomy thanks to the use of energy harvesters. During the design of the system architecture, both commercially-available components and innovative devices will be considered in order to meet the measurement requirements.

The developed measuring system has also to ensure measurement traceability, which requires the definition of a suitable metrological management. For this reason, the system has to be designed in order to calibrate the different measuring nodes by means of automatic and remotely exercised procedure against travelling standards.

**Skills and competencies for the development of the activity**

Analog and digital electronics, sensors, signal processing, measurement, uncertainty evaluation, traceability and calibration.