



SARMENTI

Smart multisensors embedded and secure system for soil nutrient and gaseous emission monitoring

Demand for sustainably produced food is driving current strategies for intensification of the agricultural sector worldwide. To meet these challenges, farmers need to adopt a whole-farm approach to resource efficiency for increased productivity, centred on the greater application of knowledge per hectare. Optimising soil fertility will enable farmers to maximise their productivity and profitability with higher grass and crop yield and better quality.



SARMENTI addresses the following key challenges:

- **Improve selectivity, sensitivity, precision and fabrication cost** of existing state-of-the-art sensors, for a **long period of use either in the soil or in the air. These sensors require advances to enable real-time in situ soil nutrients analysis;**
- **Integrate** of the sensors in a multi-sensor frontend module able to monitor different nutrients or environmental parameters and placed for long periods of time (ideally whole crop duration) in difficult outdoor conditions and even buried in the case of the Soil Probe;
- **Develop an appropriate packaging** to increase the lifetime of the sensors,
- Decrease the system **power consumption;**
- Guarantee the **integrity** of electronic components and data by the development of a **secure IoT node** and its integration with secure connectivity.

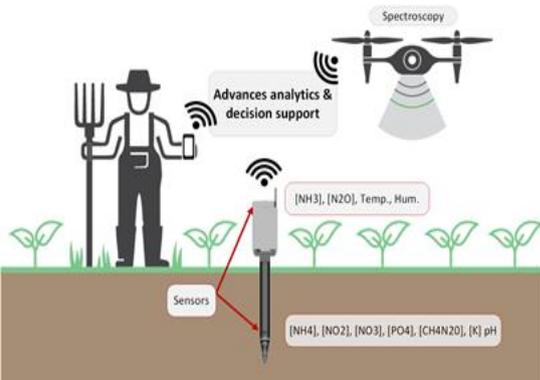
Smart Farming, Soil Nutrients, Cyber Security, electrochemical sensors, System integration, IoT node...





The architecture for the SARMENTI node consists of three devices:

- the **Soil Probe** buried in the soil contains electrochemical sensors in a hygroscopic membrane, pH, moisture and temperature sensors;
- the **Air Probe** just above the ground monitors the gases in the environment surrounding the *Soil Probe* and other environmental conditions (e.g. temperature, humidity, UV);
- the **Smart Data Logger** collects data from both probes and transmits them directly to the cloud.



We will **validate** the SARMENTI system **under growing conditions** with a crop (growth chamber) and its ability to capture temporal concentrations under environmental stresses of drying-rewetting cycles, temperature fluctuations, etc.

We will evaluate the system robustness and reliability **across a range of field sites** representative of pedoclimatic conditions and crop types in Europe



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