

Work package 2 - Smart Crop and Animal Sensing

T2.2 Infrared (IR) gas sensing

Within Synergia project, we will develop and characterize an optical-based sensor for analyzing **methane (CH₄)** in breath of cows, next to other volatile organic compounds analyzed with mass spectrometry. The sensor will be rigorously tested in laboratory conditions (e.g. selectivity, sensitivity, response time, etc.) and validated with state-of-the-art laser-based technology available in Life Science Trace Detection Laboratory (TDLab). The optical sensor will be tested in the dairy farming use-case in close collaboration with WUR. If initial lab tests are successful, this sensor will be available for field testing in WP7.

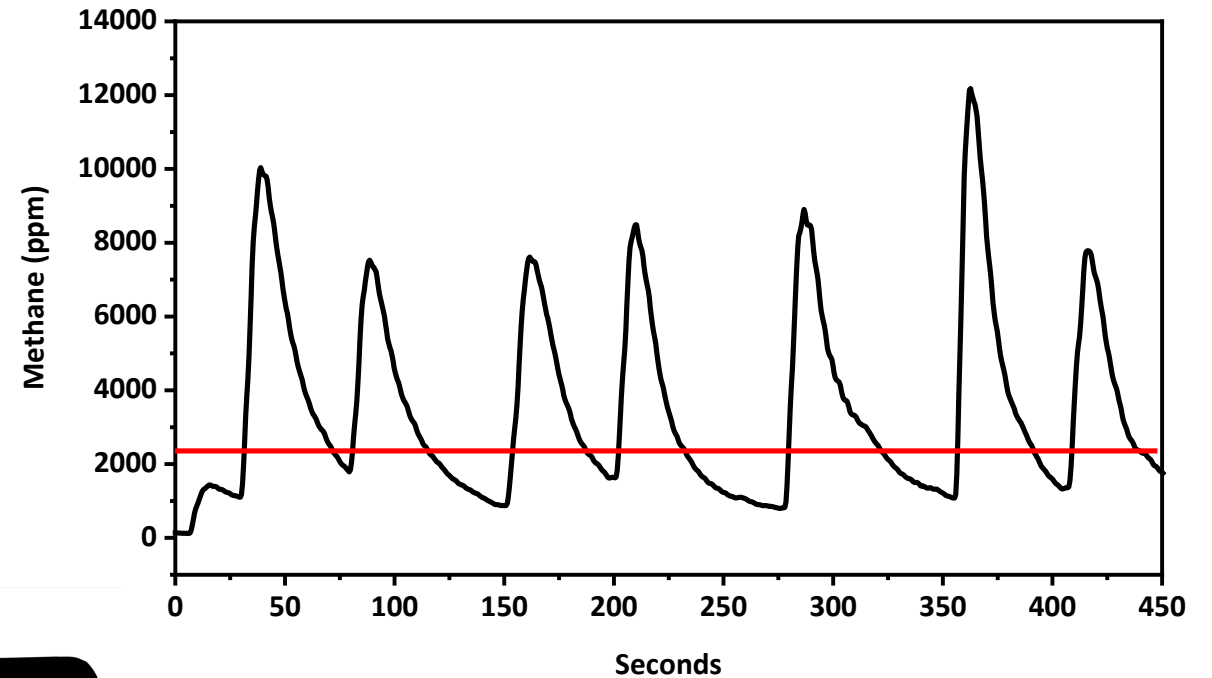
Aim: a compact, high precision, low cost, user-friendly, reliable and field-deployable sensor.

Results achieved so far:

- Sensor development & experiment
 - 2 generations of real-time methane detectors developed
 - 2 exhaled breath sampling experiments conducted on dairy cows, in collaboration with WUR.
- Research output
 - 2 oral-presentation in conference, 2 research articles

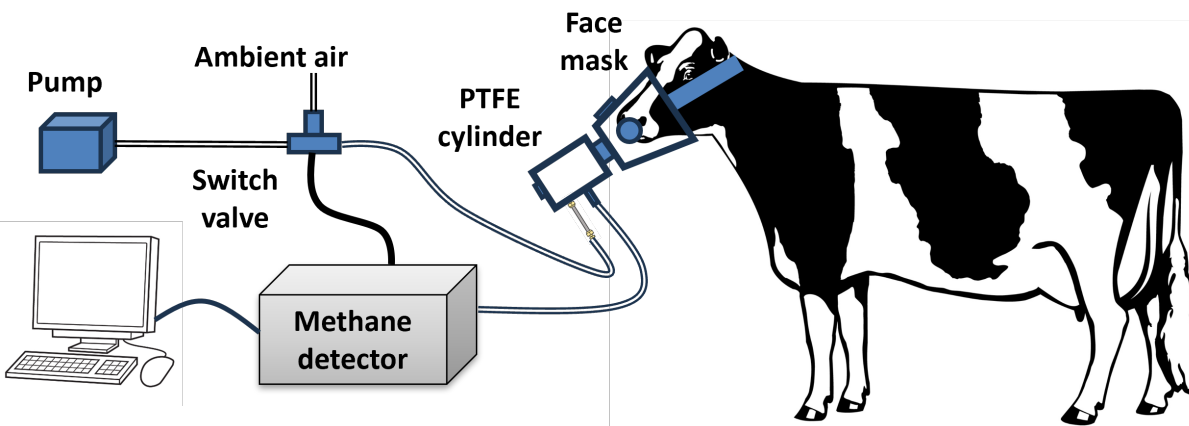


Real-time methane detector with face mask



Methane sensor:

- Shoe-box size
- Real-time detection
- Wireless transmission
- Customized **LabVIEW** program



Impact expect on current and future agriculture sensing systems

- Precise methane tracking at the individual cow level helps farmers identify high-emission sources (e.g., specific feeding practices on cows).
- By measuring the methane level from their breath, farmers gain insights into animal and adjust their daily activities in the farm (e.g., milking, feeding).
- Our sensor combines ease of use, affordability, and a compact form—make it affordable and practical for farmers to integrate into their daily routines.
- Its portable design enables neighboring farms to share and use the same device cooperatively.
- Early detection of diseases (detected by breath analysis) reduces the costs associated with veterinary treatments, emergency care, and productivity losses due to illness.