

AOTECH

ADVANCED OPTICAL TECHNOLOGIES S.L.

Experts on optical sensors technology



Presentation

Origin:

- Spin-off from the research group Applied Photonics Group (University of the Basque Country)

Company mission:

- To apply photonic solutions to all kinds of industries.

Own technology:

- Integration of spectroscopy-based sensors in food processes.
- Biosensors development for food, water and healthcare sector.
- Chemical baths monitoring system.

PROBLEM

FOOD INDUSTRY DIGITALISATION

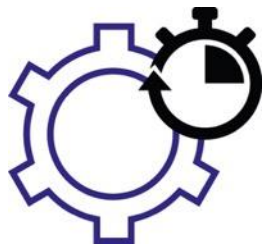
- ✓ Data through advanced instrumentation.
- ✓ Useful information.
- ✓ Real-time production adjustment and improved management.



OBJECTIVES:

✓ Efficiency

Lower production costs, waste and reprocessing; resources optimisation.



✓ Quality

Quality assurance, consistency, customer satisfaction and loyalty.



✓ Traceability

Origin and characteristics of the raw material assurance and detection of counterfeit products. Security.



AONIR Platform



- ❑ NIRS based sensors for in-line and real-time food production characterisation.
- ❑ 1 Single device → 2 versions (Contact/Non-Contact).
- ❑ Sending final data to PLC / SCADA / IoT.
- ❑ Calibration development and maintenance service.

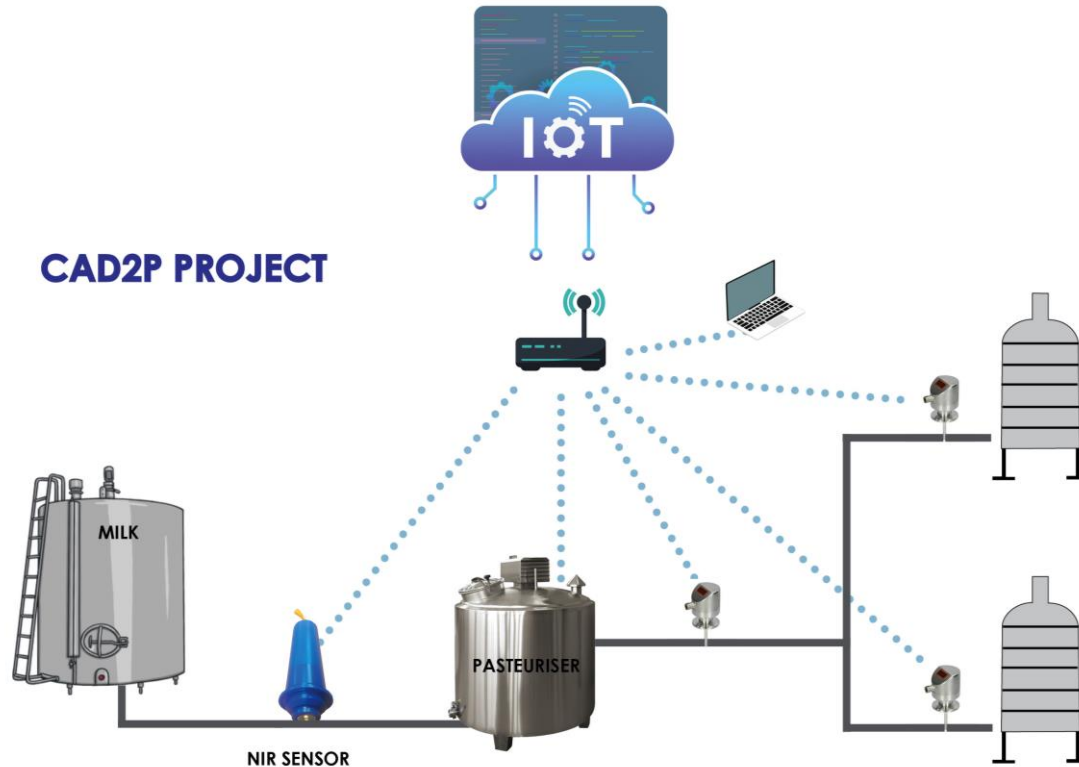


Main Food Applications

- ✓ **Non-destructive** measurements and determination of multiple parameters **at the same time**.
- ✓ Optimal results for **different kinds of products**: liquids, powder, grains, slurries, etc.
- ✓ **Real-time data and in-line** installation.
- ✓ Total quality management from raw materials to finished product → increase product **quality and consistency** with tighter control.
- ✓ **Optimisation** of mixing times / **Monitoring** of fermentation / **Energy savings** in drying process → **Real-time** determination of moisture.

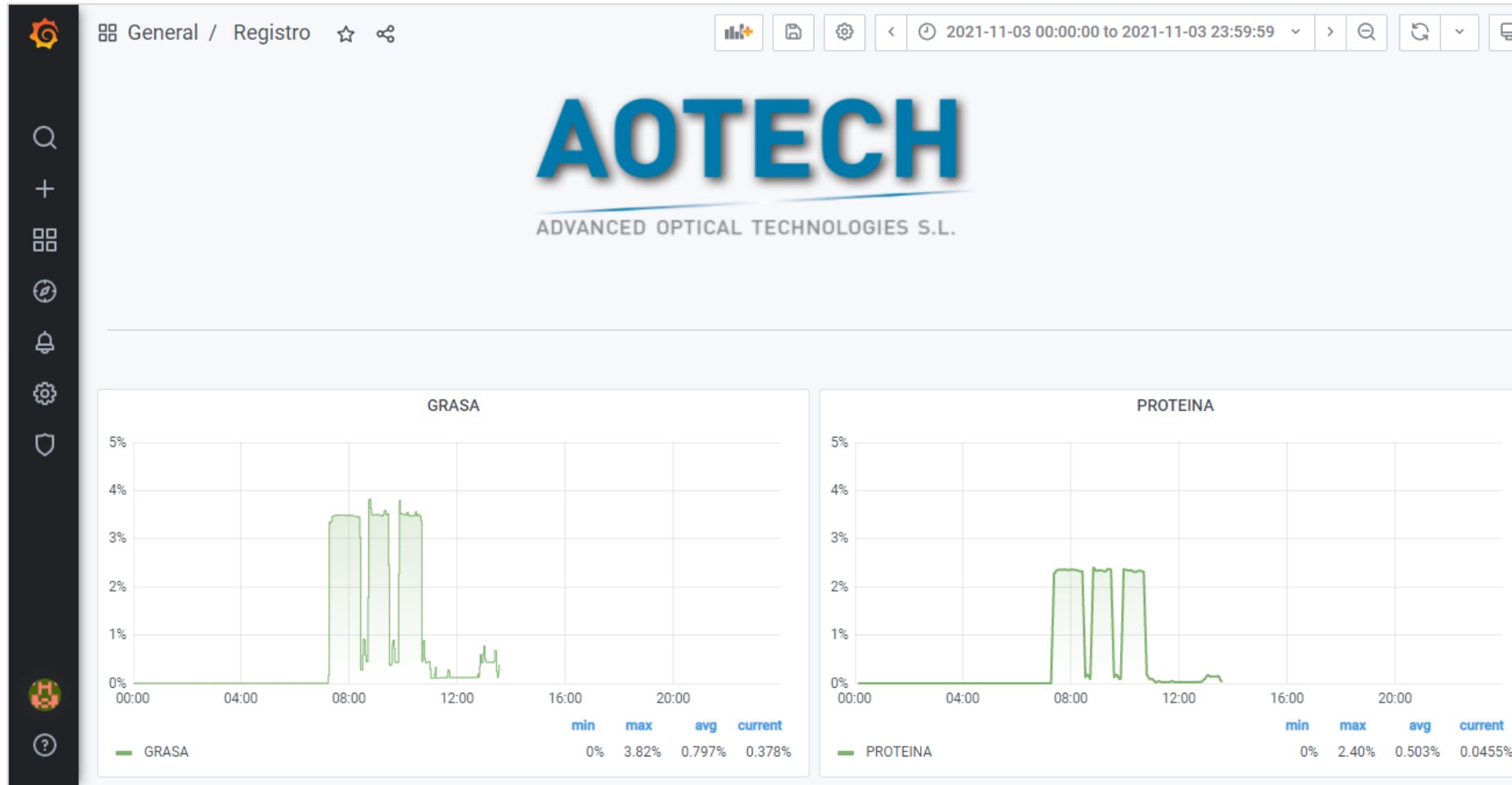


Recipe adjustments for Greek Yoghurt production



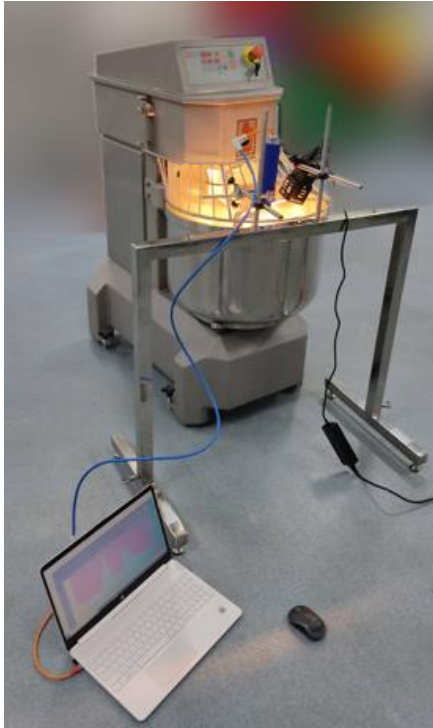
70% reduction in the variability of fat and protein content of the final product.

AONIR Platform



- ✓ DATA COLLECTION
- ✓ REPORTS
- ✓ ALARM SETTINGS

Pilot Projects



Kneading
process
evolution.



Fermentation process characterisation.



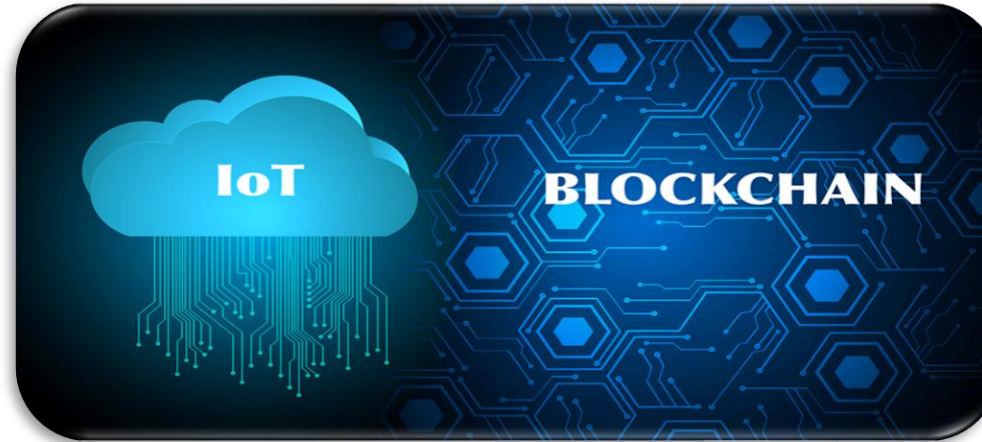
In-line monitoring of fat, protein and salt
concentrations.

IN-LINE QUALITY CONTROL & TRACEABILITY: Spectroscopy + IoT + Blockchain

Quality control

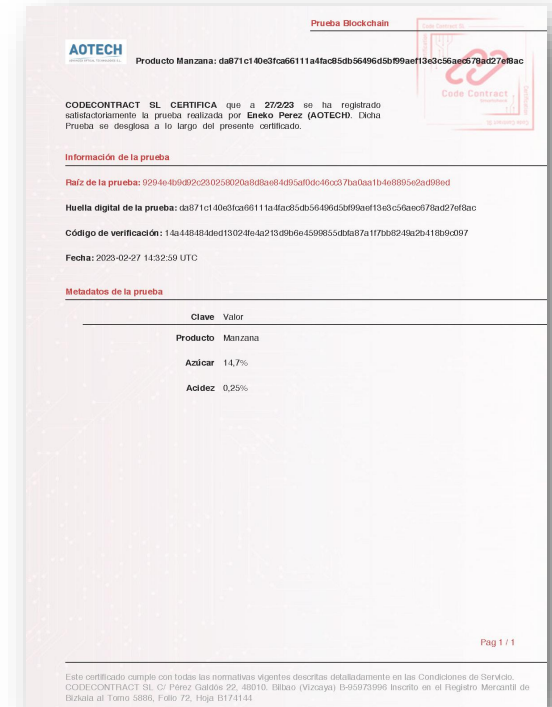
Mayonnaise production
real-time monitoring.

- ✓ Fat
- ✓ Moisture
- ✓ Salt
- ✓ Starch



Traceability

Fat content reports
certified by blockchain.



Funded by
the European Union

"This project has received funding from the European Union's i3 programme under grant agreement No 101083989. This project reflects the views of the author and the European Union is not responsible for any use that may be made of the information it contains."



WINERY 4.0: INTEGRAL PLATFORM FOR WINE (TXAKOLI) PRODUCTION PROCESS



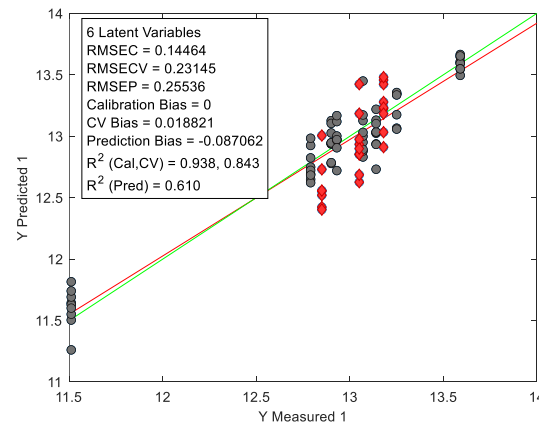
OBJECTIVE



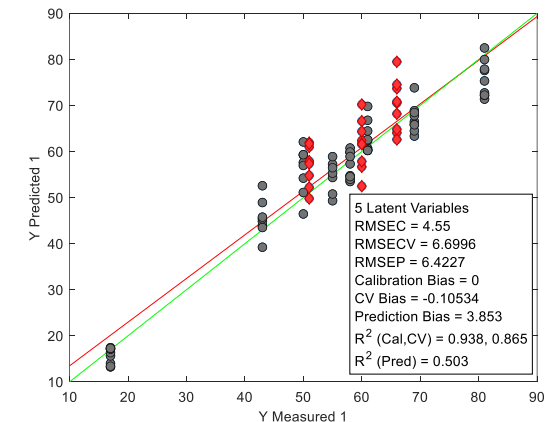
- ✓ Development of an **IoT platform** that automatically collects all the measurements of the **relevant parameters** in the production of wine (Txakoli) **in a single application** located in the cloud.
- ✓ Develop a **portable measuring device** at an affordable cost that enables most of the previously mentioned parameters to be obtained **at each stage of the txakoli production process**.
- ✓ Financing Activa Start-ups Euskadi.



ALCOHOLIC STRENGTH %



TOTAL SULPHUR ANHYDRIDE



TRAZA-NIR: GLOBAL PROJECT (2024-2028)

IoT PLATFORM FOR QUALITY TRACEABILITY OF GOODS IN THE PORT

*Our **IoT platform** gathers **real-time data** on the quality of goods during **loading and unloading**, certifying the quality of the product at each stage of the **shipping process via blockchain**.*

AONIR spectroscopy based sensors

IoT Platform

- ✓ **FINAL VALUES**, characterising the quality of the product, e.g. moisture, fat, protein, fibre or starch among others.
- ✓ **AI algorithm** to update predictive models.
- ✓ **Blockchain** certificates for each batch uploaded/downloaded.

APPLIED TO:

1. FOOD → cereals:

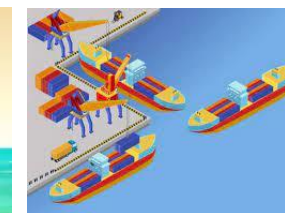
- origin
- % protein
- % moisture

2. MINING/INDUSTRIAL

- ✓ Ferro-silico-manganese
- ✓ Lime
- ✓ Sand
- ✓ Coke
 - % moisture



ORIGIN PORT LOADING



DESTINATION
PORT UNLOADING



POCs

OLIVES:

- Pesticide
- Herbicide

MAYONNAISE:

- Fat
- % ○ Protein
- Sugar
- Salt

Olive Oil:

- Cross-contamination with other vegetal oils

Milk Powder:

- Fat
- % ○ Protein
- Moisture

Feeds:

- Fat
- Protein
- % ○ Starch
- Fibre
- Ash
- Moisture

Wine analysis:

- Actual alcoholic strength (%vol)
- Total Tartaric Acidity (g/L)
- pH
- Volatile Acetic Acidity (g/L)
- Reducing sugars (g/L)
- Glucose-Fructose (g/L)
- Malic Acid (g/L)
- Lactic Acid (g/L)
- Relative Density (20C)

Spectroscopy + IoT + Blockchain



TRACEABILITY

Spectroscopy + IoT + Blockchain



AOTECH

ADVANCED OPTICAL TECHNOLOGIES S.L.

Prueba Blockchain



Producto Manzana: da871c140e3fca66111a4fac85db56496d5bf99aef13e3c56aec678ad27ef8ac

CODECONTRACT SL CERTIFICA que a 27/2/23 se ha registrado satisfactoriamente la prueba realizada por Eneko Perez (AOTECH). Dicha Prueba se desglosa a lo largo del presente certificado.



Información de la prueba

Raíz de la prueba: 9294e4b9d92c230258020a8d8ae84d95af0dc46cc37ba0aa1b4e8895e2ad98ed

Huella digital de la prueba: da871c140e3fca66111a4fac85db56496d5bf99aef13e3c56aec678ad27ef8ac

Código de verificación: 14a448484ded13024fe4a213d9b6e4599855dbfa87a1f7bb8249a2b418b9c097

Fecha: 2023-02-27 14:32:59 UTC

Metadatos de la prueba

Clave	Valor
Producto	Manzana
Azúcar	14,7%
Acidez	0,25%

- ✓ Acidity
- ✓ Sugar contents
- ✓ Firmness
- ✓ Origin



Real-Time Characterisation of Water Treatment Plants and Aquaculture



Real-Time Monitoring of Various Parameters:

- ☐ COD (Chemical Oxygen Demand)
- ☐ Nitrates
- ☐ Nitrites
- ☐ Ammonium
- ☐ Ammoniacal Nitrogen
- ☐ Phosphorus



We are looking for **pilot projects** to help us demonstrate the huge potential of our AONIR platform to achieve more efficient and sustainable production.

In addition, we are looking for partners to form **joint ventures** to collaborate in developing and commercialising specific solutions in different sectors.





AOTECH

ADVANCED OPTICAL TECHNOLOGIES S.L.

*Experts on optical
sensors technology*

Iker García, PhD
igarcia@aotech.es
+34 621.004.487