

# 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

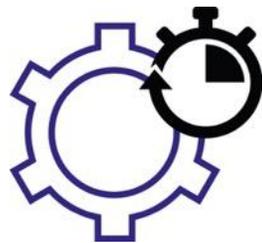
- ✓ Data through advanced instrumentation.
- ✓ Useful information.
- ✓ Real-time production adjustment and improved management.



## OBJECTIVES:

### ✓ Efficiency

Lower production costs, waste and reprocessing; resources optimisation.



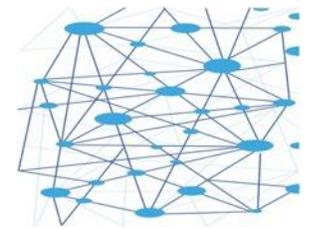
### ✓ Quality

Quality assurance, consistency, customer satisfaction and loyalty.



### ✓ Traceability

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



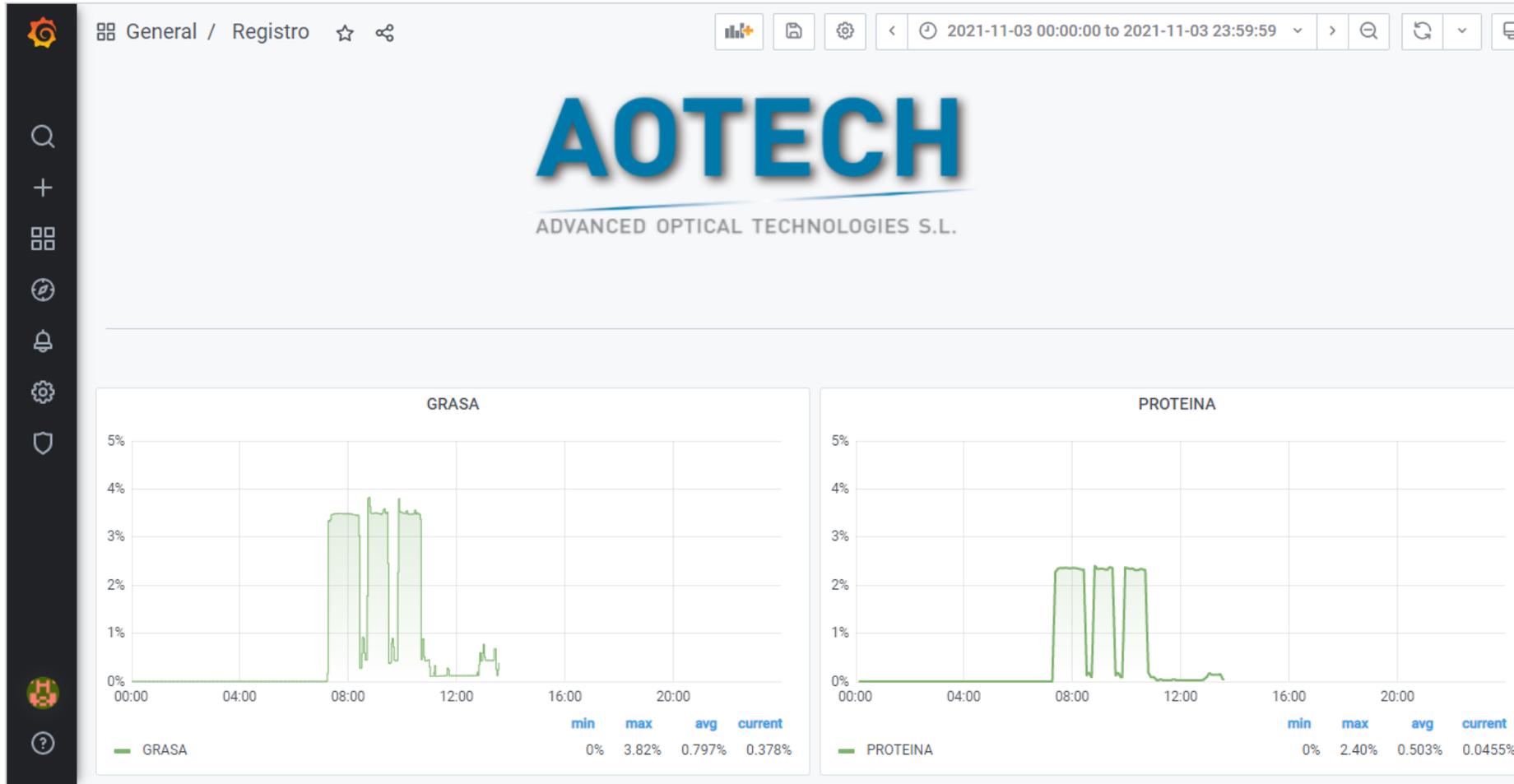
## AONIR Platform



- ❑ 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.



## AONIR Platform



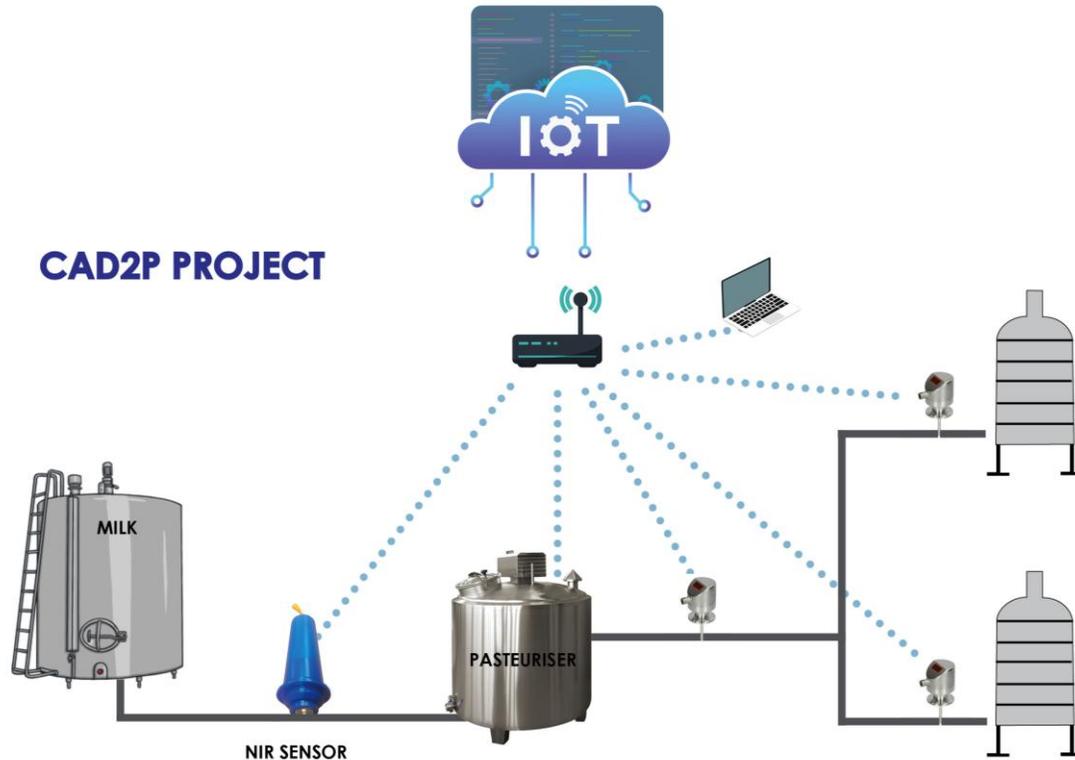
- ✓ DATA COLLECTION
- ✓ REPORTS
- ✓ ALARM SETTINGS
- ✓ BLOCKCHAIN

## 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.

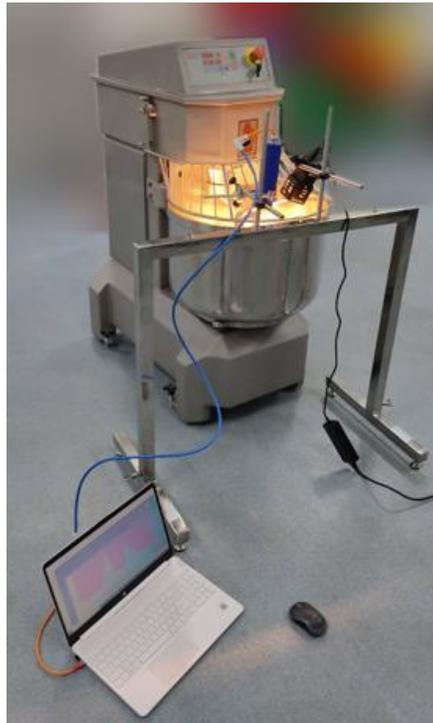


## Recipe adjustments for Greek Yoghurt production



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

## 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.

Prueba Blockchain

**AOTECH** Producto Manzana: da871c140e3f0a66111a4fa85db56496d5b99ae13e3c56aed578ad27ef8ac

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

**Información de la prueba**

Raíz de la prueba: 9294e4b6d82c20258020a8b2e64d0ca03c46cc7ba0a1b1e8805e2ad98ed

Huella digital de la prueba: db871c140e3f0a66111a4fa85db56496d5b99ae13e3c56aed578ad27ef8ac

Código de verificación: 14a448484de113024e42134806e4596855db6a97a11768824a2b41896d97

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

**Metadatos de la prueba**

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

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Este certificado cumple con todas las normativas vigentes descritas detalladamente en las Condiciones de Servicio. CODECONTRACT S.L. C/ Pérez Gallos 22, 48010. Bilbao (Vizcaya) B-55073996 Inscrito en el Registro Mercantil de Bizkaia al Tomo 5886, Folio 72, Heja B117144



"This project has received funding from the European Union's Horizon research and innovation 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."

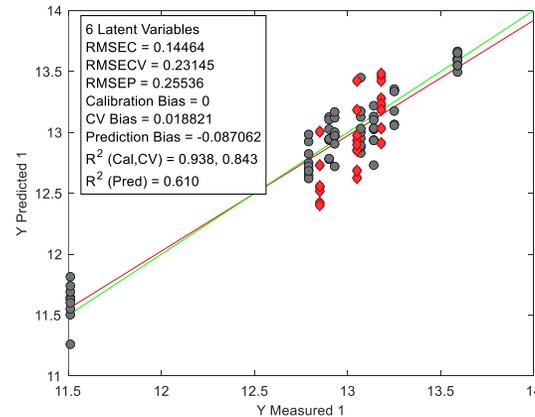
## OBJECTIVE



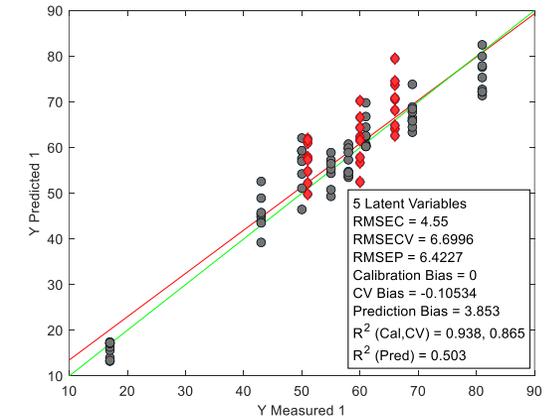
- ✓ Development of an **IoT platform** that automatically collects all the measurements of the **relevant parameters** in the production of wine (Txakoli) **in a single application** located in the cloud.
- ✓ Develop a **portable measuring device** at an affordable cost that enables most of the previously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



### ALCOHOLIC STRENGTH %



### TOTAL SULPHUR ANHYDRIDE



## 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

### APPLIED TO:

#### 1. FOOD → cereals:

- origin
- % protein
- % moisture

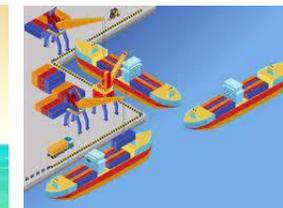
#### 2. MINING/INDUSTRIAL

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

- ✓ **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.



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

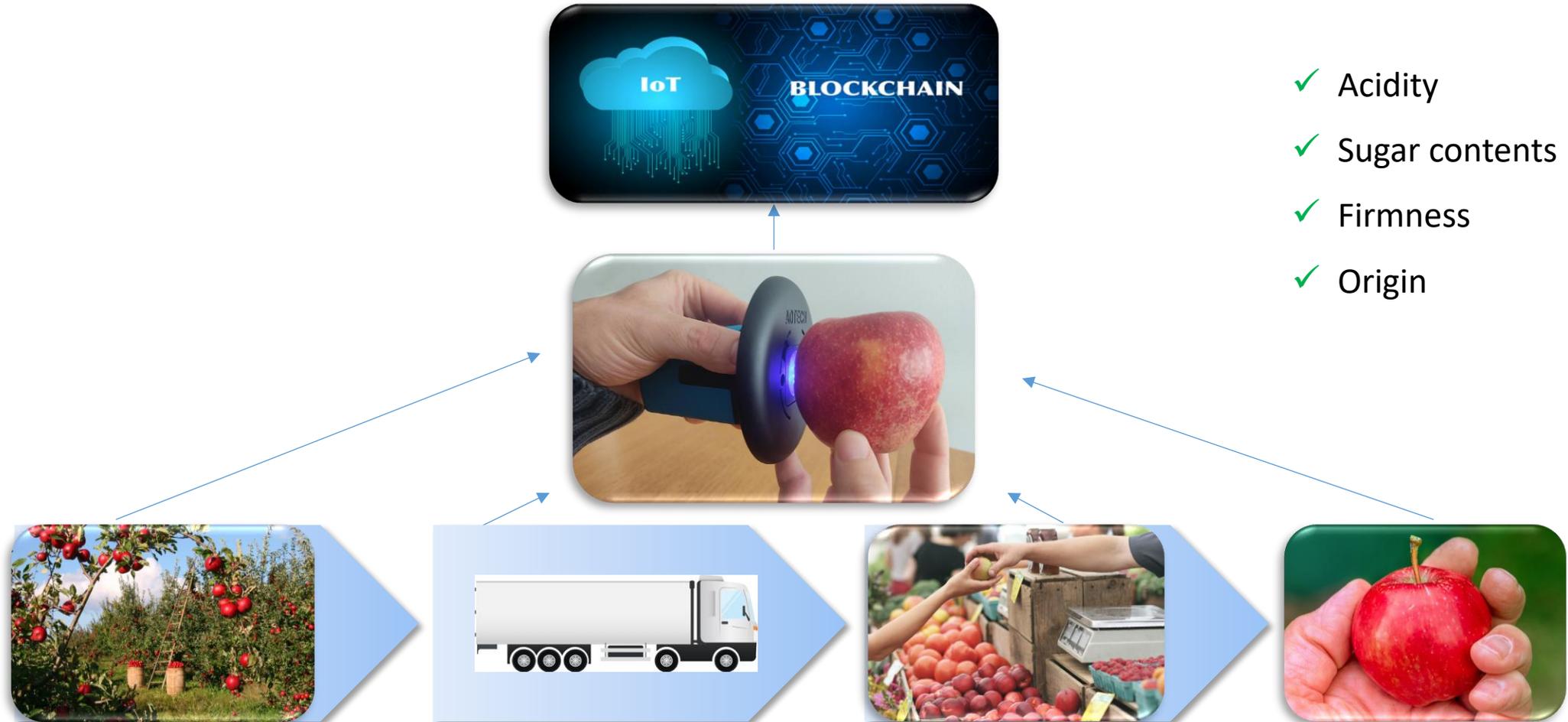
### Feeds:

- 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



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# AOTECH

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

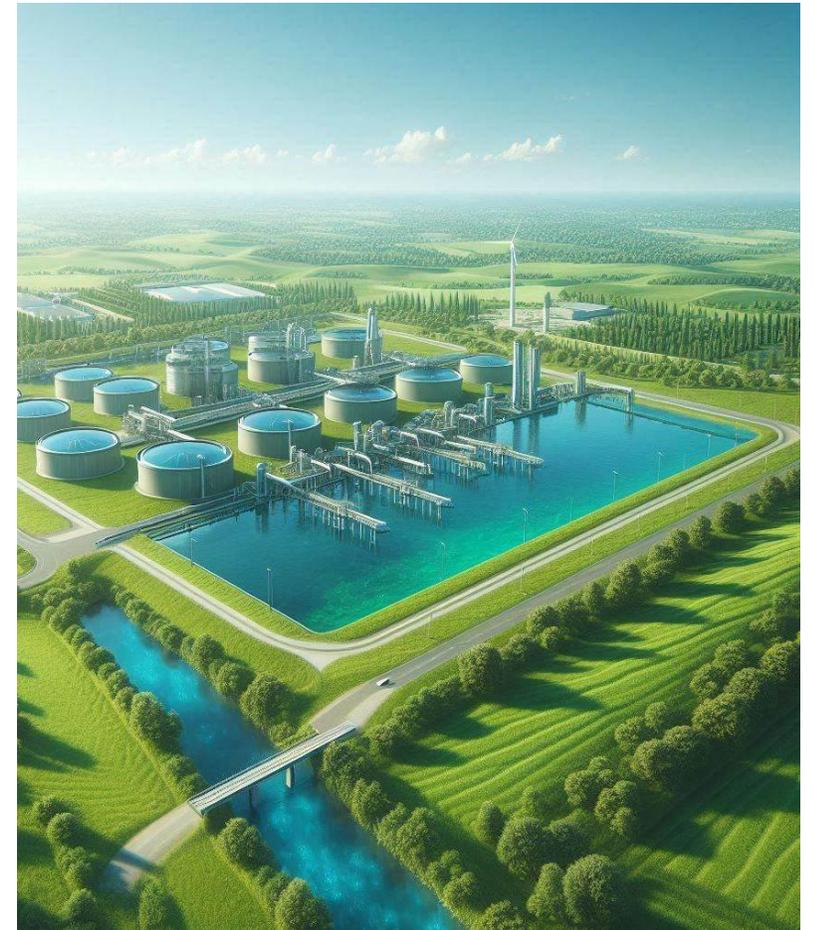


## Real-Time Characterisation of Water Treatment Plants and Aquaculture



### 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.





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sensors technology*

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