

13<sup>TH</sup> EDITION

# We CHALLENGE You

Think Technology.  
Design the Future.

**INNOVATIVE TECHNOLOGIES  
FOR SUSTAINABILITY**  
IDEA CONTEST BASED ON  
MSC AND PHD THESES

APPLY UNTIL **JULY 31<sup>ST</sup> 2022**

[[www.challenge.fraunhofer.pt](http://www.challenge.fraunhofer.pt)]



# Fraunhofer Portugal

Fraunhofer – Gesellschaft

## Fraunhofer Strategic Research Fields



Bioeconomy



Quantum Technologies



Digital Healthcare



Resource Efficiency and  
Climate Technologies



Artificial Intelligence (AI)



Hydrogen Technologies



Next Generation Computing

**76**  
Institutes

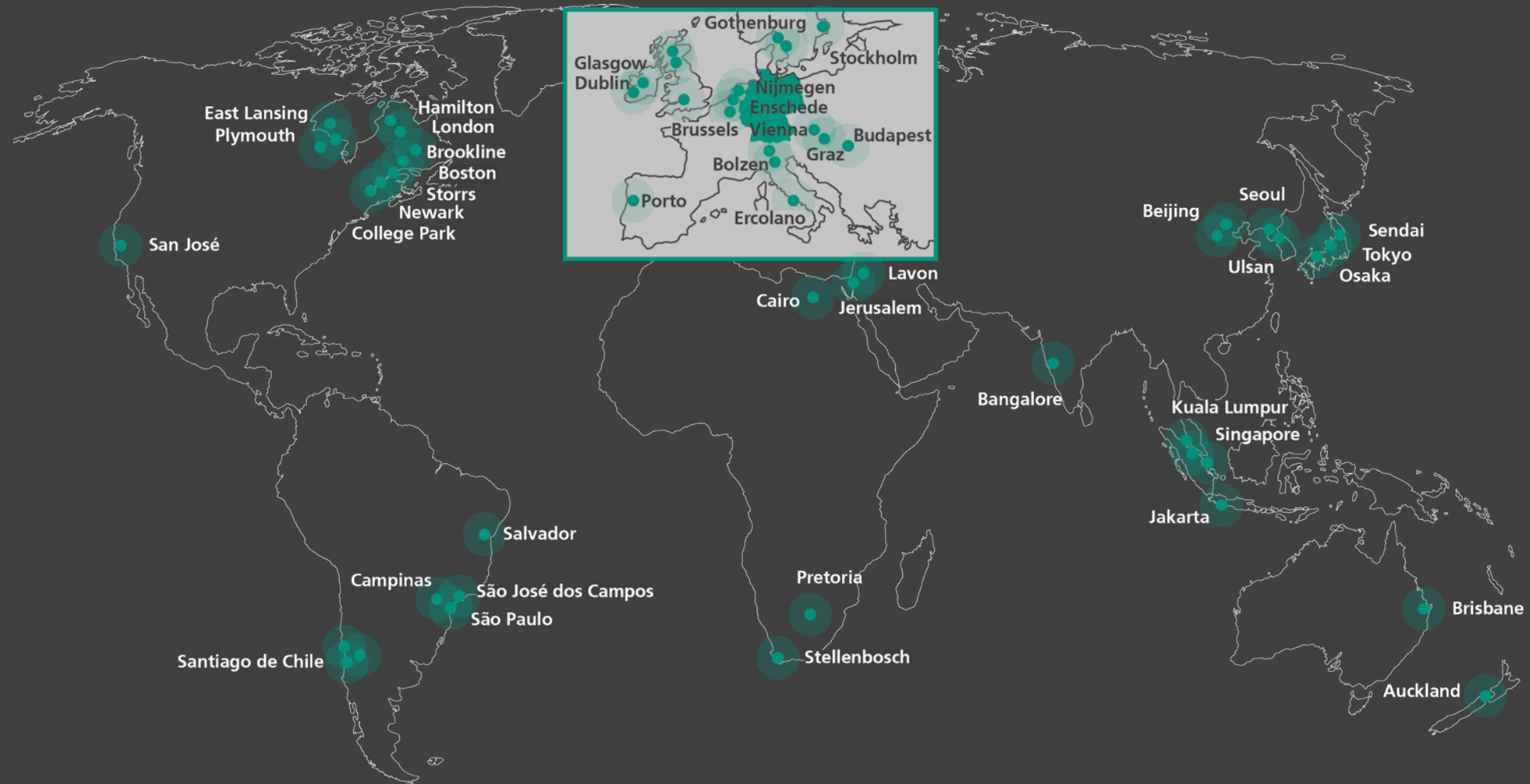
**> 80**  
Research Units

**> 30,000**  
Employees

**> € 2.9 billion**  
R&D Budget  
(€ 2.5 billion contract research)

# Fraunhofer Portugal

Fraunhofer – Gesellschaft



# Fraunhofer Portugal

## Institutional Background

### ASSOCIAÇÃO FRAUNHOFER PORTUGAL RESEARCH



**FOUNDING  
ASSOCIATES**



2008 | Non-Profit  
Research Institution of  
Public Common Interest

**RESEARCH  
CENTRES**

**AICOS**

**AWAM**

...



# Fraunhofer Portugal

Fraunhofer Operational Model and Technology Transfer

## BASE FUNDING

~1/3 Revenues



## DIRECT INDUSTRY CONTRACTS

~1/3 Revenues

## NATIONAL / INTERNATIONAL R&D PROGRAMMES

~1/3 Revenues

# Fraunhofer Portugal

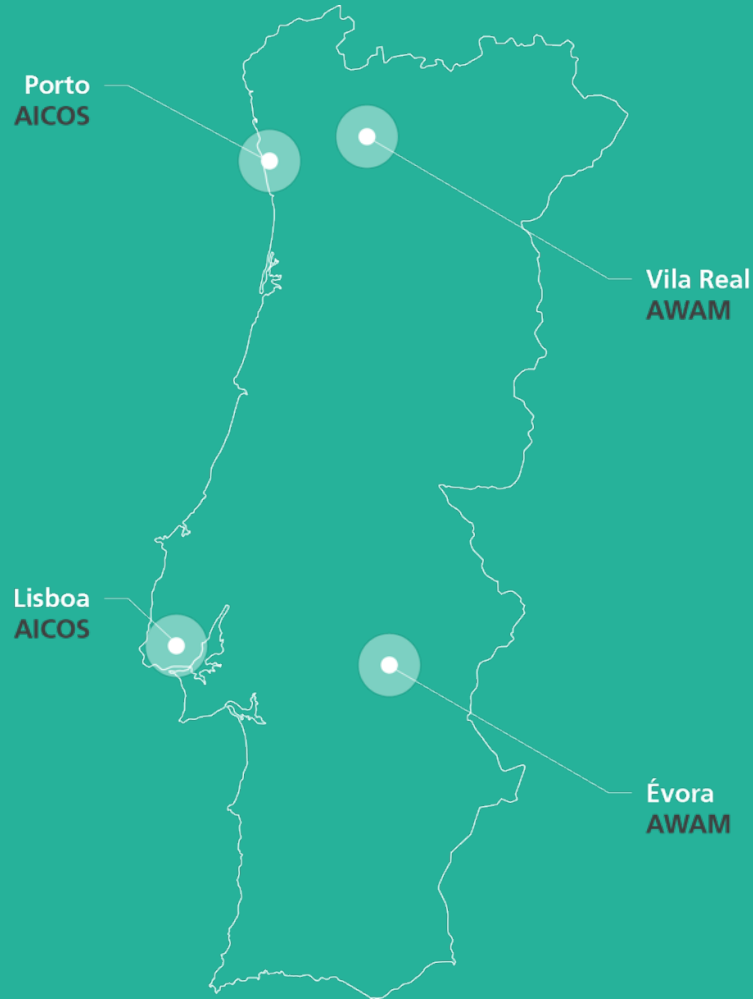
Associação Fraunhofer Portugal Research

**AICOS**  
13 YEARS



> **2** (Porto and Lisboa)  
**Research Units**

> **122**  
**Employees**



**AWAM**  
3 YEARS



> **2** (Vila Real and Évora)  
**Research Units**

> **12**  
**Employees**

# Fraunhofer Portugal

## Key Figures

93

Industry Partners

124

Researchers &  
Students

36

Achievements  
**Awards**  
(e.g. CES / Microsoft / Vodafone)  
**Honourable Mentions**

352

Publications

+1,600

Research Participants

+200

Theses

# FRAUNHOFER PORTUGAL AICOS

Fraunhofer Center for Assistive Information and Communication Solutions

# Fraunhofer Portugal AICOS

## Vision and Mission



### **PROPOSING FUTURES. IMPACTING LIVES.**

We create cutting-edge innovation based on end-user insights.


### **REMARKABLE TECHNOLOGY, EASY TO USE.**

As a leading partner for industry, we create applied research solutions capable of contributing to the market success of our clients' products and services by focusing on the value for their customers.



# Fraunhofer Portugal AICOS

## Purpose and Scientific Areas



**INTELLIGENT SYSTEMS**

- Edge and Cloud Computer Vision
- Sensor Fusion & Embedded Intelligence
- Cognitive Systems & Deep Learning
- Predictive Modelling & Recommendation



**CONNECTED THINGS**

- Embedded Electronics
- Communication and Networks
- Edge and Cloud Computing
- Quality Assurance & Regulatory Pre-Compliance



**HUMAN-CENTRED DESIGN**

- Understanding people in diverse settings
- Co-designing meaningful technologies
- Technology assessment in real life



# Fraunhofer Portugal AICOS

## Innovation Themes



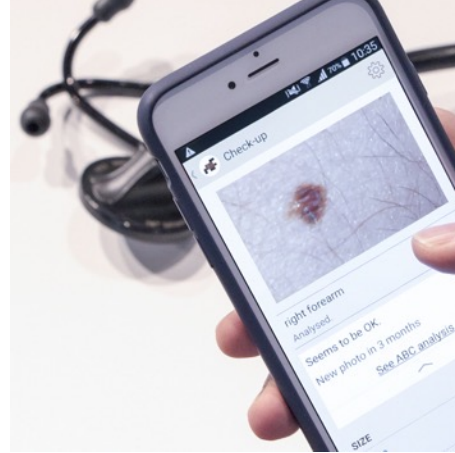
### COGNITIVE CONNECTED SOLUTIONS

- Letting everything sense
- Prediction and recommendation
- Natural user experience



### DIGITAL FARMING

- Decision support
- Mobile crowdsensing
- Efficient and self-managed networks



### ACCOUNTABLE ARTIFICIAL INTELLIGENCE

- Explicability, transparency, and bias
- Accountability and ethics
- Fairness and inclusion through technology



### DECENTRALISED HEALTH TECHNOLOGY

- Prevention
- Support to early diagnosis and intervention
- Affordable cutting-edge technology



### LIVING AND AGEING WITH DATA

- Personalised technology
- Socio-technical systems
- Technology design by non-technologists



# FRAUNHOFER PORTUGAL AWAM

Fraunhofer Center for Smart Agriculture and  
Water Management

# Fraunhofer Portugal AWAM

## Vision and Mission



**CUSTOMER FOCUS** to provide solutions for a sustainable **CIRCULAR ECONOMY** in the fields of water, energy, and nutrients.

Recognized **SCIENTIFIC INSTITUTION** in the area of process and environmental technologies and a strong **DEVELOPMENT PARTNER** for Portuguese and European companies.



# Fraunhofer Portugal AWAM

## Purpose and Scientific Areas



### SUSTAINABLE CROP PRODUCTION

- Transportable and storable fertilizers
- High quality products with defined properties
- Agriculturally usable irrigation and fertirrigation



### WATER TREATMENT

- Inorganic membranes
- Electrochemical treatment methods
- Efficient advanced oxidation processes
- Process-integrated water quality monitoring

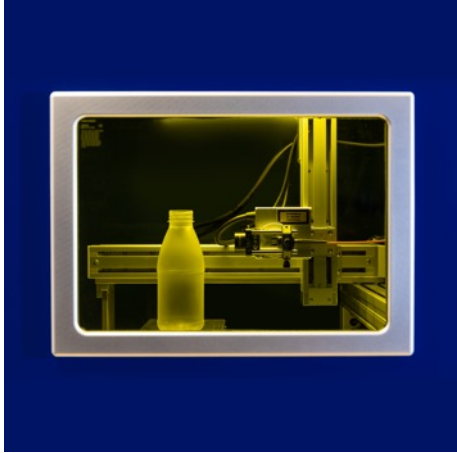


### BIOMASS ENERGY

- Biogas treatment
- Bio methane production
- CO<sub>2</sub> separation
- Energy storage
- Electrification, automation



# Fraunhofer Portugal AWAM Technologies



## DOSIMETRY

- Radiation-sensitive ceramic phosphors as dosimeter material for E-beam
- 3D dosimetry on any surface geometry possible



## ETHANOL TREATMENT

- Membranes and membrane processes for (bio)ethanol production, membrane distillation, dewatering, and similar processes



## GAS SEPARATION

- Gas separation by ceramic membranes, e.g. at elevated temperatures
- Biogas upgrading, membrane reactors, pervaporation applications



## LIQUID FILTRATION

- Nano- and ultrafiltration, e.g. for water treatment, nutrient and raw material recovery, dairy products, ...
- Standard filtration applications e.g. for biodigestion, ...



## TRACE SUBSTANCES MONITORING

- Optical biosensor design, adaptation and process integration
- Real-time detection of pollutants in low concentration ranges in water or liquid products



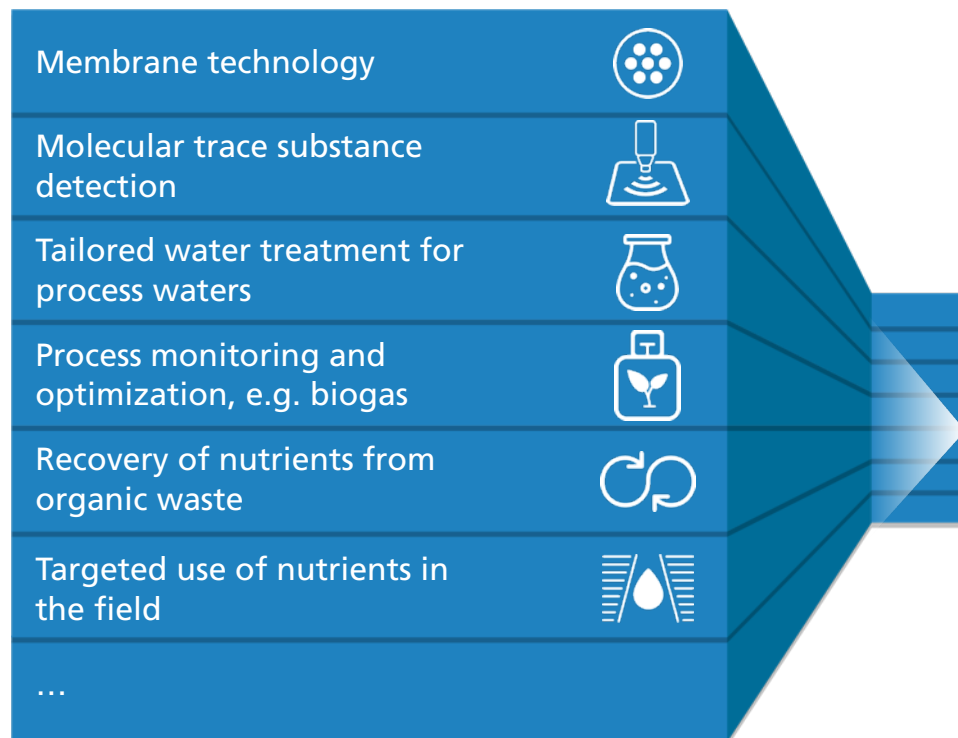
How do the research centres come  
together to answer your needs?



# AWAM – AICOS Ecosystem

How do the research centres come together to answer to your needs?

## AWAM



TO DELIVER:  
**SMART AGRICULTURE  
WATER MANAGEMENT**

## AICOS



Fraunhofer Portugal seeks to encourage cooperation between industry and the scientific community, motivating and rewarding research of practical utility.



# Fraunhofer Portugal Challenge

## Idea Contest

### PROMOTE 'RESEARCH OF PRATICAL UTILITY'

Among Portuguese University Students and Researchers

### IDEA CONTEST FOR MSc AND PhD THESES

Already in its 13<sup>th</sup> edition, the Challenge is based on MSc and PhD theses from Portuguese Universities

The poster for the Fraunhofer Portugal Challenge 2022 features a central image of a woman's face with a futuristic, glowing blue and green digital overlay. The overlay includes a city skyline, a globe, and a network of lines. The text '13TH EDITION' is in the top left, 'We CHALLENGE You' is in the center, and 'Think Technology. Design the Future.' is below it. The bottom right corner says 'APPLY UNTIL JULY 31ST 2022' and 'www.challenge.fraunhofer.pt'. The top left corner has the Fraunhofer Portugal logo and 'CHALLENGE 2022 ON THE ROAD'. The bottom right corner has 'INNOVATIVE TECHNOLOGIES FOR SUSTAINABILITY IDEA CONTEST BASED ON MSc AND PhD THESES'.

### SCIENTIFIC PRIZES FOR MSc AND PhD THESES

Winning participants are awarded monetary prizes and get media coverage of their work

### SCIENTIFIC AREAS

- Human-Centred Design
- Artificial Intelligence
- Cyber-physical Systems
- Membrane Technology
- General Process Engineering
- Sensors and Sensor Grids
- Energy Systems



# Fraunhofer Portugal Challenge

## Deadlines for 2022

### 1<sup>st</sup> Phase

- **Idea submittal period:** June 28<sup>th</sup> to July 31<sup>st</sup>
- **Announcement of the 1<sup>st</sup> round results:** September 13<sup>th</sup>

### 2<sup>nd</sup> Phase

- **Additional documentation submittal period:** September 14<sup>th</sup> to September 21<sup>st</sup>
- **Announcement of the 2<sup>nd</sup> round results:** October 13<sup>th</sup>

### 3<sup>rd</sup> Phase

- **Fraunhofer Portugal Challenge Closing Event:** October 26<sup>th</sup>  
(public presentation of finalist ideas and definition of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> places in each category)

# Fraunhofer Portugal Challenge

2021 Edition

Winning ideas in the PhD and MSc categories

## PhD Category

- **1<sup>st</sup>** : Printed metal oxides: A new era for sustainable electronics;
- **2<sup>nd</sup>** : Automated monitoring system for a sustainable agriculture;
- **3<sup>rd</sup>** : Development and implementation of devices for the conversion of agroresidues into energy and biochar in farmers cooperatives of the north Ecuadorian Amazon

## MSc Category

- **1<sup>st</sup>** : Instrumented and adaptative electromagnetic generators: a new concept of harvesting;
- **2<sup>nd</sup>** : Wearable non-enzymatic glucose sensor;
- **3<sup>rd</sup>** : Privacy-preserving visual case-based explanations.

# Fraunhofer Portugal Challenge

2021 Edition

## Closing Event





# Fraunhofer Portugal Challenge

2021 Edition

Impressive media coverage both for winning Students and Universities



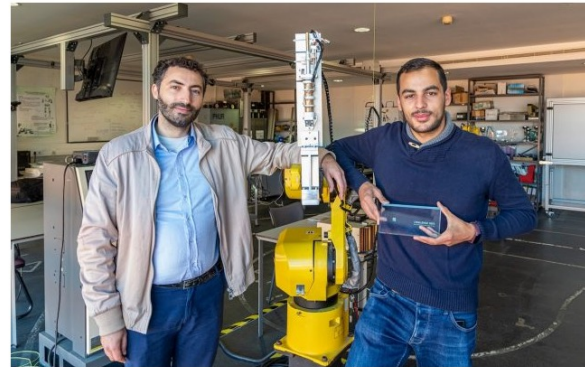
12.ª EDIÇÃO CONCURSO DE IDEIAS - FRAUNHOFER PORTUGAL CHALLENGE

**Ideias para gerador de levitação magnética e gadgets mais sustentáveis vencem Fraunhofer Challenge**



**UA: Gerador eletromagnético adaptável vence Prémio Fraunhofer para mestrados**

5 Novembro, 2021



Marco Santos e o aluno Pedro Rolo, ladeiam o gerador eletromagnético (foto UA.pt).



**Fraunhofer Portugal Challenge premeia investigação para a Sustentabilidade**

Ideias inovadoras que podem dar origem a soluções tecnológicas com utilidade prática e de impacto para a sociedade. Este é o foco do Fraunhofer Portugal Challenge, um concurso de ideias organizado desde 2010 com o intuito de premiar as melhores propostas baseadas em teses de Mestrado e Doutoramento, realizadas em universidades portuguesas. [Ler Mais](#)

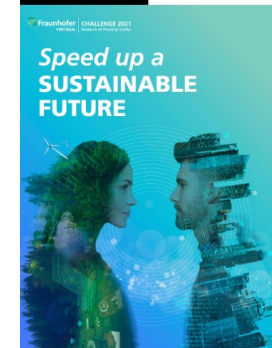


## AS IDEIAS DA FRAUNHOFER

A Fraunhofer Portugal anunciou os vencedores da 12ª edição do concurso que premeia teses de mestrado e doutoramento. Os prémios tinham como tema o ambiente: nos doutoramentos o primeiro prémio foi entregue a Emanuel Carlos, da Universidade Nova de Lisboa, devido às propostas de uso de materiais ecológicos em equipamentos de eletrónicos. Pedro Rolo, da Universidade de Aveiro, arrecadou o prémio na categoria de mestrado, com sistemas que produzem eletricidade a partir da energia libertada por máquinas e outros equipamentos.

**Fraunhofer Portugal Challenge premeia investigação para a Sustentabilidade**

Ideias inovadoras que podem dar origem a soluções tecnológicas com utilidade prática e de impacto para a sociedade. Este é o foco do Fraunhofer Portugal Challenge, um concurso de ideias do Instituto de Investigação instalado na UPTEC que vai premiar as melhores propostas baseadas em teses de Mestrado e Doutoramento, realizadas em universidades portuguesas.



Nesta 12ª edição, o concurso irá distinguir ideias inovadoras, de base tecnológica, com uma visão sustentável para o futuro de todos. A importância de uma produção e consumo sustentáveis, a sustentabilidade dos processos, o reforço da capacidade para o alerta precoce e redução de riscos de saúde, o acesso universal e equitativo a água potável são desafios urgentes. As candidaturas ao Fraunhofer Portugal Challenge decorrem até dia 31 de julho.

Inovação e Sustentabilidade dão o mote ao Fraunhofer Portugal Challenge 2021, concurso que pretende distinguir os melhores trabalhos de investigação com utilidade prática desenvolvidos em Portugal. Organizado anualmente pela associação Fraunhofer Portugal, o concurso é dirigido a estudantes e investigadores de todas as universidades portuguesas, que desenvolvem ideias com uma vertente prática, ou seja, orientadas para o mercado, com aplicabilidade na indústria ou no quotidiano da vida das pessoas.

O concurso vai premiar as melhores propostas que abracem as ideias de base tecnológica e focadas em soluções sustentáveis para os desafios mais prementes nas áreas da produção e da indústria, da agricultura, da gestão de recursos naturais ou da promoção do bem-estar. No Fraunhofer Portugal Challenge 2021 serão premiados três finalistas de cada uma das categorias: Mestrado e Doutoramento (seja no total). O valor global dos prémios científicos é de 9 mil euros.

# Fraunhofer Portugal Challenge

## Testimonials

“

The importance of winning the Fraunhofer Portugal Challenge was the fact that this technology was highlighted in Portugal, which is very important because it allows people to know what is being done and the importance of being sustainable nowadays.”

Emanuel Carlos

1<sup>st</sup> place winner in the PhD category for his idea  
"Sneaking into the brain with a new GPS-like technology"





# Fraunhofer Portugal Challenge

## Testimonials

“

Winning the Challenge was important as it opens a lot of doors. It was also a recognition, towards the international community, as the Fraunhofer Institute is internationally recognized.

On a more personal level, it was a reassurance of my commitment to this research area, connected to energy harvesting, something that is very important these days.”

Pedro Rolo

1<sup>st</sup> place winner in the MSc category for his idea  
"Instrumented and adaptive electromagnetic generators: a new concept of harvesting"



## **PORTO – Headquarters**

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