WATCHPLANT

BIOHYBRID SYSTEM
TECHNOLOGY FOR
ENVIRONMENTAL
MONITORING

www.watchplantproject.eu

What is WatchPlant?

WatchPlant is a new EU Pathfinder Project (EU-H2020-FETPROACTIVE) which proposes a radically novel approac consisting of developing a biohybrid system technology for in-situ self-powered monitoring that allows plants to wear Artificial Intelligence components and technological interfaces, which results in creating of "smart biohybrid organisms" for enviromental monitoring.

Partners

The Instituto Tecnológico de la Energía in Spain (ITE) coordinates this European project with our partners: KTH Royal Institute of Technology experts in microtechnologies; CYBRES, a research center of Advanced Robotics and Environmental Science; CIM-mes Projekt sp. Z o.o., an engineering company with experience in performing highly specialized design and analysis service; CSIC, the Spanish National Research Council for plant physiology (CSIC-IRNAS) and air quality analysis (CSIC-IDAEA); FER, University of Zagreb Faculty of Electrical Engineering and Computing with high expertise in communication capabilities, and LÜBECK University, experts in artificial intelligent and high-quality in departments like computer science/technology and natural sciences.

Leader

Partners

What opportunities emerge for markets?

A) Urban monitoring: Current tools focus on levels of pollutants. WatchPlant goes beyond these evaluations by comparing these with tracers of the health of the urban vegetation, in order to supply information to protect the urban green areas, together with urban vegetation healt.
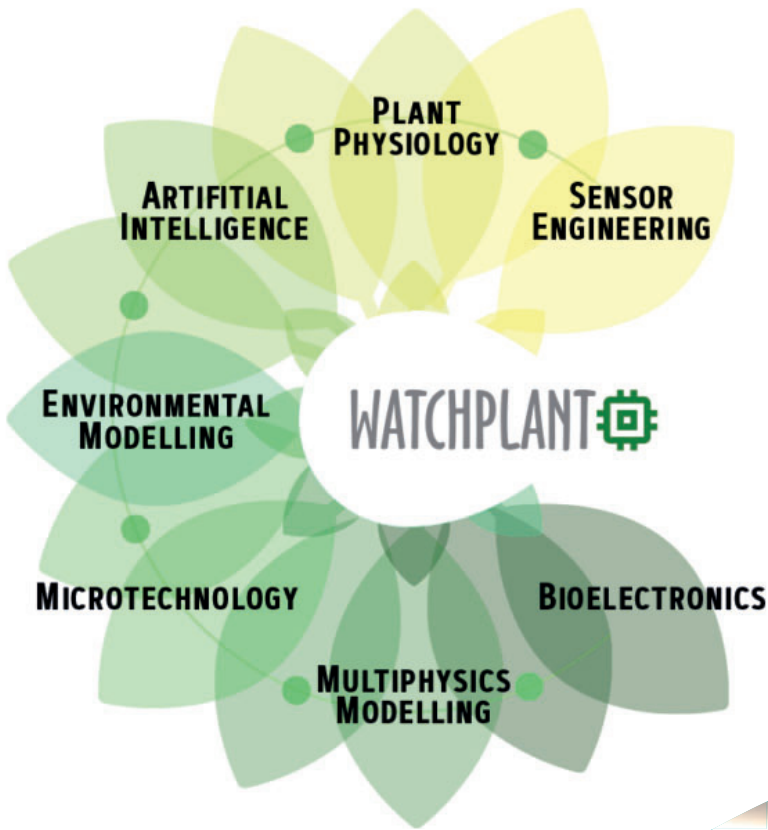
B) Agro-food industry: Identification of early-stage signals in plants related to the infection with pathogens or drought events among others, offering control, prevention, planning or mitigation functionalities in the smart-agriculture by the efficient use of resources.

C) Forestry: Control the effects of climate change in forests and remote areas for ecosystem management by remote sensing thanks to their eco-friendly characteristics to apply the correct policies.
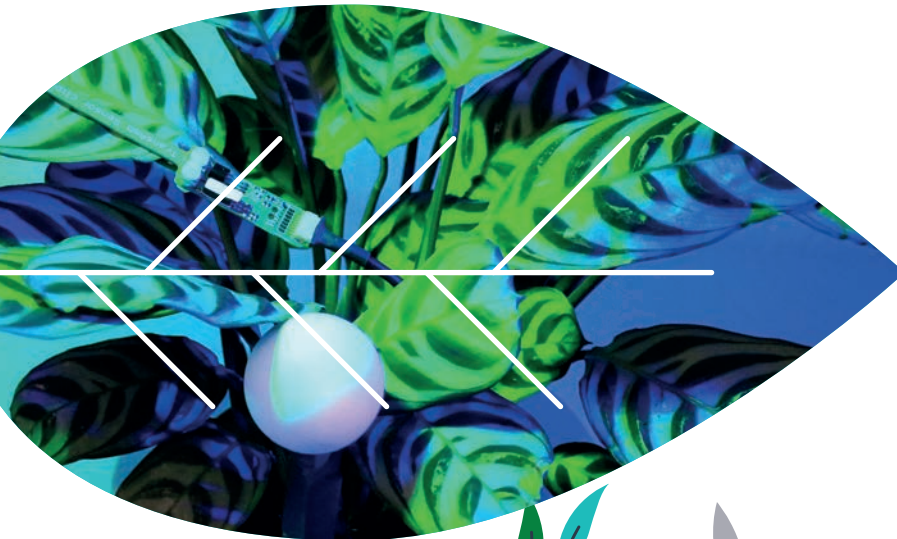
Smart
biohybrid
organisms

PLANT PHYSIOLOGY

ARTIFITIAL INTELLIGENCE

SENSOR ENGINEERING

ENVIRONMENTAL MODELLING

WATCHPLANT

MICROTECHNOLOGY

BIOELECTRONICS

MULTIPHYSICS MODELLING

New biohybrid system technology

How does it work?

This system equips urban biological organisms -plants- with Artificial Intelligence (AI) creating a smart sensor for measuring both, environmental parameters and the responding physiological state of plants, in a very early stage by the use of a barely explored fluid, phloem sap, in combination with chemical, and physical sensors. It will be integrated into complex networks that allow performing distributed information processing, decision making, modeling and data fitting, paving the way for the self-awareness or self-adaptation. Additionally, it no, the sensors will constitute a clean energy self-powered device due to the novel use of sap, not only for transforming plants into living sensors, but also for clean energy generation.
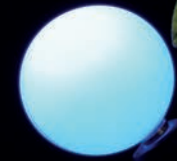
A new source of renewable energy from plants

RGB actuator

1

2

3

3

4

WATCHPLANT
phytosensing

1 RH, t, CO$_2$
(VOC, O$_3$ NO$_2$)

2 leaf transpiration,
ligth, RH, t

3 biopotentials, sap flow
(electrochemical)

4 soil moisture,
temperature

RF power, air pressure,
power supply sensors
3D Magnetometer

CYBRES
beyond technology

Benefits for companies

Bioelectronics and microtechnologies sectors: The project has the ambition to solve how to extract sufficient sap volume in a healthy plant, how to make long-lasting bioelectronics, and how create a smart self-powered wearable phyto-sensor in a single device.

Urban , agro-food and forestry sectors: Watchplant is focused prove the suitability of this new biohybrid systems for modelling urban environments using novel combinations of exiting parameters and explores the future role of sap in this sense. However, it could have more applications in the future to obtain predictive knowledge about the status of the environment in which the plant inhabit leadin to benefits for companies in different sectors.

Electricity sector: The project studies how electricity and relevant environmental information can be obtained from the sap in plants thanks to an experimental and radically innovative technology.

Energy model: Companies and public entities will be able to have a new energy generation model that is more respectful with the environment, which can also benefit citizens.

New energy generation model

Benefits for society

A promising tool to carry out weather/pollution/pandemics development forecasting systems and social networks for proving an ecological/environmental feedback to citizens.

Public environmental managers will be able to adopt adequate measures in advance, since this Project will allow them to foresee the development of factors that may affect citizens such as climate or pollution.

Companies and public entities will be able to have a new energy generation model that is more respectful with the environment, which can also benefit citizens.

Proving an ecological/ environmental feedback to citizens

Environmental Intelligence Collaboration

WatchPlant is part of a collaboration agreement signed among the five H2020 EIC Pathfinder/FET Proactive funded projects: I-Seed, SMARTLAGOON, RAMONES, ReSET and WATCHPPLANT

The main aim of this collaboration is to deliver a blueprint for a full-fledged system for Environmental Intelligence.

The main goal of Environmental Intelligence call (FETPROACT-EIC-08-2020) is to build a systemic understanding of the socio-environmental inter-relationships, to regulate or design policies and incentives for environmental sustainability and to track their effectiveness over time and to provide intelligible options for adjusting them. Moreover, the call was designed as a joint initiative in creating a European strategy for Environmental Intelligence system.

Selected projects under Environmental Intelligence topic collaborate jointly aiming at delivering a Blueprint on Environmental Intelligence, for a full-fledged system for environmental intelligence.

NEW BIOHYBRIDSYSTEM TECHNOLOGY

A biohybrid system technology for in-situ self-powered monitoring that allows plants to wear AI components and technological interfaces, which results in creating of "smart biohybrid organisms" for environmental monitoring.

A new source of renewable energy from plants which can have a great impact not only in urban monitoring but a huge range of plant related sectors such as agro-food industry or forestry

WATCHPLANT

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