

## SUCCESS STORIES

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## TECNIOSPRING PLUS SUCCESS STORY: 2 RNA-based technologies that could save thousands



**HEALTH** - In the framework of the TECNIOspring + programme, the researcher **Gerard Minuesa Dinarès** has developed two technologies based on RNA at the **Moirai Biodesign** company.

The first one he co-developed, [MoiRNAiFold](#), is a **RNA design software** available on the company's server that will enable biotech companies and research groups to design complex functional RNA molecules.

The second one is a **Plug and Play RNA technology**, a diagnostics technology based on molecular biosensors capable of detecting very low concentrations of a biomarker associated with a disease. This technology enables the fast and affordable diagnosis of a myriad of diseases in any type of setting, ranging from high-throughput labs to the point-of-care. A patent application to protect this technology has already been filed.

Overall, both technologies could save thousands of lives by contributing to the timely detection of bacterial infections such as the currently developed sepsis diagnostics assay, or viral diseases and by enabling the development of novel RNA-based therapies.

**Congratulations!**

## TECNIOSPRING PLUS SUCCESS STORY: algorithms used for diagnosis and prognosis of mental disorders and pathologies



**HEALTH** - In the framework of the TECNIOspring programme, the researcher **Marjan Mansourian** has developed an **online expert-based intelligent hybrid system that can diagnose high impact disorders** and assess treatment outcome and the motor rehabilitation of patients at the **Research Centre for Biomedical Engineering (CREB)** of the Universitat Politècnica de Catalunya (UPC). This project was implemented under the supervision of support of Dr. Miquel Angel Mañanas and based on international collaboration with Germany, Canada, and Iran.

This technology uses inductive algorithms (e.g., GMDH) to calculate the probability for a subject to contract a specific disease given several factors. First, it was used to predict the chances of children and teenagers suffering from anxiety or depression. The outbreak of COVID19 gave Marjan Mansourian a new opportunity: testing the efficiency of this system in anticipating the length of patients' stay in intensive care, the probability of suffering from long-term effects and even the mortality of the virus according to the age, sex, previous illnesses, etc. It also help identify patients who suffer from COVID19 from those who do not.

In the long run, this predictive model could be used with a wide range of pathologies and improve hospitals' management efficiency.

**Congratulations!**

## TECNIOSPRING PLUS SUCCESS STORY: biodegradable packaging that extends food's shelf life



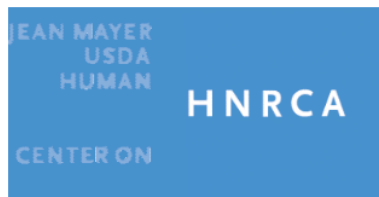
Article en català

**FOOD INDUSTRY** - In the framework of the TECNIOspring + programme, the researcher **Farayde Fakhour** has developed a **new biodegradable packaging to prolong the shelf life of produce** - for now, strawberries - at the technological centre **CCP** of the Polytechnic University of Catalonia. This packaging not only better preserve the freshness and the appearance of the strawberries by slowing down their interaction with the atmosphere and thus their degradation, it is also fabricated using plant-based raw materials which makes it a sustainable alternative to plastics.

The researcher stresses the importance of reducing food waste at a time when 45% of fruit and vegetables and 33% of total production is being lost, according to data from Stop Food Waste Day: "Our motivation has been to contribute to the development of biodegradable and edible packaging that helps to extend the useful life of food, while preserving the environment".

**Congratulations!**

## TECNIOSPRING PLUS SUCCESS STORY: cranberries to reduce gut health problems



Original article

**HEALTH** - In the framework of the TECNIOspring + programme, the researcher **José Rodríguez Morató** has explored the **positive impact of cranberries on the microbiota of the gastrointestinal tract** in case of a low-fibre animal-based diet during his fellowship at the technological centre **BAPP** (*Bioanalysis, Proteomics, and Pharmacology*) of the University Pompeu Fabra, and at the **Jean Mayer USDA Human Nutrition Research Center on Ageing** (USA). Indeed, low-fibre animal-based diets are known to increase carcinogenic bile acids and decrease the beneficial short-chain fatty acids (SCFAs) causing an imbalance in the gut microbiome, which can increase the risk for several chronic diseases such as atherosclerosis hypertension kidney disease and type 2 diabetes.

Eleven adults aged 25-54 participated in the 5-day trial during which they consumed a control diet of meats, dairy products and simple sugars, plus dried whole cranberry powder or a placebo powder according to the phase of the trial. The cranberry diet seemed to lessen the potentially adverse changes in the gut microbiome as it reduced the increase in carcinogenic bile acids, lessened the drop in SCFAs. Overall, the trial indicated that cranberry properties may play a role in maintaining gut health.

An [article](#) describing the trial and its findings was published in the Journal of Nutritional Biochemistry.

**Congratulations!**

## TECNIOSPRING PLUS SUCCESS STORY: a platform for sequencing RNA from rice fields and improve growth



Article en català

**FOOD INDUSTRY** - In the framework of the TECNIOspring + programme, the researcher **Alfonso Saera** has developed a **platform based on big data that monitors the use of biostimulants in crop fields to analyse the status of crops and improve their growth** at the **Sequentia Biotech** company. The technology allows large amounts of plant RNA data to be collected and transformed into graphs to understand how vegetation behaves when biostimulants. such as fungi, bacteria or yeasts, extracts such as amino acids or hormones and chemical compounds, are applied.

According to Alfonso Saera, "next year the new European legislation on biostimulants will come into force, which will require producers who sell them to demonstrate their effectiveness and how they affect plantations". "Until now there has been no clear regulation and our technology helps facilitating the registration of new biostimulants," he stresses.

The platform is currently in beta phase and will be presented to the sector this December at the Biostimulants Europe 2021 congress.

**Congratulations!**

## TECNIOSPRING PLUS SUCCESS STORY: a technology for recycling used membranes from desalination plants



Article en català

**CIRCULAR ECONOMY** - In the framework of the TECNIOspring + programme, the researcher **Raquel Garcia Pacheco**, has developed **a new technology that allows for the recycling of used membranes of desalination plants for water purification treatment** at the technological centre **LEQUIA**. A large desalination plant can have up to 20,000 membranes for the production of desalinated water that will be used to provide drinking water supply and irrigation. These membranes are changed every five to twelve years and are thrown away. Their recycling allows them to be reused in other smaller installations dedicated to the production of water for irrigation or industrial processes, as well as for the treatment of wastewater.

According to Garcia Pacheco, "we are able to regenerate membranes without significantly altering their initial properties, but we also recycle them into new products". The recycled membranes, therefore, "treat more water and continue to separate viruses and bacteria. Moreover, depending on the type of recycled product, they are also capable of continuing to separate salts". This membrane holder allows the creation of compact water treatment systems for isolated rural areas with difficult access. In addition, it will also optimise the recycling process by minimising its consumption of resources and energy.

This new system of recycled membrane-holders obtained a European patent.

**Congratulations!**



## TECNIOSPRING PLUS SUCCESS STORY: a smart parasol that harnesses solar energy



Article en català

**ENERGY-** In the framework of the TECNIOspring programme, the researcher **Gerard Cortina**, PhD in mechanical engineering from the university of Utah (USA), has developed **smart parasols that include solar panels to harness and store solar energy for lighting at night** while efficiently protecting people from the sun at the **IASO** company in Lleida. These parasols incorporate high-efficiency single-crystal silicon photovoltaic cells and light supporting materials that reduce the weight of the solar panel. By means of a set of electronic devices, the solar radiation is stored in a battery that supplies enough energy to give an autonomy of five hours to the luminous panels.

According to Gerard Cortina, who is leading the research, "the aim of the project is to combine a solar protection element and the harness of the energy from which we are protecting ourselves to use it for lighting during the night, exploiting of the functionalities of two existing products and combining them to create a sunlight". "Many parasols currently already have built-in lighting systems that have to be connected by cables to the electricity supply of the premises, but if we can make them autonomous thanks to an energy collection of their own, we avoid the need to use the wiring," explains Cortina. The researcher also points out that in this way "the population is made aware of the use of renewable energies".

A functional prototype of this smart parasol already exists.

**Congratulations!**



## TECNIOSPRING PLUS SUCCESS STORY: a new system to speed up the detection of toxic algae

TECNATOX

[Article en català](#)

**BIOTECHNOLOGY** - In the framework of the TECNIOspring + programme, the researcher **Gemma Giménez** has developed a **new system to speed up the detection of toxic algae** on the Catalan coast at the technological centre **TecnATox** of the University Rovira i Virgili. It is based on the application of molecular biology, which allows faster and more efficient detection of the presence of toxic microalgae, capable of producing toxins that can be ingested by mussels or fish and end up causing food poisoning in humans.

By "detecting the early presence" of toxins from microalgae in a "faster, more efficient way and covering more territory", this new method allows to "anticipate possible toxic episodes", assures the researcher, Gemma Giménez. Nowadays, the most common method used to detect toxic algae is analyse samples with an optical microscope, but this process requires a high level of taxonomic knowledge and can take up to a week to obtain the results. Analysing 4 samples with optical microscopy takes four or five days, while with molecular biology (i.e. through DNA sequencing), it is possible to speed up the process and reach up to 100 samples in two days.

**Congratulations!**

## TECNIOSPRING PLUS SUCCESS STORY: big data monitoring for water use optimisation in agriculture



Article en català

**ICT** - In the framework of the TECNIOspring + programme, the researcher **Sadegh M. Astaneh**, PhD in Information and Communication Technologies from the University of Milan (Italy), has developed a **monitoring system based in Big Data to optimise the use of water and fertilisers** in the agriculture domain at the Barcelona based company **Modpow AgriTechnologies**. The solution, named MATAI, monitors the liquid data under the ground in order to draw up a watering recommendation for the farmer, according to the real-time conditions of each plot - which can save more than 30% of water consumption and fertiliser over the year.

As Jordi Barceló, CEO of the company, points out, "with this system we put our eyes under the ground and inform the farmer of everything that happens and that he cannot see with the naked eye". This way, "we save large quantities of water and fertiliser, as we have found that many growers over-water and end up damaging the crop". For his part, Astaneh points out that "the precision of the indications and the information collected by the devices are two key factors for the recommendations to be as accurate as possible". The researcher adds that "this R&D project represents an added value in the activity of the fruit and vegetable sector".

**Congratulations!**

X



This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 712949

## TECNIOSPRING PLUS SUCCESS STORY: virtual reality glasses for medical tests in 3D



UNIVERSITY OF  
CAMBRIDGE

**HEALTH** - In the framework of the TECNIOspring + programme, the researcher **Daniel Esteban-Ferrer**, PhD in nanobioengineering from the University of Barcelona (UB), has made a stay at the University of Cambridge with the support of the Catalan company **Visyon** (Grup Mediapro). He has developed **software that uses virtual reality glasses to visualise medical tests in 3D**. With this tool, images of organs, cells, neurons, bacteria or viruses can be viewed in high resolution and analysed in all their dimensions to identify suspicious changes and could lead to the early detection of diseases such as cancer or Alzheimer's disease.

The software, based on artificial intelligence algorithms, "can detect changes in cellular structures that may go unnoticed by the human eye and, therefore, early detection of diseases such as cancer is possible", says the Catalan researcher. The project is currently in the **proof-of-concept phase**, a process that will last for about six months. The researcher hopes that "very soon it will be possible to carry out tests in real environments such as hospitals or laboratories".

Daniel Esteban-Ferrer has created a **startup, ViReInstruments S.L.**, to continue the research project and is currently seeking funding.

**Congratulations!**

