Ministero dello sviluppo economico

Ministero degli Affari Esteri e della Cooperazione Internazionale

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IPA AWARDS CEREMONY
INFORMATION PACK

28TH OF FEBRUARY TO THE 1ST OF MARCH 2022
ITALIAN PAVILION AT EXPO 2020 / AUDITORIUM

Netval

knowledge share

ITA
ITALIAN TRADE AGENCY

THE AWARD DEDICATED TO THE EXCELLENCE OF ITALIAN PUBLIC RESEARCH

EXPO2020 DUBAI:
IPA AWARDS CEREMONY

28TH OF FEBRUARY TO THE 1ST OF MARCH 2022
ITALIAN PAVILION

IPA AWARDS AT A GLANCE

The Ministry of Economic Development, through the Italian Patent and Trademark Office (UIBM) with the purpose of promoting the Italian innovation ecosystem, has put in place actions aimed at the economic enhancement of industrial property titles, in particular patents, to expedite the dissemination of both, technology and knowledge transfer.

To this end, in collaboration with Associazione Netval (the Italian Network for the Valorisation of Public Research), the Ministry organized the 'Intellectual Property Award' 2021 (IPA 2021) competition. Innovation teams from Italian Universities, Public Research Organizations and Research Hospitals (IRCCS), were invited to present their most *avant garde* solutions in the fields of:

1. Agritech and Agrifood
2. Cybersecurity, Artificial Intelligence, and Big Data
3. Green Technologies and Alternative Materials
4. Life Science and Health Care
5. Aerospace
6. Renewable Sources, Alternative Energy and Water
7. Future Mobility

A total of 217 technologies were submitted. After a competitive and scrupulous selection process, judged by a panel of national experts, 35 finalists (5 per category) were chosen.

The IPA2021 finals will take place at the Italian Pavilion's Auditorium, on the 28th of February and the 1st of March 2022, where the competitors will present their innovations for final judging. A winner for each category will be chosen and awarded a cash prize of €10,000. A contribution by the Ministry, to be paid to the University, Public Research Body or Research Hospitals, to be invested in future development of the patent.

We invite industrial experts, venture capitalists, business angels and investors to attend the IPA Awards Ceremony. Come and get a taste of the Italian Innovation Landscape and explore collaboration opportunities with the fellow 35 finalist, the Associazione Netval and the Knowledge Share IP Platform, the national patent platform which hosts more than 1,600 patents, including spin-offs, belonging to over 99 Italian Universities, Public Research Organizations and Research Hospitals.

SHORTLISTED TECHNOLOGY BRIEFS

1. AGRITECH AND AGRIFOOD

PEPTIDES FOR PLANT PROTECTION

DISCOVER MORE →

UNIVERSITÀ DEGLI STUDI DI PADOVA
Team Delegate Laura Morbiato

Natural peptides, derived from Trichoderma fungus, have been patented for the leaf treatment of Plasmopara Viticola (grape downy mildew) and other common agricultural pathogens. An efficient biocompatible product, soluble in water and stable in sunlight.

FOOD PASTEURIZATION WITH HIGH PRESSURE CO2

DISCOVER MORE →

UNIVERSITÀ DEGLI STUDI DI PADOVA
Team Delegate Sara Spilimbergo

Extending fresh food shelf-life by conducting pasteurization using supercritical carbon dioxide. A process that maintains optimal temperature and pressure conditions, thus preserving the nutritional content, structure, colour and flavour of the food, whilst reducing presence of bacteria.

RAPID PURIFICATION OF PHYCOBILIPROTEINS

DISCOVER MORE →

CONSIGLIO NAZIONALE DELLE RICERCHE (CNR)
Team Delegate Rosaria Lauceri

Membrane Chromatography-based purification process of cyanobacteria and algae derived phycobiliproteins, which can be applied to both dried and fresh biomass extracts. The process is simple, rapid, economical and, consequently, suitable for large scale production.

METHOD FOR DETECTING *MACROPHOMINA PHASEOLINA*

DISCOVER MORE →

UNIVERSITÀ DI PISA
Team Delegate Susanna Pecchia

A molecular diagnostic assay to detect the presence of the phytopathogenic fungus *Macrophomina phaseolina*. A portable, sensitive, rapid and cost-efficient DNA assay kit able to performed direct analysis of the infected plant or soil sample in the field.

DEVICE FOR MEASURING TANNINS IN A LIQUID

DISCOVER MORE →

UNIVERSITÀ DI BOLOGNA
Team Delegate Eleonora Iaccheri

Analytical method and device to quantify the level of tannins in wines and oenological products. The method allows direct measurement of tannins without the need for neither sample preparation, purification nor separation techniques.

SHORTLISTED TECHNOLOGY BRIEFS

2.CYBERSECURITY, ARTIFICIAL INTELLIGENCE, BIG DATA

IPOGNAC: A HIGH-PERFORMANCE QUBIT SOURCE FOR QUANTUM KEY DISTRIBUTION

DISCOVER MORE →

UNIVERSITÀ DEGLI STUDI DI PADOVA
Team Delegate Giuseppe Vallone

High-speed modulation of the polarization of photonic pulses, for use in the field of quantum key distribution. Completely automated in generating perfectly known polarization states that do not vary over time. Offers the possibility to change configuration (polarization or time-bin coding) automatically. A prototype of the modulator has already been tested within the University network.

METHOD FOR SENDING CLASSICAL DATA IN QUANTUM INFORMATION

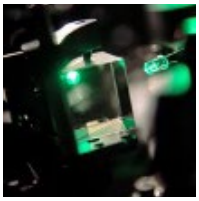
DISCOVER MORE →

UNIVERSITÀ DI BOLOGNA
Team Delegate Marco Chiani

Method for transferring classical information on quantum information protected from error corrections in quantum communications. Finds application in network management and control, to annotate the quantum information or for synchronization.

DEVICE FOR THE GENERATION OF SINGLE PHOTON ENTANGLED STATES

DISCOVER MORE →



UNIVERSITÀ DEGLI STUDI DI TRENTO
Team Delegate Nicolò Leone

Device for generating quantum correlations (entanglement) between two states of the same photon. The key aspect of the invention is the manipulation of different degrees of freedom of a single photon. These can be the polarization, the momentum, the angular momentum, the mode of propagation, or the frequency.

DEVICE FOR PARALLEL PROCESSING OF DATA IN MEMORY

DISCOVER MORE →

POLITECNICO DI TORINO
Team Delegate Fabrizio Riente

Nanodevice able to both memorize and elaborate data stored on a magnetic strip. By using a magneto-tunnel junction the data can be read and written electrically. The data can be simultaneously implemented to conduct simple logic operations, without the need of external circuits.

TOOTHPIC: SECURE PASSWORDLESS AUTHENTICATION

DISCOVER MORE →

POLITECNICO DI TORINO
Team Delegate Giulio Coluccia

An authentication system which uses the fingerprint of the optical sensor of a user's device, e.g., a smartphone, as a physical unclonable authentication function. Ideal for multifactor authentication, encrypted communication and digital signatures.

SHORTLISTED TECHNOLOGY BRIEFS

3. GREEN TECHNOLOGIES AND ALTERNATIVE MATERIALS

RE-PAPER: REUSABLE SILICA MONOLITHS FOR DECONTAMINATING RECYCLED PAPER PULP

DISCOVER MORE →

UNIVERSITÀ DI BOLOGNA
Team Delegate Enrico Buscaroli

Re-usable, modified mesoporous silica for the absorption and removal of toxic (MOSH) and carcinogenic (MOAH) contaminants during the production of food safe paper / cardboard using standard mill operating procedures. The silica does not affect the quality nor the neutral colour of the cellulose.

ADDITIVE PROCESS FOR NON-OXIDE CERAMICS

DISCOVER MORE →

POLITECNICO DI TORINO
Team Delegate Abdollah Saboori

Exploiting vacuum additive manufacturing technologies through a 1-step process, it enables the synthesis, the controlled densification and the shaping of non-oxide materials, in porous as well as fully dense ceramic components, with a tailored nano-micro-macrostructure.

REVERSIBLE ADHESIVE SYSTEM FOR BONDING AND DISASSEMBLING OPERATIONS

DISCOVER MORE →

POLITECNICO DI TORINO
Team Delegate Alessandro Benelli

Iron oxide nanoparticles are introduced within the thermoplastic adhesive binding objects. When exposed to a custom-made magnetic field generator, the nanoparticles heat-up, facilitating the separation and also bonding of objects.

METHOD FOR THE RECOVERY OF PALLADIUM

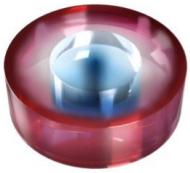
DISCOVER MORE →

UNIVERSITÀ DEGLI STUDI DI CAGLIARI
Team Delegate Angela Serpe

Selective removal of Palladium (Pd) from contaminated leachates and industrial wastewaters, using Cloud Point Extraction based on the action of a "green" ligand dissolved in a small amount of non-ionic surfactant. Pd recovered in the form of a metal complex from the surfactant phase.

ZENIT SMART POLYCRYSTALS: MATERIALS FOR INNOVATIVE LASERS

DISCOVER MORE →



CONSIGLIO NAZIONALE DELLE RICERCHE (CNR)
Team Delegate Jan Hostaša

A process for the production of ceramic-based transparent materials with a variable 3-dimensional (3D) composition and shapes; the invention includes methods for producing doped transparent ceramics, of use in laser gain media, scintillators and lighting.

SHORTLISTED TECHNOLOGY BRIEFS

4.LIFE SCIENCE / HEALTH CARE

TARGETING SMALL RNAS AS A THERAPY FOR ALS

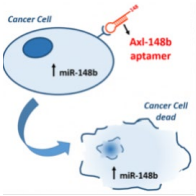
DISCOVER MORE →

UNIVERSITÀ DI MILANO BICOCCA
Team Delegate Monica Nizzardo

A drug product to treat all forms of ALS by targeting the miR-129-1 pathway. Antisense technology is entering a phase of clinical successes and this strategy can provide clinically meaningful benefit to patients that have no therapeutic hope.

CHIMERIC COMPLEX AND ITS THERAPEUTIC USES IN CANCER METASTASIS TREATMENT

DISCOVER MORE →

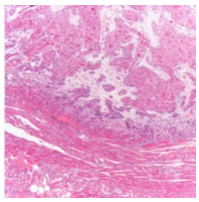


UNIVERSITÀ DEGLI STUDI DI TORINO
Team Delegate Daniela Taverna

Chimeric complex composed of an aptamer targeting specific receptor tyrosine kinases (AXL) and an anti-metastatic activity microRNA. The aptamer is able to bind specifically to the AXL receptor, known to be expressed on the surface of many cancer cells. By doing so, the microRNA is specifically conveyed to cancer cells, where it exerts its anti-metastatic activity.

EARLY DETECTION OF HEAD AND NECK SQUAMOUS CELL CARCINOMA

DISCOVER MORE →

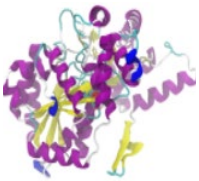


UNIVERSITÀ DI BOLOGNA
Team Delegate Luca Morandi

An *in vitro* detection method of head and neck squamous carcinoma. The diagnosis is based on the quantitative evaluation of the methylation status of a panel consisting of 13 genes, starting from a sample taken with a small brush. Able to predict any relapses and prognosis in areas adjacent to those already surgically treated.

PISA: POST-TRANSLATIONAL INTRACELLULAR SILENCING ANTIBODY PLATFORM

DISCOVER MORE →



SCUOLA NORMALE SUPERIORE
Team Delegate Gabriele Ugolini

Method to select recombinant antibody domains able to selectively bind and silence intracellular post-translationally modified (PTM) targets. The antibodies obtained with the method can be used for the validation of new therapeutic targets and for the generation of new diagnostic applications.

I3D: INTRAOCULAR DRUG-DELIVERY DEVICE

DISCOVER MORE →

POLITECNICO DI MILANO
Team Delegate Marco Ferroni

i3D is a bioabsorbable device for in-situ drug-delivery. Compose of concentric magnesium-based elements, which upon degradation release the pre-loaded drug in a timely and controlled manner. Applicable for the treatment of retinal and ocular posterior segment diseases, age-related macular degeneration, and ailments requiring by-dose drug release.

SHORTLISTED TECHNOLOGY BRIEFS

5. AEROSPACE

ADDITIVE MANUFACTURED UV CURED COMPOSITE PROPELLANTS FOR ROCKET PROPULSION

DISCOVER MORE →

POLITECNICO DI TORINO
Team Delegate Simone Garino

Production process for composite propellant grains for rocket propulsion. Allows for local composition chemical control, lowers risks and costs associated with the production of large batches in a safer environment for the operators. Can be used as rocket propulsion, in cartridge production for signal-emergency rockets and incorporated in energy pellets for gas-generator systems.

HYBRIS: STRUCTURAL BATTERIES FOR ELECTRIC AIRCRAFTS

DISCOVER MORE →

POLITECNICO DI MILANO
Team Delegate Alberto Favier

Hybrid-electric aircraft, equipped with structural light-weight batteries, that can be used in pure electric mode during take-off and landing phases. HYBRIS technology is applicable to any aircraft that uses electric power for propulsion. The structural batteries can be applied in both the civil and military aviation.

NEAR-ZERO EROSION, ULTRA HIGH TEMPERATURE CERAMIC COMPOSITE

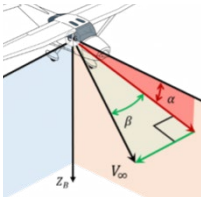
DISCOVER MORE →

CONSIGLIO NAZIONALE DELLE RICERCHE (CNR)
Team Delegate Luca Zoli

Wear-free materials in ultra-refractory ceramic composite with the ability to cope with temperature changes, from -200 ° C to over 1800 ° C, and perform well in particularly aggressive environments from a chemical and mechanical point of view, thus being reusable and with a durability superior to currently used materials.

ASSE: ANGLE OF ATTACK AND SIDESLIP ESTIMATOR

DISCOVER MORE →



POLITECNICO DI TORINO
Team Delegate Angelo Lerro

ASSE is a synthetic sensor for aerodynamic angle estimation, applicable to any flying object due to the universality (independent from aircraft/configuration) and exact end of the method, which does not require any prior calibration. The goal is to limit the first cause of fatal accidents: loss of control due to stall conditions.

ANTI-ICE SYSTEM INTEGRATED IN PRIMARY AIRCRAFT STRUCTURE

DISCOVER MORE →

POLITECNICO DI TORINO
Team Delegate Carlo Giovanni Ferro

A new anti-ice/de-Ice system for aircrafts is presented together with its relative method of fabrication. This novel component integrates in a single part both the passageways of the hot-air through the external skin and the feeding tubes without assemblages or welding. In this manner there is an enhancing on the heat power exchanged along with a reduction of the weight of the system.

SHORTLISTED TECHNOLOGY BRIEFS

6. RENEWABLE SOURCES, ALTERNATIVE ENERGY AND WATER

SINERGY: METAL POLYSULFIDE REDOX FLOW BATTERY

DISCOVER MORE →

POLITECNICO DI MILANO
Team Delegate Alessandra Accogli

A metal-polysulfides redox flow battery based on low-cost, Earth-abundant and non-toxic materials, with the possibility of recycling sulphur-rich waste, establishing a virtuous circle of circular economy. Low installation cost (50-150 $/kWh), high energy efficiency (> 70%) and long cycle-life (> 20 years).

LIFT ENERGY: FLUORINATED SURFACE COATING FOR LI-BATTERIES

DISCOVER MORE →

POLITECNICO DI MILANO
Team Delegate Maurizio Sansotera

A fast and scalable method to create a thin artificial solid electrolyte interface (SEI) on lithium metals used in Li-metal rechargeable batteries. The SEI is obtained under mild conditions by exposing a Li metal electrode to a gaseous fluorination agent. A method that mitigates the formation of dendrites during Li plating, with higher stability and efficacy.

SMARTWIND: «SMART» INERTIA EMULATION FOR WIND GENERATORS

DISCOVER MORE →

UNIVERSITÀ DEGLI STUDI DI GENOVA
Team Delegate Andrea Bonfiglio

An auxiliary controller that allows a wind turbine generator to provide support to the electricity system in case of sever frequency transients. Suitable to be retrofitted onto operating wind turbines, can be used in offshore and onshore wind farms, whilst improving the integration wind power generators into the electric system.

BATTERY MANAGEMENT SYSTEM FOR REDOX FLOW BATTERIES

DISCOVER MORE →

UNIVERSITÀ DEGLI STUDI DI PADOVA
Team Delegate Andrea Trovò

Electronic Battery Management System (BMS) specifically designed to optimise the performance of Redox Flow Batteries used for energy storage in power plants that generate electricity with renewable resources or within power grids, in rapid and cost-efficient way.

WATER SENSING WITH COSMIC RAYS

DISCOVER MORE →

UNIVERSITÀ DEGLI STUDI DI PADOVA
Team Delegate Luca Stevanato

Real-time data acquisition of the moisture content of soils, vegetation and snow-covered surfaces over large areas. Compared to devices currently on the market (electromagnetic sensors, remote sensing, ambient neutron sensors) it is more reliable, efficient and cost effective.

SHORTLISTED TECHNOLOGY BRIEFS

7. FUTURE MOBILITY

SELF-CONFIDENT: ONLINE LEARNING FOR DETECTING DEPTH SENSORS FAILURES

DISCOVER MORE →

UNIVERSITÀ DI BOLOGNA
Team Delegate Matteo Poggi

Method and a sensor system, for determining the confidence of disparity maps inferred by a stereo algorithm or a network, through a self-adapting neural network. Highly reliable, easy to implement and cost competitive; designed for autonomous driving systems, computer vision and robotics.

LOW-POWER MAGNETOMETER FOR IMPROVED SENSORS INTEGRATION IN FUTURE VEHICLES

DISCOVER MORE →

CONSIGLIO NAZIONALE DELLE RICERCHE (CNR)
Team Delegate Federico Maspero

MEMS (Micro Electro-Mechanical Systems) fabricated with standard industrial processes, with high resolution, compact size and low power consumption. Can be integrated with existing inertial sensors (accelerometers, gyroscopes), enabling a fully-MEMS inertial measurement unit, reducing the integration problem of MEMS sensor with magnetic sensor.

THEO: DRIVE-ADAPTIVE, HEV ENERGY MANAGEMENT SYSTEM

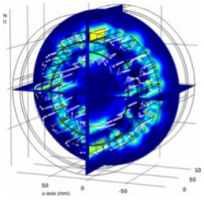
DISCOVER MORE →

POLITECNICO DI TORINO
Team Delegate Pier Giuseppe Anselma

An intelligent custom-made, real-time energy management system, to help reduce the fuel consumption and tailpipe emissions of hybrid electric vehicles, by learning and adapting to the driving style of the vehicle user. Optimal HEV powertrain operates not only instantaneously but considering the entire journey of the user.

CONTACTLESS MAGNETIC GEARBOX WITHOUT CLUTCH

DISCOVER MORE →

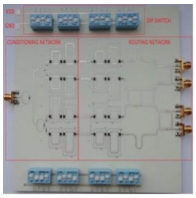


POLITECNICO DI TORINO
Team Delegate Elvio Bonisoli

Magnetic gearbox with contactless power transmission, designed to replace a traditional mechanical gearbox. With lower transmission noise, an integrated torque limiter, reduced maintenance and no need for lubrification. Finds applications in industrial automation, transport, robotics, aerospace and wind generation.

RECONFIGURABLE RADIO FREQUENCY DISTRIBUTION NETWORK

DISCOVER MORE →



UNIVERSITÀ DEGLI STUDI DI PERUGIA
Team Delegate Valentina Palazzi

A radio frequency power dividing and phase shifting network, with a single input and a plurality N of output ports, able to distribute the input signal on a subset n of the N output ports, in a selective and reconfigurable way; ensuring matching conditions to all ports. The magnitude and phase control of the output signals is pursued only by varying the phase condition of variable phase shifters present in the circuit.