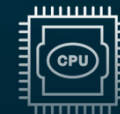




Space technologies used in terrestrial applications



These applications have been developed as a result of support for technology transfer between the space and terrestrial sectors. The support was implemented by the ESA Technology Broker Czech Republic initiative. The initiative is managed by Technology Centre Prague.



CONTENT



Health



Aviation



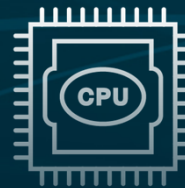
Materials



Smart Cities



Transport



ICT



Environment

Successful application



iCane - Eyes For Blind People

SPAD (Single Photon Avalanche Diode) sensor utilization



Introduction

Svarovsky, s.r.o. is the largest European manufacturer of white canes with a 20-year tradition. They produce circa 18 000 items annually, of which 90% of them are intended for export.

Czech Space Research Center company participated on the European Laser Timing project - ESA ACES experiment. This project used the principle of detecting the impact of a photon sent by a laser on a SPAD (Single Photon Avalanche Diode) sensor. The moment of photon impact is sensed by the SPAD detector with such a resolution that it allows the calculation of the distance with very high accuracy.

Solution

Svarovsky, s.r.o. decided to use this sensor technology to create a device that could be

integrated into the handle of a blind cane and would allow the user to keep an awareness of their surroundings using an acoustic signal or vibration.

The project was scouted by Technology Centre Prague and supported by €60,000 from the ESA Spark Funding programme within the project ESA Technology Broker.

SUCCESS CASES

White cane with applied SPAD sensor for detection of nearby objects



ESA Technology Broker is a project implemented by the Technology Centre Prague



TECHNOLOGY
BROKER

Czech Republic

Successful application



ICARUS ARMOR

Commercial application for a device measuring astronauts' physical parameters



Introduction

Company is working on project called ICARUS ARMOR – a wearable vest which enables to map individual users' physiological limits (with special focus to thermal stresses).

The output of this project shall be an The technology, originally developed as ESA BIC project for monitoring the thermal overheating problems faced by astronauts, will be boosted by Uptimai's own technology which solves uncertainty propagation in engineering problems.

Solution

The human body is extremely complex and lots of factors is interconnected each other. Using the Uptimai's know-how the existing models will be simplified, and digital twin will be developed, so that the ICARUS ARMOR can be easily integrated e.g., as apps into today's

devices like smartphones, smart watches and web-based apps. This will allow the technology to be used to ensure the safety of workers who are in demanding environments – firefighters, miners, metallurgical work, etc.

The project was scouted by Technology Centre Prague and supported by €60,000 from the ESA Spark Funding programme within the project ESA Technology Broker.

SUCCESS CASES

Wearable vest which enables to map individual users - physiological limits (with special focus to thermal stresses)



ESA Technology Broker is a project implemented by the Technology Centre Prague



TECHNOLOGY
BROKER

Czech Republic

Successful application



Fly is Fun

ESA's method for correcting the output of a global navigation satellite receiver is introduced into sport aircraft navigation



Introduction

The Czech company FUN AIR s.r.o. has developed and distribute sport pilot GPS navigation app designed for mobile phones and tablets. The navigation has become one of the most widely used applications in this category due to its comprehensiveness and reliability. However, the Instrument Landing System (ILS) function for precision landing is missing due to the high vertical deviation of the GNSS data.

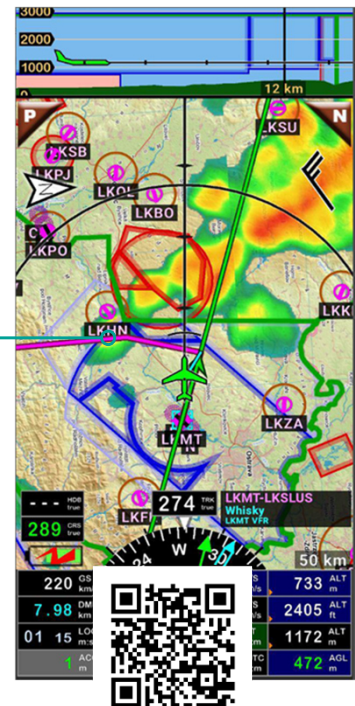
Solution

ESA Technology Broker linked FUN AIR s.r.o. with Gianluca Caparra, ESA Radio Navigation System Engineer, who proposed to use the self-learning algorithm used by ESA to refine the vertical deviation of GPS navigation. FUN AIR s.r.o. has obtained a test license for this self-learning algorithm and has started

validating its effectiveness for vertical deviation refinement in its air navigation. The successful application of the algorithm will enable sport and hobby pilots to land safely even in low visibility conditions and contributes to safer aviation.

SUCCESS CASES

Refined navigation data enables sport pilots to land accurately in poor visibility



ESA Technology Broker is a project implemented by the Technology Centre Prague



TECHNOLOGY
BROKER

Czech Republic

Successful application



Dronetag

Czech Technical University's (CTU) know-how in securing satellite communication data was used by Dronetag to develop a system for safe identification of drones



Introduction

Dronetag, s.r.o. has developed the Dronetag RIDER, a breakthrough Remote Identification Device (RID) aimed at enhancing airspace safety for drones. This project, supported by ESA Spark Funding, addresses critical issues in the drone industry, specifically the lack of RID data reception on mobile devices and vulnerabilities to spoofing. Dronetag, in collaboration with CTU, aimed to create a reliable and secure solution for drone pilots and airspace control authorities.

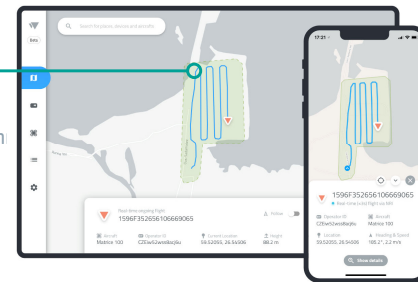
detect and prevent RID data spoofing. This know-how was provided by CTU, which validated it during satellite communications security projects. The integration of this innovative firmware into robust HW and its incorporation into Dronetag's HW ecosystem has created a product that has attracted interest from more than 30 partner organizations. Dronetag has thus become the market leader in RID technology.

Solution

The Dronetag RIDER is a compact wireless device designed to receive 99% of all RID broadcast messages and provide airspace users with reliable situational awareness. The device uses GNSS for accurate time stamping and incorporates multilateration algorithms to

SUCCESS CASES

Space-tested algorithm help safely identify drones



ESA Technology Broker is a project implemented by the Technology Centre Prague



TECHNOLOGY
BROKER

Czech Republic

Successful application

Isocyanate-free polyurethanes

Development of new isocyanate-free PUR foams increases safety and sustainability in many application areas



Introduction

TOSEDA is a long-term client of the ESA Technology Broker and in 2017-2019 participated in the ESA-supported project Development of "Green" Polyurethane Materials for Use in Spacecraft and Launcher Applications. Developed through research funded by the European Space Agency (ESA), "(H)NIPU - (hybrid) nonisocyanate polyurethanes" aims to replace toxic isocyanates in polyurethane (PUR) materials, focusing on sustainability and renewable resources.

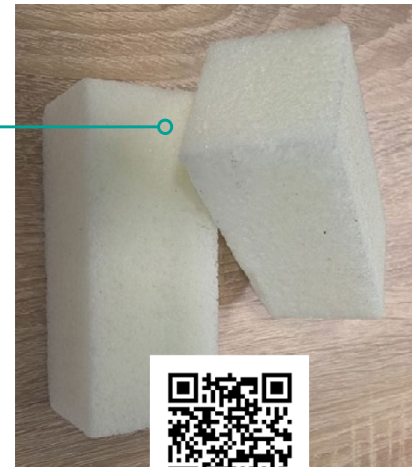
Solution

Traditional PUR chemistry is prevalent in industries like foam production and coatings, with a global market worth \$50 billion. Company FENOS AG is interested in implementing (H)NIPU in various markets due

to regulatory pressures and environmental concerns. The innovative aspects of (H)NIPU include increased safety, sustainability, and potential for novel materials with broader regulatory applicability. This collaboration led to the development of new isocyanate-free PUR foams, demonstrating the successful application of (H)NIPU technology in terrestrial industries.

SUCCESS CASES

Environmentally friendly polyurethane foam material not only for space applications



ESA Technology Broker is a project implemented by the Technology Centre Prague



TECHNOLOGY BROKER

Czech Republic



Successful application



Novel vibro - acoustic simulation

Decreasing interior noise levels in subway rail vehicle using space optimized know-how and experience in Statistical Energy Analysis (SEA).



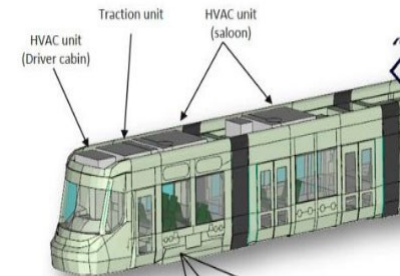
Introduction

A leading innovator in virtual prototyping software Mecas ESI fostered an interior noise decrease in ŠKODA Transportation.

ŠKODA Transportation used the services of the Technology Centre Prague and the ESA Technology Broker project to identify potential solutions to its technology needs.

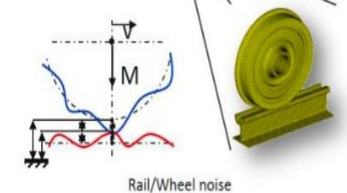
Solution

Within the frame of acquired cooperation agreement, the company Mecas ESI has applied its know-how and experience in Statistical Energy Analysis (SEA) and vibro-acoustic simulation gained through participation in space industry projects and helped Czech transportation manufacturer to decrease interior noise levels in subway rail vehicles.



SUCCESS CASES

Wearable vest which enables to map individual users - physiological limits (with special focus to thermal stresses)



Rail/Wheel noise

ESA Technology Broker is a project implemented by the Technology Centre Prague



TECHNOLOGY BROKER

Czech Republic

Successful application

Archaeological satellite map

Upgrade of the aerial archaeological map by using the know-how for clearing satellite data.



Introduction

Czech software and systems engineering company Space Systems Czech upgraded an archaeology map of the Czech Republic for the Institute of Archaeology of the Czech Academy of Sciences, Prague.

Space Systems Czech is a company incubated within the BusinessRunway programme of the Technology Centre Prague. As part of the incubation, it uses the services of the ESA Technology Broker project to find new partners.

Solution

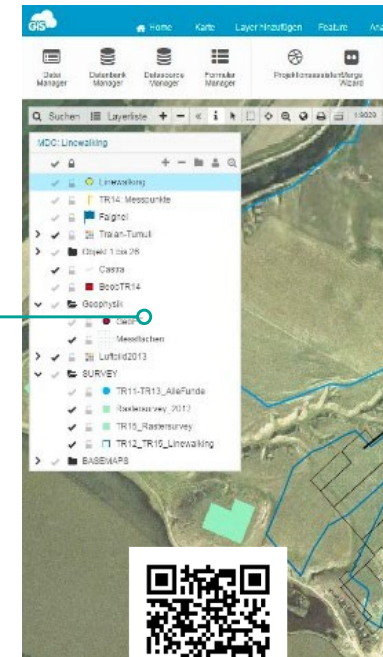
ESA Technology Broker has linked the company up with the Institute of Archaeology and applied its know-how in software development for critical infrastructure into a mapping system. During this process, errors and failures were removed due to knowledge

of Big Data and GIS, additional functions were added.

Technology transfer commercial value reached the €40.000.

SUCCESS CASES

The refined archaeological photomap will bring new research opportunities for archaeologists



ESA Technology Broker is a project implemented by the Technology Centre Prague

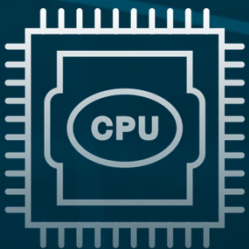


TECHNOLOGY
BROKER

Czech Republic

ICT

Successful application



Photonics circuit optimization



Efficient design optimization transforms simulation process, slashing testing time from days to hours.

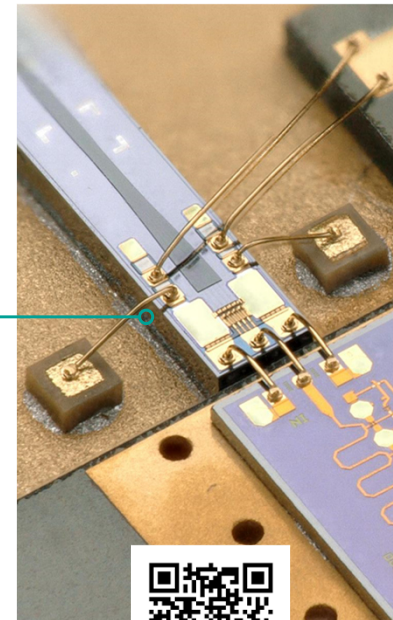
Introduction

Argotech, a Czech research and development powerhouse, spearheads advancements in optics, electronics, and mechanics. Focused on enhancing services in Photonics Integrated Circuits (PIC), the company collaborated with ESA Technology Broker to tackle the challenge of lengthy simulation times. Through innovative partnerships, Argotech sought to revolutionize its approach to testing and design optimization.

Solution

Embracing a collaborative approach, Argotech joined forces with CST, a German analytical software expert, facilitated by ESA Technology Brokers. Leveraging specialized software, the team streamlined PIC design and testing, dramatically reducing simulation duration from days to mere hours. This solution not only

expedited development but also ensured heightened precision in the realm of bidirectional optical components (BIDI) for high-speed communication.



SUCCESS CASES

PIC design that was part of the simulation testing.



ESA Technology Broker is a project implemented by the Technology Centre Prague



TECHNOLOGY BROKER

Czech Republic

Environment

Successful application



Radiation monitors help Earth



Production of TIMEPIX radiation monitors for earthly applications.

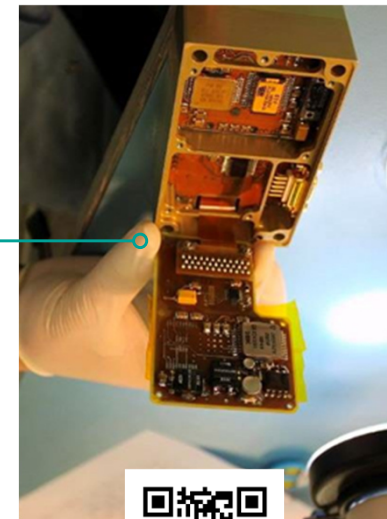
Introduction

ADVACAM s.r.o., a leading provider of radiation imaging cameras and spectral imaging detectors, engaged in a technology transfer initiative with the Institute of Experimental and Applied Physics of the Czech Technical University in Prague (IEAP). Facilitated by the Technology Centre Prague under the ESA Technology Broker project, this collaboration aimed to apply advancements in space technology to terrestrial applications, specifically targeting innovations in radiation monitoring solutions.

Solution

Through collaborative efforts, ADVACAM s.r.o. and IEAP harnessed cutting-edge pixel particle detector technology, originally developed for space applications, to create radiation monitors tailored for terrestrial use.

Leveraging licensing agreements, IEAP successfully penetrated international markets with the new product, marking a significant milestone in the realm of radiation monitoring solutions. This technology transfer not only expanded the product portfolio of both entities but also fostered cross-disciplinary innovation at the intersection of space and terrestrial technologies.



SUCCESS CASES

Radiation imaging camera in a tailored product.



ESA Technology Broker is a project implemented by the Technology Centre Prague



TECHNOLOGY
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