

# VICECOUNSELLOR'S INNOVATION PROJECTS

2023-2024

**Tknika**

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Euskadiko LHren Ikerketa Aplikatuko Zentroa  
Centro de Investigación Aplicada de FP Euskadi  
Basque VET Applied Research Centre

- Digitisation of heritage, dissemination in metaverse, and tokenisation through blockchain
- SMART VIRTUAL MOBILITY
- Autonomous robotic chair for girls and boys with cerebral palsy and severe mobility issues
- Integration of Artificial Intelligence (AI) in Robotics
- Deployment of Hadoop cluster "on premises"
- System for dicom data viewing in virtual reality for diagnosis and clinical treatment
- KONDIABERRI-Retrofitting + VR/EB
- Development of an AI model based on Machine Learning to optimise the use of cutting fluid in CNC machines
- Research to integrate Artificial Intelligences in the 3D Animation cycle, video games, and interactive settings in the Course for specialisation in the development of video games and Virtual Reality
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- CIBERCAR SIMU Simulation of cybersecurity settings in vehicles
- Optimisation of autonomous mobile robotic set to select and transport materials using artificial vision, collaborative tools, and connection to the plant management system
- MenTek-AI - Technology and AI to measure emotional well-being in VET classrooms
- Platform for LHlab4.0 to integrate industry 4.0 settings that is inter-operable and reliable
- ROS development for 2 autonomous robots and 1 delta robot in smart production cell
- Access control by integrating IoT devices in the blockchain network of FP Euskadi (VET Basque Country)
- Blockchain and Metaverse. Regulatory framework for the new digital economy

- Development of a web-application to facilitate management of farming and gastronomic sectors and promote the circular economy through trash cooking
- Immersive IoS restaurant, virtual reality, internet of senses and emotions, and big data applied to the restaurant industry
- GeoIn 5.0
- Mixed reality applied to students with special educational support needs
- The prickly pear cactus: A powerful ally in the search for plant proteins
- MOCAP-ERGO TRANSFER
- Digitising the solidary network between generations
- Smart label for the sustainable agro-food sector
- SMART AGRICULTURE: Guiding artificial intelligence toward the well-being of plants and producers
- Emotional wellness through virtual spaces
- GoldenAge: application to boost healthy ageing
- 3DBIO-CART: Bio-printing cartilaginous implants
- IoT applied to beekeeping
- Barber waste and hair filters for aquaculture, enriched as fertiliser for agricultural soil
- Production systems in industrial bioreactors in VR
- Personalised bites of joy
- Development of precision pharmaceutical, nutraceutical, and dermo-cosmetic formulas with 3D printing for personalised needs
- MikroZELL
- EKI II, social robots at homes for the elderly and day centres
- ReViCom. Application of Virtual Reality (VR) for long-term paediatric patients to improve technical and socio-emotional skills
- From Waste to Safe Water (A waste to purify water)
- Study of the application of Incremental Sheet Forming (ISF) as an alternative to AM technologies in the manufacturing of implants for cranioplasty

**CIFP POLITÉCNICO EASO  
POLITEKNIKOA LHII**

## **Digitisation of heritage, dissemination in metaverse, and tokenisation through blockchain**

This project addresses digitisation from a two-fold point of view: use of laser scanner + drone + 360° image technology for 3D digitisation of heritage (architectural, historical-artistic, or natural), dissemination on immersive reality platforms, and later tokenisation through blockchain for monetisation and inclusion on a chain of value.

**CIFP MEKA LHII  
CIFP DON BOSCO LHII**

## **SMART VIRTUAL MOBILITY**

This is a project that combines two technologically new aspects. On one hand, we will work on the new systems that assemble electric vehicles, and on the other, we will generate resources in virtual reality. Both of these aspects will be used in the future to teach Vocational educational training classes.

To this end, we have resources and knowledge acquired from previous projects related to the two aforementioned aspects.

Regarding resources related to electric vehicles, we have a fitted workshop, as well as electric vehicles to conduct practical classes. With the aid of the company NAUTILUS experiencias digitales, we have the possibility of creating said practical classes in VIRTUAL REALITY. This material can later be used by other schools who do not have physical resources, or who wish for practical classes with other models or makes by electric vehicle manufacturers.

**CIFP ARMERIA ESKOLA LHII  
CIFP DON BOSCO LHII**

## **Autonomous robotic chair for girls and boys with cerebral palsy and severe mobility issues**

With the cooperation of Aspace Gipuzkoa, the main goal of the project is to design and build an autonomous robotic chair that can be replicated and is based on ROS and artificial intelligence, so that girls and boys with cerebral palsy and severe mobility issues can move about autonomously. Moreover, by using reverse engineering, an open autonomous robot will be developed that can be used both in electronic training cycles and in skills tests to boost the sector's visibility and reduce the huge deficit of qualified workers in demand.

**CIFP BARAKALDO LHII  
CIFP TOLOSALDEA LHII**

## **Integration of Artificial Intelligence (AI) in Robotics**

Under Artificial Intelligence (AI) decision-making, the project consists of controlling a robot by using a PLC, as well as robotic middleware called ROS. There is an IP camera for decision-making, along with a specific Artificial Intelligence (AI) module.

**CIFP TARTANGA LHII**  
**CIFP TXURDINAGA LHII**  
**CIFP MIGUEL ALTUNA LHII**

## **Deployment of Hadoop cluster "on premises"**

"Artificial intelligence, automation, the internet of things (IoT), virtual and augmented reality, and other lines of strategic technological development feed from handling and analysing a massive amount of data with Big Data technologies.

This project aims to roll out a Big Data cluster hosted at the CIFP Tartanga Data Processing Centre to act as a base for a future hybrid cloud, generating knowledge and transferring it to the educational community and interested companies."

**CPIFP TOLOSAKO**  
**INMAKULADA LHIPI**  
**CIFP TARTANGA LHII**

## **System for dicom data viewing in virtual reality for diagnosis and clinical treatment**

The purpose of this project is to develop virtual reality (VR) applications to simulate and train future healthcare professionals, using CAT or MR medical images.

VR technology is used in different fields like anatomy applied to the clinic or the creation of virtual spaces to train educators and students. On the other hand, it provides educators with scalable tools that can be updated, allowing for greater independence in commercial solutions and reduced costs.

**CIFP MAQ.-HERRAMIENTA LHII**  
**CPIFP HARROBIA LHIPI**

## **KONDIABERRI-Retrofitting + VR/EB**

Retrofitting a machining centre, with cutting-edge numerical control.  
Conducting the retrofitting process with students. Virtualising the assembly process.  
Creation of documentation and applications of virtualisation.

**CIFP MAQ.-HERRAMIENTA LHII**  
**CIFP IURRETA LHII**

## **Development of an AI model based on Machine Learning to optimise the use of cutting fluid in CNC machines**

The project's aim is to improve the sustainability of chip removal industrial processes and to reduce their environmental impact by applying Artificial Intelligence techniques based on Machine Learning. With these techniques, the goal is to reduce the environmental impact of numerical control chip removal machines by identifying, monitoring, and controlling factors that affect the environment, such as the generation of waste from the use of cutting fluids.

**CPIFP HARROBIA LHIPI**  
**CIFP TARTANGA LHII**  
**CPIFP CEINPRO LHIPI**  
**CPIFP EGIBIDE LHIPI**

## **Research to integrate Artificial Intelligences in the 3D Animation cycle, video games, and interactive settings in the Course for specialisation in the development of video games and Virtual Reality**

The aim of the "IA3D" project is investigation and experimentation in the state of the art of Artificial Intelligence systems for application in the cycle "3D animations, video games, and interactive settings" and in the specialisation course "Development of Video Games and Virtual Reality". Investigations from 2023-2024 shall be implemented in the didactic units to be used during 2024-2025.

**CPIFP GOIERRI LANBIDE**  
**ESKOLA LHIPI**  
**CIFP MAQ.-HERRAMIENTA LHII**

## **AMFOR: Additive Manufacturing for Foundry Models**

The purpose of the project is to analyse model manufacturing for lost wax and lost foam casting processes, using 3D SLA printing technology and recently introduced innovative castable materials. We shall develop the design and optimisation of models, tests and assessments shall be conducted to guarantee the quality of the models and the casting, and a cost and economic viability analysis shall be conducted. The project seeks to prove the advantages of 3D printing technology for manufacturing casting models (lost wax/lost foam) in comparison with traditional methods.

**CIFP SAN JORGE LHII**  
**CPIFP CEINPRO LHIPI**

## **Virtualisation of a 5G telephone base station**

The project aims to create an immersive environment with Virtual Reality to emulate a telephone base station for later use in business and educational environments.

**CIFP TXURDINAGA LHII**

## **Basque Quantum to FP**

Analysis, synthesis, and internalisation of the use of IBM's quantum computers, and proposal of different demonstrations on their real use; demonstrations to be conducted both in simulators and actual IBM computers currently in the United States, Germany, Japan, Canada, South Korea and, soon, in the Ikerbasque building's facilities in Donostia.

Research and dissemination project aiming to bring Quantum Computing to Vocational Educational Training, eliminating fears and reluctance toward the emerging technology that is coming like a tsunami.

**CIFP TXURDINAGA LHII**  
**CIFP CIUDAD JARDÍN LHII**

## **SMART WINDOWS 4.0: Artificial Vision applied to analysis of shop window performance**

Continue with the previous year's project, increasing the number of businesses where we install the artificial vision system that counts the number of people going by a shop window, records the time they stopped to look at the window, and determines whether the people end up entering the business or not, and compare these results after the business owner takes action on the shop window.

**CIFP USURBIL LHII**

## **Digital Twin 4.0**

Creation of a digital twin of the cell 4.0 for stamping medals, to analyse and study its operation digitally.

**CIFP ANDRA MARI LHII**  
**CPIFP TXORIERRI S. Coop.**  
**Ltda. LHIPI**

## **Cyber Range v2.0**

This project is the natural evolution of the Cyber Range project carried out during 2022-2023, which suggests several qualitative improvements: on one hand, the system will be optimised by virtualising it 100%, thereby avoiding dependence on operations and communications hardware (PLCs/robot/firewall/router...) that the current version has. Additionally, the developed scenarios will be migrated. This will be taken as a starting point to include new scenarios, resulting in a powerful educational tool.

**CIFP MIGUEL ALTUNA LHII**

## **Integration of the IRIS BOX into the workshop on Advanced Manufacturing 4.0**

The objective of this project is to complete the workshops Advanced Manufacturing 4.0 by Miguel Altuna LHII, partially digitising and automating measurement tasks by integrating the new IRIS BOX measurement station and the dedicated module that will be added to the software from the workshop Advanced manufacturing 4.0.

**CIFP MIGUEL ALTUNA LHII**  
**CIFP ARMERIA ESKOLA LHII**

## **Toward the Workshop 4.0 with the aid of the Digital Twin**

We will develop retrofitting of the didactic lathes located in the machining workshops at centres, fitting them with sensors, digitising them, and virtually starting them up by creating their digital twin, so that production can be both managed and maintained (both preventive and predictive).

**CIFP MIGUEL ALTUNA LHII**

## **Implementation of a Machine Tending application with a collaborative robot**

This project seeks to implement a loading and unloading process in computer numerical control machines (CNC), with a Machine Tending application, specifically. Developing the machine-robot interface, increasing the autonomy of the machines and facilities, collaborating with humans, avoiding repetitive and dangerous activities, and allowing humans to devote themselves to activities of greater value.

**CIFP BIDEBIETA LHII  
CENTRO INTEGRADO DE  
APRENDIZAJES VIRTUALES Y  
DIGITALIZADOS**

## **Virtualisation of the ARI cycle through digital twins for Virtual Learning and LHII Digitisation**

The objective of the project is to create material to virtualise the ARI cycle. To this end, we will use the face-to-face teaching model (Bidebieta Model LHII) to develop a digital twin of the models used. Then, with these virtual spaces, we will create didactic material that can be used by the VET and BIRTLH network of centres. Remote learning will be encouraged for secondary school, since students will have the opportunity to work on complex automated processes, even if virtually.

**CIFP USURBIL LHII  
CPIFP SAN VIATOR LHIPI  
CIFP DE DESARROLLO  
SOSTENIBLE EN EDIFICACIÓN  
INTELIGENTE LHII**

## **InstallCharger. Facilities for electric vehicle charging points**

The Installcharger project tackles the integration of different recharging systems for any kind of public-private location, considering the actions implied by both new construction and adaptation or renovation. This is all based on a holistic perspective, including factors such as solar self-supply, dynamic storage, energy communities, micro-networks, and the impact of all this on the electrical system.

The purpose of this project falls in line with these clearly defined objectives: development of knowledge on recharging systems for different EVs and their maintenance, study of execution or adaptation for electricity, and Civil Works for different buildings and infrastructures to begin developing sustainable, viable, and executable electromobility formats. All this considering the different vectors in energy transition, such as: renewable generation, smart networks, energy communities, smart and connected mobility, etc.

**CIFP DON BOSCO LHII**  
**CPIFP LA SALLE BERROZPE**  
**LHIPI**

## **Remanufacturing360.** **Digital maintenance of household appliances**

Repair and salvaging to re-manufacture waste from electrical and electronic appliances from society 4.0 by digitising equipment in immersive settings with virtual reality.

**CIFP USURBIL LHII**  
**CIFP TOLOSALDEA LHII**

## **IA-THERM. Artificial Intelligence applied to the design of thermal installations in buildings**

The purpose of this project is to analyse, test, and teach design systems supported by artificial intelligence for water, gas, thermal, and ventilation installations in buildings. The system will use automatic learning algorithms to analyse input data, such as the size of the building, the number of users, air quality, temperature, and moisture, and will create precise and efficient designs for plumbing, gas, heating, ventilation, and air conditioning (HVAC) installations.

**CIFP DON BOSCO LHII**  
**CIFP MENDIZABALA LHII**

## **5G VET in the Basque Country.** **Roll-out of professional 5G infrastructures at Vocational Educational Training centres in the Basque Country**

The main goal of the "5G FPeuskadi" project is to create a professional 5G infrastructure model for the Basque Country's Vocational educational training centres and to roll out private hubs in different centres. To this end, we will research typologies of dedicated and shared core 5G networks. This way, we will complete and broaden knowledge of experimental networks that work in specialising communications for Tknika and cloud computing.

**CPIFP SAN VIATOR LHIPI**  
**CPIFP SOMORROSTRO LHIPI**

## **5GKRA. Autonomous exterior 5G robotics**

This project seeks to deepen knowledge of autonomous robotic applications for exterior settings with real-time control based on communication with a private 5G network.

**CPIFP SAN VIATOR LHIPI  
CPIFP SOMORROSTRO LHIPI**

## **CIBERCAR SIMU. Simulation of cybersecurity settings in vehicles**

The "CYBERCAR SIMU" project seeks to deepen knowledge of cybersecurity in the automobile sector by developing simulation settings that show the different points of attack or vulnerabilities in the vehicle.

All within the technological trend wherein vehicles are increasingly connected and automated through smart transport systems and communication technologies like 5G.

**CPIFP ARRATIAKO ZULAIBAR  
L.I. LHIPI  
CPIFP SOMORROSTRO LHIPI  
CPIFP MARISTAK DURANGO  
LHIPI**

## **Optimisation of autonomous mobile robotic set to select and transport materials using artificial vision, collaborative tools, and connection to the plant management system**

We propose integrating artificial vision technologies and collaborative grippers into AMR+COBOT to automate the flow of materials in a factory, either in boxes or by picking individual elements.

**CPES SAN LUIS BHIP**

## **MenTek-AI - Technology and AI to measure emotional well-being in VET classrooms**

MenTek-AI is a tool to improve early detection of possible situations of emotional risk in the classroom, such as anxiety or suicide, thanks to technologies like Big Data and AI.

With a gamified app, we collect data on students' emotional situations, which are processed with an AI-based model, trained on protocols for caring for specific risks.

**CPIFP MONDRAGON ESKOLA  
POLITEKNIKO LHIPI**

## **Platform for LHlab4.0 to integrate industry 4.0 settings that is inter-operable and reliable**

Development of a platform as support for reliable data acquisition through rapid integration and interoperability between OT; IT, and IIoT devices for the industry 4.0.

CIFP EGIBIDE LHII

## ROS development for 2 autonomous robots and 1 delta robot in smart production cell

The project involves creation of a palletising cells for parts using a Delta Robot (parallel kinematics robot), which are widely used in the food sector for many Pick & Place applications due to the high-duty cycle.

The Delta Robot will be developed with parts designed and manufactured by additive manufacturing. Parts are supplied by two autonomous mobile robots, a JetBot and an industrial Omron AMR.

The Delta Robot and the JetBot are programmed with an ROS programming platform, and communication and management are handled with another industrial autonomous robot, which is programmed with its own programming software, handling the entire production process with a Siemens PLC S7/1500. We will conduct a safety analysis and install and develop the measures necessary in installation because, since there are autonomous robots, we must comply with suitable safety regulations to prevent all kinds of accidents.

CIFP EMILIO CAMPUZANO  
LHII  
CIFP ANDRA MARI LHII

## Access control by integrating IoT devices in the blockchain network of FP Euskadi (VET Basque Country)

The project aims to implement a blockchain-based system to control access to different VET centre classrooms and laboratories. To this end, we shall manage digital identity based on the Ethereum Blockchain network belonging to VET of the Basque Country, integrating smart lock IoT devices and analysing potential applications of SBTs (Soulbound Tokens).

CIFP MENDIZABALA LHII  
CIFP EMILIO CAMPUZANO  
LHII

## Blockchain and Metaverse. Regulatory framework for the new digital economy

After acquiring knowledge during the 2022-23 year on BLOCKCHAIN, traceability, virtual, augmented, and mixed reality, and to implement their potential without risks, next year, we shall analyse legality in digital activities, managing and/or processing the information generated, and data processing, management, and use. Over the course of next year, we shall transfer a manual of good practises to the educational community that is adapted to national and European regulations on the digital world.

CIFP HOSTELERÍA LHII  
CIFP CIUDAD JARDÍN LHII  
CIFP AGRARIO ARKAUTE LHII

## Development of a web-application to facilitate management of farming and gastronomic sectors and promote the circular economy through trash cooking

Within the framework of digitisation as a springboard for educational transformation, ongoing improvement, and the Plan Integral para una Transición Verde (Comprehensive Plan for a Green Transition), the goal of this project is to design and develop an application to associate different VET families, the farming sector, and food and culinary industries, such that it allows different user levels (teachers, students, professionals, and general consumers) to manage their resources in an innovative way.

CIFP HOSTELERÍA LHII  
CIFP MENDIZABALA LHII  
CIFP CIUDAD JARDÍN LHII  
CIFP TXURDINAGA LHII

## Immersive IoT restaurant, virtual reality, internet of senses and emotions, and big data applied to the restaurant industry

Offering restaurant clientele an immersive, multi-sensory experience based on the concept of the Internet of the Senses, complemented with the development of smells, lighting, image, and sound, such that they are entirely immersed in a specific situation while enjoying a menu. In turn, data will be analysed on how the elements in this experience affect emotions, change perception of the sense of taste, the satisfaction level of clients, and consumption habits.

CPIFP CENTRO DE ESTUDIOS AEG  
LHIPI  
CIFP IURRETA LHII  
CIFP DON BOSCO LHII  
CPIFP LA SALLE BERROZPE LHIPI  
CIFP POLITÉCNICO EASO  
POLITEKNIKOA LHI  
CIFP ANDRA MARI LHII

## GeoIn 5.0

Designing and implementing textile garments by incorporating IIoT technology, a personal security app with geolocation to prevent incidents of gender-based violence or violence against children, or the disappearance of the elderly or disabled.

CIFP POLITÉCNICO EASO  
POLITEKNIKOA LHII  
CIFP TXURDINAGA LHII

## Mixed reality applied to students with special educational support needs

The project aims to improve accessibility for the collective of people with auditory diversity in the educational sphere. With the application of mixed reality glasses that subtitle conversations, the aim is to improve the teaching-learning process for the collective and improve their integration in the classroom.

**IES PLAIAUNDI BHII  
CPES ESHBI HOSTELERÍA  
ARTXANDA BHIP**

## **The prickly pear cactus: A powerful ally in the search for plant proteins**

The project is focused on using the entire prickly pear cactus to obtain new proteins to act as a food source for healthy people, for example vegans, and people with chronic illnesses, such as diabetes, obesity, and cardiovascular diseases. It also aims to reduce the waste generated during production, using said waste in cosmetics, making creams with this waste whose most important characteristic is hydration of the skin. Moreover, we would make dishes with the prickly pear cactus as the main ingredient. The project includes growing the prickly pear cactus in wet climates, the project's first challenge, where we would use digitisation and a moisture sensor to monitor cultivation of the plant.

**IES PLAIAUNDI BHII  
CIFP POLITÉCNICO EASO  
POLITEKNIKOA LHII  
CPIFP HARROBIA LHIPI  
CPIFP CEINPRO LHIPI**

## **MOCAP-ERGO TRANSFER**

Creation of a virtual reality application with MOCAP technology to reinforce good practises in patient transfer and to conduct an ergonomic study.

**CIFP USURBIL LHII  
CIFP TOLOSALDEA LHII  
TOLOSAKO INMAKULADA  
IKASTETXEA**

## **Digitising the solidary network between generations**

With this project, we will promote health and administrative consulting and accompaniment for the elderly who live alone, with the support of a digital device, working on inter-generational solidarity and social inclusion.

The elderly will be provided with an accessible digital device and administration students and healthcare administration will work on their communication skills.

**CIFP DERIO NEKAZARITZA  
ESKOLA LHII  
CIFP ANDRA MARI LHII  
CIFP ZORNOTZA LHII**

## **Smart label for the sustainable agro-food sector**

The project's objective is to highlight more sustainable agro-food models by implementing a digital tool in craftsman shops that is based on blockchain technology, and the implementation of diverse sensors to facilitate management, traceability, and guaranteeing hygiene-health conditions for these productions.

**CPIFP OTEIZA  
POLITEKNIKOA LHIPI  
CIFP FRAISORO ESKOLA  
LHII**

## **SMART AGRICULTURE: Guiding artificial intelligence toward the well-being of plants and producers**

This project will guide data management and artificial intelligence to guarantee the well-being of plants and producers, making agriculture precise, more digital, sustainable, and accessible. To this end, we will use a medium-sized farming operation as a base and monitor the structure of the terrain and the data obtained will be used to define settings that guarantee the well-being of the specific plants. Once the project is complete, vocational educational training centres will be offered all the information from the data collection, and will be shown plant models created with artificial intelligence.

**CPIFP TOLOSAKO INMAKULADA  
LHIPI  
CIFP POLITÉCNICO EASO  
POLITEKNIKOA LHII  
CPIFP CEINPRO LHIPI**

## **Emotional wellness through virtual spaces**

Traditional education was focused on students' cognitive area, but today, and in order to provide a response to the needs and concerns arising in society, emotional education for students has taken on greater force. Thus, in recent years, we have taken several steps with the purpose of meeting the emotional needs of teens and youth. This has allowed us to create spaces for reflection, wherein we have detected the need to also work on emotions with educators. Consequently, this project aims to create a space where educators can work on their emotions, without forgetting the emotional well-being of students.

Technology will also play an important role, since we intend to develop two virtual reality software and research the use of a chatbot. On one hand, we have the development of two virtual reality software: one for educators to identify students with suicidal behaviour, and another to form part of friendly spaces for educators ("Relaxing Reality"). On the other hand, using artificial intelligence, we intend to research the use of a chatbot to help to develop the emotional well-being website.

**CIFP BARAKALDO LHII  
CIFP TXURDINAGA LHII**

## **GoldenAge: application to boost healthy ageing**

The project consists of designing and starting up an intuitive application to reduce the digital gap, providing a plan for physical training, nutrition, and psychology for those older than 65 years of age. Within this plan, we offer individualised guidelines based on each person's specific needs, to encourage healthy ageing and achieve improvements in well-being and quality of life.

**CIFP POLITÉCNICO EASO  
POLITEKNIKOA LHII**

### **3DBIO-CART: Bio-printing cartilaginous implants**

The main purpose of this project is to design a 3D-printed bio dye to regenerate cartilage. To this end, we will work on combining decellularised tissue and cells.

**CIFP ANDRA MARI LHII**

### **IoT applied to beekeeping**

In this project, we will use the Internet of Things (IoT) so that beekeepers can monitor variables such as temperature, humidity, geo-location, and weight, to optimise management of beehives in an efficient and sustainable way, boosting the health of bees, bee productivity, and pollination.

In our project, we fuse vocational educational training with innovation in the field of bio-science and sustainability, creating a platform to redefine beekeeping through IoT technology.

**CIFP DON BOSCO LHII  
CIFP MONTE ALBERTIA LHII  
CIFP KARDALA LHII  
CIFP FRAISORO ESKOLA LHII**

### **Barber waste and hair filters for aquaculture, enriched as fertiliser for agricultural soil**

The production and use of synthetic farming fertilisers can cause severe damage and risk to human and environmental health.

Following circular economy criteria, this project aims to transform waste from the aquaculture and beauty sectors into secondary raw materials to be reused in the production of organic fertilisers for farming activities.

**CIFP DON BOSCO LHII  
CPIFP HARROBIA LHIPI  
CPIFP CEINPRO LHIPI  
CIFP SAN JORGE LHII**

### **Production systems in industrial bioreactors in VR**

With this project, we simulate production systems with industrial bio-reactors in virtual reality. This way, students can learn the main characteristics of these production systems and conduct customary procedures.

**CIFP DON BOSCO LHII**  
**CIFP ESCUELA DE HOSTELERÍA**  
**LEIOA LHII**  
**CIFP POLITÉCNICO EASO**  
**POLITEKNIKOA LHII**

## **Personalised bites of joy**

With this project, we seek to analyse food and pharmacological needs for people affected, for example, by swallowing issues (dysphagia). With the obtained results, we seek to adapt their medication and food, making it healthy and pleasant. This will improve care for patients and their well-being with foods that provide pleasure in eating.

**CIFP DON BOSCO LHII**  
**IES FRANCISCO DE**  
**VITORIA BHI**

## **Development of precision pharmaceutical, nutraceutical, and dermo-cosmetic formulas with 3D printing for personalised needs**

Research and development of innovative formulations of different types with bio-printing techniques to administer pharmaceutical, nutraceutical and dermocosmetic active ingredients. Study of needs that may be covered by using formulations obtained by 3D printing. Development of formulations for learning and transfer among VET centres in the Basque Country, universities, and companies.

**CPIFP ZABALBURU LHIPI**

## **MikroZELL**

Design and development of combustible microbial cells to generate electricity. Research of different substrates and microorganisms to determine their energy efficiency and technical viability, and use of IoT technology with Arduino to control the tension generated in the cells and measure the energy obtained in a precise and remote fashion.

**CIFP DON BOSCO LHII**  
**CIFP POLITÉCNICO EASO**  
**POLITEKNIKOA LHII**

## **EKI II, social robots at homes for the elderly and day centres**

Research and apply the possible use of social robotics in elderly homes and day centres to promote active, health ageing and prevent fragility.

## **ReViCom. Application of Virtual Reality (VR) for long-term paediatric patients to improve technical and socio-emotional skills**

Design, development, and application of VR in long-term paediatric patients in order to improve socio-emotional and curricular skills and acquiring necessary habits in childhood. This project is inclusive in nature, since it helps to develop skills in children in a disadvantaged situation due to their illness.

## **From Waste to Safe Water (A waste to purify water)**

The project has two main objectives: the first is to obtain a biomaterial to regenerate polluted water, using a sub-product from a small company as raw material. The targeted pollutants have a direct and very notable impact, both on human health and the environment. The second objective is to transfer the technical-procedural learning to the network of VET centres on subjects like the circular economy, sustainability, 3D bio-printing, material characterisation, drug release mechanisms, and gene sequencing with digital tools.

## **Study of the application of Incremental Sheet Forming (ISF) as an alternative to AM technologies in the manufacturing of implants for cranioplasty**

The project consists of studying Incremental Sheet Forming technology as an alternative to additive manufacturing to manufacture cranioplasty prosthetics, mainly because of the advantage of reducing the time it takes to obtain the prosthetics. To this end, we take medical images with pathologies that require cranioplasty to obtain virtual models. In addition to helping the team of neurosurgeons to plan the operation with cutting guides, we obtain the design for the implant. As of this point, we propose implementing ISF technology, with a prior analysis of the most suitable biomaterials to be transformed by this technology, which is currently still in development phase. Work is focused on designing and prototyping of tooling and forming tools, integration into CNC machines, an experimentation phase with biocompatible materials, and evaluating them to compare with additive manufacturing technologies.