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| **Project name (P1)**: Risk mitigation plan for biodiversity and food production to face climatic change in the eastern region of Cuba |
| **Subproject (SP1):** Research practices are upgraded to contribute to the assessment of the effects of climate change in the Eastern region of Cuba |
| 1. **PhD theme (max. 20 words):** Dynamic of organic carbon in mangroves related to the variation of the hydroperiod and climate change effects
 |
| **Abstract (max. 150 words):** Mangroves are important coastal ecosystems for Cuba, in the last years the government has been encouraging its conservation as the ecological benefits for the coastal area. The conservation of mangrove ecosystem has been explicitly including in the government plan to face climatic change (“Tarea Vida”). In a context of environmental risks as sea flooding, intense drought and hurricanes, the present research aims at determine hydroperiod combination pattern and keys climatic variables for increase organic C storage according with ecological type of mangrove, valid for mitigation and adaptation to climatic change. There is not precedent in Cuba of study the captured capacity of Corg for mangroves, neither the relationship between patterns of extent and frequency period of flood for optimize Corg. Consequently, it makes difficult have criteria for conservation and restoration of Corg in mangrove ecosystem.  |
| **PhD student profile:** Basic Science(Biology, Chemistry) |
| **UO Promoter (Name, faculty, e-mail):** * Prof. Dr. C. Joel Reyes Domínguez, BIECO, joel@bioeco.cu
 |
| **Flemish Promoter (University/faculty, e-mail):** Nico Koedam , Vrije Universiteit Brussel (VUB), nikoedam@vub.ac.be  |
| **PhD programme** (UO)**:** Environmental Sciences |
| **PhD programme (Flemish University):** Biological Sciences**,** U. Hasselt |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** Methodology to characterize and determine hydrocarbons present in the Bay of Santiago de Cuba.
 |
| **Abstract (max. 150 words):** There are different analytical methods that allow to study the hydrocarbon contamination, the use of them simultaneously can offer more precise results of determination and characterization of different types when spilled. As precedents, there are researches carried out that show results in this regard, Pérez et al (2008), Santana et al (2015), but the results obtained so far do not provide the characterization of the type of hydrocarbon. If you deepen in the use of these methods to characterize the spilled hydrocarbons and know the exposure time in the seawater, run the PETROMAR model in receiver mode, being able to know the initial coordinates of the spill and with it possible offenders of the fact. The use of available tools and the establishment of a methodology for Cuban bays, particularly in the bay of Santiago de Cuba, would be the novelty of this investigation. |
| **PhD student profile:** Basic Science (Chemistry, Biology, Biochemistry), Engineering (Chemistry) |
| **UO Promoter (Name, faculty, e-mail):** * Prof. Dr. C. José Francisco Falcón Hernández, FIQA, falcon@uo.edu.cu
 |
| **PhD programme** (UO): Environmental Sciences |
| **Local or Joint PhD:** Local PhD |
| 1. **PhD theme (max. 20 words):** Shell and genital organs morphometry, ecological niche models and conservation of tree snail *Coryda alauda*): related with climate warming?
 |
| **Abstract (max. 150 words):** The land snails have been suggested for study potential indicators of climatic warming (Nicolai & Ansart 2017). *Coryda alauda* is registered in eastern Cuban forests and is potential indicator of climatic warming. The research aims at updates information of *C. alauda* biodiversity as potential indicator of climatic change by using molecular and ecological techniques. The study of specie biodiversity and its effects on climatic change is a key step for its conservation and management. Additionally, this proposal could be used to study the climate change effect on Caribbean land snails and other groups. The PhD theme fit well in the VLIR priorities at country level and the IUC programme. In addition, there is a clear relationship between the study and the objectives of “Tarea Vida” by taking measures for climatic change impacts mitigation at eastern region.  |
| **PhD student profile:** Basic Science (Biology) |
| **UO Promoter (Name, faculty, e-mail):** * Prof. Dr. C. Bernardo Reyes Tur, Faculty of Natural and Exact Sciences, breyes@uo.edu.cu
 |
| **PhD programme** (UO)**:** Environmental Science |
| **Local or Joint PhD:** Local PhD |
| 1. **PhD theme (max. 20 words):** Impact of the environmental stress over cepolid´s reproductive physiology in Cuban eastern
 |
| **Abstract (max. 150 words):** Cuban Cepolids are performed by 61 species of snails, with a high percent of endemism. The mating of these animals is regulated by the transference of accessory-glands products. The objective of the research is to analyze the functionality of sexual allohormones in Cuban eastern Cepolids exposed to different stress factors through molecular, cellular and histological markers. New knowledge about range of environmental conditions in which Cuban snails’ sexual allohormones are functional is expected, as main alteration cells and tissues of accessory-glands under environmental stress. Contributions to new knowledge about Cuban snail´s reproduction in a climatic change environment will be done. Molecular, cellular and histological characteristics of a snail could be used like bio indicators of environmental quality. Also, present study would contribute to design strategies for the conservation of snails in a climatic change environment, ecological services and the Cuban natural values. |
| **PhD student profile:** Basic Science (Biology) |
| **UO Promoter (Name, faculty, e-mail):** * Prof. Dr. C. Bernardo Reyes Tur, Faculty of Natural and Exact Sciences, breyes@uo.edu.cu
 |
| **PhD programme** (UO)**:** Environmental Science |
| **Local or Joint PhD:** Local PhD |
| 1. **PhD theme (max. 20 words):** Diversity of microturbellarians Proseriata (Plathyhelminthes) of Cuba
 |
| **Abstract (max. 150 words):** Microturbellarians are one of the most important components in of marine ecosystems because are predators of micro-algae, nematodes and other meiofauna members. In addition, they are sensitive to environmental changes that usually are associated with their life cycle and development. Consequently, this animal group could be evaluated as potential indicators of climate change effects on marine ecosystems. So far, Cuban marine biota has the highest species richness in the Caribbean Sea, nevertheless the invertebrate species inventory, including flatworms, could be judged completely out of dated. As a consequence, this |
|  scarce knowledge on microturbellarian diversity, ecology and conservation biology seems to be a limitation for their use as bioindicator. The sparse knowledge on Caribbean microturbellarians diversity means a handicap to shed light on aspects of their biology such as phylogenetic relationships and biogeography.  |
| **PhD student profile:** Basic Science (Biology) |
| **UO Promoter (Name, faculty, e-mail):** * prof.PhD. Bernardo Reyes Tur, Facultad de Ciencias Naturales y Exactas, breyes@uo.edu.cu
 |
| **Flemish Promoter (University/faculty, e-mail):** Tom Artois, U Hasselt, tom.artois@uhasselt.be  |
| **PhD programme** (UO)**:** Environmental Science |
| **PhD programme (Flemish University):** Biological Sciences, U Hasselt |
| **Local or Joint PhD:** Joint PhD |
| **Subproject (SP2):** Innovative sustainable technologies for crop production are developed and implemented by selected stakeholders to improve food quality and face the effects of climate change in the Eastern region of Cuba |
| 1. **PhD theme (max. 20 words):** Indicators of water and energy management to improve the efficiency of irrigation systems
 |
| **Abstract (max. 150 words):** Water resources in Cuba are limited and constitute the most threatened natural resources in consequence of climate change. Water resources on food production are a determining factor for the food security in our country. The low efficiency in the use of water for irrigation in most crops, leads to the reduction of yields and the profitability in agricultural activities and associated processes. One of the tools used to increase efficiency and productivity in Agricultural Enterprises are the management indicators and their comparison through benchmarking techniques, based on the analysis of non-parametric production frontiers, which allow obtaining best practices in the productive processes. In this sense, the general objective of this research is to propose efficiency indicators to optimize the management of water and energy in productive agricultural processes in the specific conditions of the Ceballos Manufactory Company in the Ciego de Ávila province. |
| **PhD student profile:** Engineering (Hydraulic, Agronomy) |
| **UO Promoter (Name, faculty, e-mail):** * Prof. Dr. C.Pavel Vargas Rodríguez, Construction Faculty, pvargas@uo.edu.cu
 |
| **PhD programme (UO):** Tutelary PhD Programme in Constructions & Hydraulics  |
| **Local or Joint PhD:** Local PhD |
| 1. **PhD theme (max. 20 words):** Evaluation of the impact of cyanobacteria on the production of agricultural interest crops
 |
| **Abstract (max. 150 words):** Cyanobacteria have around 60 – 70% of protein content in cell biomass. Cyanobacteria inhabiting in plant soil and plant rhizosphere play a fundamental role in the water regulation mechanisms of plants, contributing with the increase of chlorophyll in the leaves and delay aging. However, although the physical and chemical characteristics of the irrigation water used in the facilities of In vitro-Plant Production Factory (Biofábrica) of Santiago de Cuba are known, there is scarce scientific evidence to show the influence of the cyanobacteria present in the water and its influence on the growth of crops. For these reasons, it is proposed to carry out the *in vitro* study and in field conditions of known concentrations of toxic and non-toxic species cyanobacteria and their impact on agricultural crop. |
| **PhD student profile:** Basic Science (Biology, Chemistry) |
| **UO Promoter (Name, faculty, e-mail):** * Prof. Dra C. Liliana Gomez Luna, CNEA, e-mail: lilianag@uo.edu.cu
 |
| **Flemish Promoter (University/faculty, e-mail):** Bart Vandecasteele, Bartvandecasteele@ilvo.be  |
| **PhD programme** (UO)**:** Environmental Science |
| **PhD programme (Flemish University):** Biological Sciences**,** U Hasselt |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** Evaluation of *Cucumis sativum* fruits extracts obtained with water treated with static magnetic field
 |
| **Abstract (max. 150 words):** Crops irrigation with magnetically treated water improve crops production, as magnetic field positive affect shoot growth and seed germination. The effect of magnetic field treatment (MFT) on plant growth and plant metabolism have been reported. Cucumber is a plant species highly consumed by the population and contains a unique compound, Cucurbitacin with antioxidant properties. The biosynthesis pathway of Cucurbitacin C, genes and catalytic steps has been described, as transcriptional regulating factors of biosynthesis in leaves and fruits. The Bi gene confers bitterness to whole plant and it is associated with an operon-like cluster, similar to the gene cluster for biosynthesis of Thalianol in *Arabidopsis* sp. Fruit bitterness requires both Bi and the dominant Bt (Bitter fruit) gene. The present research aims at evaluation of phytochemicals compounds extracted from cucumber juice grown under MFT for determine antioxidant and anti-inflammatory activities of *Cucumis sativum* juice on *in vivo* models. |
| **PhD student profile:** Basic Science (Biology, Biochemistry, Pharmacy) |
| **UO Promoter (Name, faculty, e-mail):** * Prof.Dra. C**.** Yilan Fung Boix, CNEA, yilan@uo.edu.cu
 |
| **Flemish Promoter (University/faculty, e-mail**): Ann Cuypers, U Hasselt**,** anncuypers@uhasselt.be  |
| **PhD programme** (UO)**:** Environmental Science |
| **PhD programme (Flemish University):** Biological Sciences, U Hasselt |
| **Local or Joint PhD:** Joint PhD |

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| **Project name (P2)**: Biomedical technologies and services for improving the medical assistance in the eastern region of Cuba |
| 1. **PhD theme (max. 20 words):** Multi-modal photoplethysmography signal acquisition and processing.
 |
| **Abstract (max. 150 words):** The project proposes a new multi-modal sensor for photoplethysmography. The approach includes hardware design and new digital signal processing tools for pulse waveform analysis. The new sensor will improve the signal acquisition and processing stages of the photoplethysmograph device Angiodin ®, which was improved during the first phase of the UO IUC program. As a medical device the new approach will be the kernel for the homecare solutions proposed by the project P2 for the second stage. The proposed solution will have a direct impact on the diagnosis, treatment and decision-support processes, especially for patients with diabetes and risk of cardiovascular accidents. The PhD project deals with improving human health which is perfectly coherent with the main priorities of the country and VLIR. UO has, as its first line of research, the development of medical technology and applications for the Cuban Health system. |
| **PhD student profile:** Engineering (Automatics, Biomedics, Informatics) |
| **UO Promoter (Name, faculty, e-mail):** Juan Carlos García Naranjo, Center of Medical Biophysics, Email: juan.garcia@cbiomed.cu  |
| **Flemish Promoter (University/faculty, e-mail):** Johan Stiens, Vrije Universiteit Brussel (VUB), Department of Electronics and Informatics, jstiens@etrovub.be  |
| **PhD programme** (UO)**:** Biomedical Engineering |
| **PhD programme (Flemish University):**  |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** Recommender Systems in e-Health Application Domains.
 |
| **Abstract (max. 150 words):** Conversational Recommender Systems (CRS) offer flexible support to users as they browse a product catalogue, and help them to better understand and elicit their preferences. In this research we aim to come up with a novel CRS approach that suggests query revisions that are more likely to retrieve products with the largest utility increase for the user. In this recommendation model a product is described by its features and the main challenge is to infer the user preferences on these features from implicit feedbacks collected during user-system interactions. This recommendation approach can be useful in e-health to assist radiologists in finding historic medical imaging studies that are relevant for analysis or diagnosis task on a target imaging study. This kind of clinical decision support tool will surely improve the quality and turnaround of diagnosis tasks in a radiology department and will add new potentialities of the Imagis ® ICT platform. This research project is strongly linked to the VLIR-IUC-UO project" Medical Imaging Network at Eastern Cuba" and the IUC-PP-Phase-II project "Biomedical Technologies and Services for Improving the Medical Assistance in the Eastern Region of Cuba ". |
| **PhD student profile:** Engineering (Informatics, Biomedics), Basic Science (Computing) |
| **UO Promoter (Name, faculty, e-mail):** Prof. Dr. C. Carlos Morell (UCLV) |
| **Flemish Promoter (University/faculty, e-mail):** Jef Vandemeulebroucke (VUB), Vrije Universiteit Brussel (VUB), Department of Electronics and Informatics, jefvdmb@etrovub.be  |
| **PhD programme** (UO)**:** Biomedical Engineering |
| **PhD programme (Flemish University):**  |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** Hemoglobin Solution Dynamic Viscosity Determination using Proton Magnetic Relaxation
 |
| **Abstract (max. 150 words):** Sickle cell disease (SCD), also called Sickle Cell Anemia (SCA), is a serious blood disorder that causes acute pain, severe anemia, infections and vascular blockages that lead to widespread organ damage and death. In all the world each year 300 000-400 000 sick children are born. In Cuba the 3 % of the population is affected by SCD, reaching a 10 % at the eastern region. This project aims to develop a new methodology for measuring dynamic viscosity in hemoglobin solutions using nuclear magnetic relaxation. The approach will be complemented with additional experiments to provide information about the extracellular space and design of a hardware which will allow use these and previous results in Cuban hospitals. The research continues with previous studies about exploring exchange through erythrocyte cell membrane. The general objective fit well with research and development priorities at country level, as VLIR country priorities. Studies about development of medical devices and computational platforms for the benefit of public health services are key research results/outputs at Universidad de Oriente.  |
| **PhD student profile:** Engineering (Biomedics), Basic Science (Biophysics) |
| **UO Promoter (Name, faculty, e-mail):** Manuel A. Lores Guevara, Centre of Medical Biophysics, manuel.lores@cbiomed.cu  |
| **PhD programme** (Universidad de Ciencias Médicas, La Habana)**:** Tutelary PhD programme in Health Sciences  |
| **Local or Joint PhD:** Local PhD |
| 1. **PhD theme (max. 20 words):** The cry analysis oriented to the diagnosis and study of child neurodevelopment
 |
| **Abstract (max. 150 words):** The study of Infant Neuro-development and disabilities aims at determine those children with symptoms or in risk of debuting with a deviation of normal patterns of cognitive development for treatment and follow up. The study includes cry recordings of children up to 1 year of age. The expected results are: new acoustic indicators in cry signal with diagnostic and predictive potential, new algorithms for cry classification based on biomedical signal processing and PC-based methodology for support diagnosis and monitoring of neurodevelopment and disability of neonates. The expected outcomes will improve newborn diagnosis, an early detection of child neurodevelopment deviations and reduction of infant mortality and morbidity rates. As a social impact, the expected outputs favors health care services for Cuban children. It fits well with VLIR and UO priorities, as it is supported by a national research project and it responds to objectives of Health research highlight at UO. Several health institutions are stakeholders. The topic is closely related with previous research activities, and expected outputs will be added to computational platform Imagis ®.  |
| **PhD student profile:** Engineering(Biomedics, Automatics, Informatics) |
| **UO Promoter (Name, faculty, e-mail):** Dr. C. Prof. Sergio D. Cano Ortiz, Faculty of Informatics, Telecommunications and Biomedical Engineering (FITIB), CENPIS, scano@uo.edu.cu  |
| **Flemish Promoter (University/faculty, e-mail):** Dr. C Prof. Hichem Sahli, VUB-ETRO, hsahli@etrovub.be |
| **PhD programme** (UO)**:** Biomedical Engineering |
| **PhD programme (Flemish University):**  |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** Nero-protector effect of ELFMF in cerebrovascular disease
 |
| **Abstract (max. 150 words):** Previous studiesevidenced the angiogenic and beneficial effect of ELFMFs in biomodels, neurological score and survival after ischemic stroke in the rat 2 vessel occlusion model. New knowledge about mediating molecular mechanisms of the process concluded that beneficial effects of ELFMF’s depends of activation of the molecular mediator nitric oxide in endothelial cells. The present research aims at exploring new knowledge of the therapeutic windows and the effect of age on ischemic stroke. The effect of ELFMF on hemorrhagic stroke *in vivo* models will be studied. In addition, the effect of ELFMF on the Nero- inflammation after stroke will be determined, as recent data indicate the importance of microglia, macrophages and other immune cells in strokes, but also, the effect of treatment on blood flow and ischemic area using NMR. These results will contribute to the therapy clinical translation and open new application fields for the magnetic stimulator device NaK.  |
| **PhD student profile:** Engineering(Biomedics); Basic Science (Biology, Biophysics) |
| **UO Promoter (Name, faculty, e-mail):** Prof. Dra. C. Lena Perez Font, Centro Nacional de Electromagnetismo Aplicado (CNEA), lena@uo.edu.cu  |
| **Flemish Promoter (University/faculty, e-mail):** Annelies Bronckaers (annelies.bronkaers@uhasselt.be) & Bert Brône UHasselt. Biomed Institute (bert.brone@uhasselt.be), Biomed Institute, U Hasselt |
| **PhD programme** (UO)**:** Biomedical Engineering |
| **PhD programme (Flemish University):**  |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** Development of computational methods for intraoperative monitoring of consciousness state from the EEG
 |
| **Abstract (max. 150 words):** Detection of consciousness states during surgical procedures or induction of barbituric coma, guarantee good physiological stability for the patient. Administration of hypnotic drugs and intravenous muscle relaxants as inhalators generate unconsciousness state, amnesia, analgesia and muscle relaxation. It is essential analyze main sources of patient’s physiological information, highlighting Electroencephalogram (EEG) signals, containing information for identify consciousness states in sleep (or hypnotic) conditions, and the effect of anesthetic drugs. New data for parameters optimization as other physiological measurements for multimodal determination of consciousness states are foreseen, reflecting changes in depth anesthetic stage produced by 14 drugs. Results about risk reduction of intra-operative awakening in patients based on NPA classification are expected, by enhancing the efficiency of medical services. The topic fits well with VLIR and UO priorities. It is supported by national research founds and clinical institutions as stakeholders. The expected ICT tools will be integrated in the computational platform Imagis ®.  |
| **PhD student profile:** Engineering(Biomedics, Automatics, Informatics) |
| **UO Promoter (Name, faculty, e-mail):** Dr. C. Enrique J. Marañón Reyes, enriquem@uo.edu.cu, Centro de Estudios de Neuprocesamiento de Imágenes y Señales (CENPIS) |
| **Flemish Promoter (University/faculty, e-mail):** Prof. Dr. Hichem Sahli, VUB-ETRO, hsahli@etrovub.be  |
| **PhD programme** (UO)**:** Biomedical Engineering |
| **PhD programme (Flemish University):**  |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme:** Eye movement tracking and processing methods for analysis of neurodegenerative diseases
 |
| **Abstract (max. 150 words):** The analysis of eye movements allows diagnosis of neurodegenerative diseases as ataxias, spinocerebellar degenerations and multisystemic atrophies. Devices for diagnosis of neurodegenerative disorders are located only in the Center for Research and Rehabilitation of Hereditary Ataxias (CIRAH), at Holguin province. Recently, the System for Biomedical Measurements for the Vestibular Exploration (SMB-EV®) was extensively introduced in hospitals of Cuban provinces. SMB-EV made diagnosis of vestibular diseases by rotational stimulus. The PhD topic aims at development and evaluation of hardware and software tools for acquisition, processing and analysis the eye movement for the diagnosis of neurodegenerative diseases, integrated with SMB-EV® system. The topic fits well with VLIR and UO priorities. The expected outputs foresee improvement quality and effectiveness of neurodegenerative diseases diagnosis, not only at eastern region, where there is the highest prevalence of spinocerebellar ataxia, but also in all over Cuban hospitals and institutes.  |
| **PhD student profile:** Engineering(Automatics, Biomedics, Informatics) |
| **UO Promoter (Name, faculty, e-mail):** Dr. C. Carlos Román Vázquez Seisdedos, Faculty of Informatics, Telecommunications and Biomedical Engineering (FITIB), cvazquez@uo.edu.cu,  |
| **PhD programme** (UO)**:** Biomedical Engineering |
| **Local or Joint PhD:** Local PhD  |
| 1. **PhD theme:** Algorithms of parallelization of mathematical functions for shape analysis applied to digital processing of images of blood samples
 |
| **Abstract (max. 150 words):** Erythrocyte shape analysis is a relevant source of information in different medical pathologies. In all the cases, it is desirable to obtain this information in the earlier stages of the studied process where the computational analysis become more challenge. This PhD topic proposes a new versions of efficient mathematical functions for analysis of shape erythrocyte using high performance computing. With these new tools the analysis time necessary to emit a criterion on the cell deformation present in a patient is drastically reduced. The project is closely linked to previous works about sickle cell anemia developed in phase I and should complement them. The results could be included in future versions of Imagis ® which was supported by the VLIR program in phase 1. The proposed idea is linked to the research line of development and application of technologies and services for the improvement of human health of UO and with VLIR and IUC priorities: it is included in the project aimed at promoting the development of technologies and services in biomedicine to improve medical assistance in the eastern region of Cuba.  |
| **PhD student profile:** Basic Science (Mathematics, Computing)**,** Engineering (Informatics) |
| **UO Promoter (Name, faculty, e-mail):** Dra. C. Silena Herold Garcia, Faculty of Basic & Natural Sciences (Department of Computing), silena@uo.edu.cu  |
| **PhD programme (UO):** Biomedical Engineering  |
| **Local or Joint PhD:** Local PhD |

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| **Project name (P3)**: Natural Products and Pharmaceutical Services to improve the patient quality of life in Eastern Cuban Hospitals |
| **Subproject (SP1):** Creation of a reference preclinical center for the development of natural products: A bridge between the lab and the hospital |
| 1. **PhD theme (max. 20 words):** Antipyretic and antimicrobial activity of the *Zanthoxylum fagara* leaves and stem bark.
 |
| **Abstract (max. 150 words):** Plant genus *Zanthoxylum* has 549 species distributed in tropical and temperate regions where they are used as insecticidal, anti-inflamatory, antioxidant, antiparasitic and antimicrobials. Secondary metabolites as alkaloids, sterols, terpens and flavonoids are responsible medicinal properties. Zanthoxylumsspeciesare distributed in eastern of Cuba (common name: ‘amoroso’, ‘aruña gato’, ‘limoncillo’). Cuban people use leaves and stem extracts as antipyretic and sedative. Previous phytochemical studies identified secondary metabolites in Cuban plant species, related with antimicrobial and anticancer activity. The research aims at evaluation of antipyretic and antimicrobial activity of *Z. fagara* leaves and stem bark. The pharmacologic as toxicology activities will be studied in experimental model close to humans. Expected outputs foreseen improvement patient’s life quality by discovering new drugs. Main stakeholder is the Experimental Toxicology Centre (TOXIMED), which is the institution under the legal framework for design and follow up preclinical studies in the eastern of Cuba.  |
| **PhD student profile:** Basic Science (Biology, Biochemistry, Chemistry, Pharmacy) |
| **UO Promoter (Name, faculty, e-mail):** Dr. C. Julio César Escalona Arranz, Faculty of Natural & Basic Sciences, jcea@uo.edu.cu  |
| **PhD programme (UO):** Tutelary PhD programme in Biology  |
| **Local or Joint PhD:** Local PhD |
| 1. **PhD theme (max. 20 words):** Evaluation of psychotropic and neurotropic activities of the species *Plectranthus neochilus* Sehtlr
 |
| **Abstract (max. 150 words):** The research proposal fit well with research lines about health at UO. The research aims at pharmacological and phytochemical characterization of leaves from the plant species *Plectranthus neochilus* (comm. ‘meprobamato’). The species is widely used by the Cuban population for medicinal purposes, but not scientific evidence to support its rational, safe and effective use exist. Consequently, the proposed objective is to evaluate psychotropic and neurotropic activities of extracts and fractions obtained from *Plectranthus neochilus* Sehtlr leaves. Having these scientific studies is essential for this plant species can be used rationally for medicinal purposes and thus ensure the quality of life of the population, also for future pharmaceutical application and can be included in the basic table of herbal medicines of Cuba and to improve the patient quality of life in Eastern Cuban Hospital. |
| **PhD student profile:** Basic Science (Biology, Biochemistry, Chemistry, Pharmacy) |
| **UO Promoter (Name, faculty, e-mail):** * Dra. C. Ania Ochoa Pacheco, aochoap@uo.edu.cu;
* Dr. C. Julio Cesar Escalona Arranz, jcea@uo.edu.cu, Faculty of Basic & Natural Sciences
 |
| **Flemish Promoter (University/faculty, e-mail):** *prof.*Wim Vanden Berghe PhD, Department Biomedical Sciences (U. Antwerp), wim.vandenberghe@uantwerpen.be  |
| **PhD programme** (UO)**:** ??  |
| **PhD programme (Flemish University):**  |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** Evaluation of insecticide and antimicrobial activities of *Persea americana* Mill seeds
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| **Abstract (max. 150 words):** Nowadays, there is a remarked interest towards fruit industrial processing, where the by-products resulting like *Persea americana* Mill seeds are normally discarded. Several studies have shown the wide spectrum of medicinal properties of *P. americana*, but in the scientific literature the insecticidal activity of the avocado seed has been poorly explored. Additionally, non-studies have reported the possible anti-parasitic activity through *in vitro* and *in vivo* experiments. On the other hand, there is insufficient correlation between the main bioactive compounds identified in avocado seeds and the insecticide and anti-parasitic effect studied. The present research aims at evaluation of insecticide and antimicrobial potential of crude extracts/fractions from *P. americana* Mill seeds. Scope the effectiveness in the management of vector control and the vector-host interactions in disease transmission may be of great impact to improve the patient quality of life and to reduce the incidence of infectious diseases. |
| **PhD student profile:** Basic Science (Biology, Biochemistry, Chemistry, Pharmacy) |
| **UO Promoter (Name, faculty, e-mail):** Dra. C. Idelsy Chil Nuñez, idelsy@uo.edu.cu; Dr. C. Gabriel Llaurado Maury, gabriel@uo.edu.cu, Faculty of Basic & Natural Sciences.  |
| **Flemish Promoter (University/faculty, e-mail):** prof. Paul Cos PhD, Laboratory of Microbiology, Parasitology and Hygiene (LMPH), Faculty of Pharmaceutical, Biomedical and Veterinary Sciences (U. Antwerp), paul.cos@uantwerpen.be |
| **PhD programme** (UO)**:** Tutelary PhD programme in Biology |
| **PhD programme (Flemish University):**  |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** Evaluation of the hypolipidemic and antiatherosclerotic activity of bioproducts derived from the edible-medicinal mushroom *Pleurotus* sp.
 |
| **Abstract (max. 150 words):** World Health Organizationstatistics reveal that cardiovascular diseases (CVDs) are 1st cause of death globally (*WHO*, 2017). Several drugs for handle with atherosclerosis are marketed, however treatment are costly and generates undesirable effects on patient health. Beneficial effects of edible mushrooms on CVDs treatment and prevention have been previously studied, however knowledge about the action mechanism of the metabolites on hypercholesterolemia and anti-atherosclerosis is scarce. The PhD thesis aims at evaluation antihyperlipidemic and antiatherogenic activity of metabolites isolated from edible mushroom species of *Pleurotus* on *in vivo* and *in vitro* models. New evidences about the action mechanism of the mushroom genus are expected, mainly the ones related with hypolipidemic and antiatherogenic activity. The expected outputs could be used for design new marketed nutraceutic products focused on prevention and therapy of CVDs. The PhD topic fits well with VLIR and UO country priorities, as the ones of national health care system.  |
| **PhD student profile:** Basic Science (Biology, Biochemistry, Pharmacy) |
| **UO Promoter (Name, faculty, e-mail):** Humberto Morris, Faculty of Natural and Basic Sciences, jquevedo@uo.edu.cu  |
| **Flemish Promoter (University/faculty, e-mail):** *prof*. PhD Guido De Meyer PhD (Chair of Department), Depart. Pharmaceutical Sciences – U Antwerp, guido.demeyer@uantwerpen.be  |
| **PhD programme** (UO)**:** Tutelary PhD programme in Biology |
| **PhD programme (Flemish University):**  |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** Development of a granulate for solid dosage forms from *Pleurotus ostreatus* mushroom with hypoglycemic activity
 |
| **Abstract** (max. 150 words)**:** The specie of edible mushroom*Pleurotus ostreatus* is a functional food with medicinal properties as antihyperglycemic. This natural product is therapeutic alternative for treatment of diabetes. The present research aims at development of granulates from *P. ostreatus* extracts for solid dosage forms with hypoglycemic activity. This product will allow design new dosage forms from edible mushroom with a beneficial effect for human health, reducing needs of hypoglycemic drugs in the Cuban health system. The research contributes to the development and application of technology and services for the improvement of human health and product development, goods and services based biotechnology, as research areas of the Universidad de Oriente, overlooking raise the impact of the scientific results in response to priority and demands of the territory and nation. Strengthening the role of the University together with the pharmaceutical industry and the local government for social, cultural and economic development of the territory. |
| **PhD student profile:** Basic Science (Pharmacy) |
| **UO Promoter** (Name, faculty, e-mail): * *prof*. Dra. C. Idelsy Chil Núñez, Faculty of Natural and Basic Sciences (Depart. Pharmacy), idelsy@uo.edu.cu;

*prof.* Dr. C. Humberto Morris Quevedo, Faculty of Natural and Basic Sciences (Centre of Study of Industrial Biotechnology), jquevedo@uo.edu.cu  |
| **PhD programme** (UO)**:** Tutelary PhD programme in Biology |
| **Local or Joint PhD:** Local PhD |
| 1. **PhD theme** (max. 20 words)**:** Evaluation of the antimicrobial and antioxidant activity of leaves extracts of *Amyris elemifera* L
 |
| **Abstract** (max. 150 words)**:** The number of bacteria resistant to conventional multiple drugs is increasing. Therefore, new alternatives for design drugs based on natural products are arising. Plant genus *Amyris*, *fam*. Rutaceae produced flavonoids compounds showing cytotoxicity, as well as amides with moderate antifungal activity. The species A. *selemifera* grows in Cuba coastal areas, where population use it for treatment of respiratory disorders. However, antimicrobial and/or antioxidant activity of the plant species have never been reported. The present research aims at evaluate the antimicrobial and antioxidant activity of *A. selemifera* leaves. The expected outputs will provide scientific support of therapeutic use of the plant species based on its pharmacological properties. The research fit well at UO and VLIR country priorities, as country priorities for design new drugs based on natural products for infectious diseases treatment.  |
| **PhD student profile:** Basic Science (Biology, Biochemistry, Pharmacy) |
| **UO Promoter** (Name, faculty, e-mail): *prof.* Dr. C. Julio C. Escalona Arranz, Faculty of Natural and Basic Sciences (Depart. Pharmacy), jcea@uo.edu.cu  |
| **PhD programme** (UO)**:** Tutelary PhD programme in Biology |
| **Local or Joint PhD:** Local PhD |
| 1. **PhD theme (max. 20 words):** Design and synthesis of glycogen synthase kinase 3 beta (GSK3β) inhibitors as potential agents for Alzheimer’s disease
 |
| **Abstract** (max. 150 words)**:** Alzheimer’s disease (AD) is an increasing public health concern in countries with growing elderly population. The Ser/Thr protein kinase GSK3β is a therapeutic target of the molecular pathways that links two major pathological hallmarks of AD (amyloid-β peptide aggregates and hyperphosphorylation of τ-protein). An overexpression of the biomolecule generates pathologies as AD, so development of mild inhibitors is of paramount importance. Recently, our research group, by using 3 types of bioactive compounds, carried out a molecular docking study into two allosteric regulation pockets of the protein with promising results (Unpublished). The present research aims at designing and synthesizes of non-ATP competitive inhibitors as allosteric modulators of GSK3β. A 2-phase research work, one involving computational design and modelling and the second one by organic synthesis and *in vitro* biological activity evaluation will be done. Expected outputs will contribute with a better comprehension of binding mechanisms of small organic molecules into allosteric regulation pockets of GSK3β by molecular simulation.  |
| **PhD student profile:** Basic Science (Biochemistry, Pharmacy, Bioinformatics, Chemistry) |
| **UO Promoter** (Name, faculty, e-mail): * *prof.* Dr. C. Julio C. Escalona Arranz, Faculty of Natural and Basic Sciences (Depart. Pharmacy), jcea@uo.edu.cu
 |
| **PhD programme** (UO)**:** Tutelary PhD programme in Chemical Sciences  |
| **Local or Joint PhD:** Local PhD |
| **Subproject (SP2):** Strengthening of hospital pharmaceutical services. An efficient way to improve the healthcare quality |
| 1. **PhD theme** (max. 20 words)**:** Model for the comprehensive medication management for pharmaceutical care in hospital institutions
 |
| **Abstract** (max. 150 words)**:** The research aims at development a model for Comprenhensive Medication Management in the pharmaceutical care of patient on secondary health attention services. The pharmaceutical care practice (PCP) has been influenced by technical methodologies associated with identify drugs therapy problems (DTPs). Recently, Pharmacotherapy Integrated Management has been extended, as clinical services, to health institutions worldwide. In Cuba, services of the PCP is still provided separately and don’t exhibit the provision of holistic approach. The expected outputs of PhD topic aims at obtaining novel professional performances facilitating the pharmacist's insertion in health team, development of interventions propitiating rational use of medications, improvement of health-related quality of life (HRQoL) and reduction of medication costs. Also, a decrease of hospital admissions and stays of patients associated with adverse reactions and pharmacological treatment effectiveness is expected. The research fit well with UO priorities on eastern region as VLIR country priorities about health care services improvement.  |
| **PhD student profile:** Basic Science (Pharmacy) |
| **UO Promoter (Name, faculty, e-mail):** *prof*. Dra. C. Niurka María Dupotey Varela, Faculty of Natural & Basic Sciences (Department of Pharmacy), ndupoteyv@uo.edu.cu  |
| **Flemish Promoter (University/faculty, e-mail): Undefined** |
| **PhD programme** (Universidad de la Habana, IFAL)**:** Pharmaceutical Sciences  |
| **PhD programme (Flemish University):**  |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** Carbapenemase production and antimicrobial multi-resistance in Gram-negative bacteria causing nosocomial infectious diseases.
 |
| **Abstract** (max. 150 words)**:** The World Health Organization recognized antimicrobial resistance phenomenon as an important health problem worldwide. The antimicrobial multi-resistance is responsible of infectious diseases dissemination and high rate of mortality. In Cuba, antimicrobial multi-resistance in nosocomial bacteria, their prevalence and dissemination have been poorly studied. However, recent studies show high and increasing frequency of severe nosocomial infectious in Cuban hospitals caused by isolates of *Acinetobacter*, *Pseudomonas, Klebsiella* and *Enterobacteria* showing cephalosporin-resistance phenotypes, but also genetic markers for resistance to carbapenemic antibiotics (Carbapenemase). Genes for Carbapenemase have been isolated from *Klebsiella pneumoniae* and show a high rate of horizontal genetic transfer between Gram-negatives species. The present research aims at the study of dissemination of Carbapenemase phenotype in nosocomial Gram-negative bacteria showing antimicrobial multi-resistance pattern, as the incidence of Carbapenemase producer species on the prevalence of nosocomial infections. A protocol for detection of antimicrobial multi-resistance and Carbapenemase-producer Gram-negative strains in clinical samples, will be proposed.  |
| **PhD student profile:** Basic Science (Microbiology, Biochemistry, Biology, Pharmacy) |
| **UO Promoter** (Name, faculty, e-mail): * *prof.* Dra. C. Teresa Orberá Ratón, Faculty of Natural and Basic Sciences (Centre of Study for Industrial Biotechnology), torbera@uo.edu.cu
* Dra. C. Dianelys Quiñones Perez (National Laboratory for Study of Antimicrobial Resistance - Institute of Tropical Medicine “Pedro Kourí”), dia@ipk.sld.cu
 |
| **PhD programme** (UO)**:** Tutelary PhD Programme in Biology  |
| **Local or Joint PhD:** Local PhD |
| 1. **PhD theme** (max. 20 words)**:** Development of *Calophyllum rivulare* Bisse hairy root cultures to enhance the obtaining of bioactive secondary metabolites
 |
| **Abstract** (max. 150 words): Hairy root cultures is a well-recognized technique for biomass and secondary metabolites production. It is generated by infection with *Agrobacterium rhizogenes*. Hairy roots show genetic stability and stable metabolite production than those from undifferentiated cell cultures. The genus *Calophyllum* comprised about 130 plant species distributed in tropical areas. Phytochemical studies revealed the genus of rich source of metabolites as xanthones, coumarins, chromenes, flavonoids and triterpenoids that exhibit imunomodulatory, antimicrobial, antimalarial and anti-HIV activities. *Calophyllum rivulare* (‘ocuje blanco’) is a Cuban endemic species with promising properties as antiparasitic. As it is possible monitoring the production of potential bioactive Calanolides and other secondary metabolites from *C. rivulare* hairy root cultures, the present research foreseen optimization of metabolites production by hairy root culture techniques under submerged fermentation. The expected outputs are on the line of improvement of functional foods production impacting on health quality of Cuban population.  |
| **PhD student profile:** Basic Science (Biochemistry, Biology, Pharmacy, Biotechnology) |
| **UO Promoter (Name, faculty, e-mail):** * *prof.* Dr. C. Humberto Morris Quevedo, Faculty of Natural and Basic Sciences (Centre of Study of Industrial Biotechnology), hmorris@uo.edu.cu
 |
| **Flemish Promoter (University/faculty, e-mail):** prof. Ann Cuypers PhD,Centre for Environmental Sciences (CMK), University of Hasselt, ann.cuypers@uhasselt.be  |
| **PhD programme** (UO): Tutelary PhD Programme in Biology |
| **PhD programme (Flemish University):**  |
| **Local or Joint PhD:** Joint PhD |

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| **Project name (P4)**: Safeguarding cultural heritage. Tools and practices for its integrated management in Santiago de Cuba and the Eastern Region of Cuba |
| **Subproject (SP1):** Archives. Movable and Intangible Heritage |
| 1. **PhD theme (max. 20 words):** Film heritage: The cinematographic experience in Santiago de Cuba during the 20th century.
 |
| **Abstract** (max. 250 words): Cinema is a media with the greatest social, cultural and historical impact since its appearance and throughout the 20th century. It is part of the cultural heritage of peoples as established by UNESCO and EU. Cuban laws protect and promote it by its nature as an art, considered the most powerful and suggestive means of artistic expression and dissemination and the most direct and widespread vehicle for education and popularization of ideas. The research intends to analyze the link between Cuban film history and the sociocultural history of its viewers in Santiago de Cuba throughout the 20th century, based on the need expressed by valuable Cuban researchers that national cinematographic historiography has the challenge of questioning to society, listen to what it says and contribute to creation of new files. Audiences and their consumption paradigms become the priority. The study is inspired by the theoretical perspective of the "New History of Cinema" from the Film Consumption model in Context applied in recent years in countries such as Belgium and Mexico. |
| **PhD student profile:** Humanities (Arts’ History, Communication)  |
| **UO Promoter (Name, faculty, e-mail):** * Dr. C David Silveira Toledo, Vicerrectorate of Extension Activities, Department of Heritage, toledo@uo.edu.cu
 |
| **Flemish Promoter (University/faculty, e-mail):** * *prof.*PhD Philippe Meers**,** Dept. of Communication Studies. Faculty of Social Sciences-University of Antwerp, philippe.meers@uantwerpen.be
 |
| **PhD programme** (UO)**:** Tutelary PhD programme in Sciences about Art |
| **PhD programme (Flemish University):**  |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** The management of cultural heritage from the hypermedia communication
 |
| **Abstract** (max. 250 words): The objective of this research is to explain the communication mechanisms that from the digital environment enable the management of cultural heritage for use the hypermedia communication. This tools is the potential space for the communication activities that integrated imagines, texts, videos and other supports that permitting the interaction between cultural heritage and society. The communication mechanisms linked to the digital environment that allow the management of this heritage value, a fact of great importance because the integrating of the hypermedia communication with the digital era has tools that allow sharing and promoting the tangible and intangible cultural heritage of a country beyond borders. |
| **PhD student profile:** Humanities (Arts’ History, Communication) |
| **UO Promoter (Name, faculty, e-mail):** *prof.* Dra. C. Maribel Brull Gónzález, Faculty of Humanities, brull@uo.edu.cu  |
| **Flemish Promoter (University/faculty, e-mail):** *prof.* PhD Paolo Favero, Dept. of Communication Studies. Faculty of Social Sciences- University of Antwerp,  |
| **PhD programme** (UO)**:** Tutelary PhD programme in Sciences about Art |
| **PhD programme (Flemish University):** |
| **Local or Joint PhD:** Local PhD |
| 1. **PhD theme (max. 20 words):** Documentary heritage management. The case of the Historical Archive of the Universidad de Oriente
 |
| **Abstract** (max. 250 words): The documents can have relevant characteristics and be symbols of the collective memory of a people, nation, region or society. Through their support and content, they reflect the diversity of peoples, cultures and languages, becoming part of the heritage of humanity. The documentary heritage is made up of all those documents that have historical, artistic, scientific, literary and cultural value of the nation and is preserved in archives and libraries. Currently, studies on the subject are oriented towards a new approach, digital heritage, understood as unique resources that are the result of knowledge or expression of human beings that often do not have a physical but digital support, (Regional Office of Education for Latin America and the Caribbean, Unesco, 2014), so that its conservation requires production, maintenance and management processes. The Historical Archive of the Universidad de Oriente has documents of great significance that have not been adequately preserved or disseminated, so that their value as a testimony of our history and culture is insufficiently appreciated or valued by society. The objective of this research is to explain the fundamental mechanisms for the proper management of the constituent elements of the Historical Archive of the Universidad de Oriente, articulating its treatment as a document with the parameters and digital tools for the proper management of them. The impact of the research lies in achieving increased visibility, rescue and digitalization of the documentary collection deposited in the archive of the institution, as well as highlighting the legacy that important personalities contributed to the nation from the academy. |
| **PhD student profile:** Social Sciences(History, Sociology) |
| **UO Promoter (Name, faculty, e-mail):** prof. Dra. C. Margarita V. Hernández Garrido, Faculty of Social Sciences, hmargarita@uo.edu.cu  |
| **Flemish Promoter (University/faculty, e-mail):** prof. Dr. C. Philippe Meers. Faculty of Social Sciences. University of Antwerp. philippe.meers@uantwerpen.be  |
| **PhD programme** (UO)**:** Tutelary PhD programme in Sociological Sciences  |
| **PhD programme (Flemish University):** |
| **Local or Joint PhD:** Local PhD |
| **Subproject (SP2):** Built Heritage and New Technologies |
| 1. **PhD theme (max. 20 words):** The heritage of the southeast of Cuba as a resource for regional development
 |
| **Abstract** (max. 250 words): The research proposal consists in the study and analysis of the southeast of Cuba heritage, as a resource for regional and local development. The objective of the same aims to build a holistic vision at the regional level of how different patrimonial resources are managed and managed and how the country's economic policies organize and distribute the income created by these. In this way, it is intended to study the extent to which cultural heritage is integrated, conceived, and managed within the economic and social development policies included in the Guidelines of the Communist Party of Cuba (PCC),the 2030 Cuba Development Plan, the General Plans of Urban Planning (PGOU) and others specific plans. The firs to objectives would comprise the surveying, documentation, mapping and organization of heritage in the southeast of Cuba. Elaborating diverse layers of information that include settlement systems, natural resources, protected areas, anthropic resources, marine resources, intangible resources among others. The current planning and development plans are concentrated in specific areas and particularize the sector where they affect; in turn these plans do not interact with each other at a regional level, which demonstrates the lack of integrity and a global vision of them. This primary work will constitute the basis for the development of the subsequent analyzes and strategies that allow to manage the heritage in an integrated manner and demonstrate how with the application of them the patrimonial resources for the development of the population at the local level can be exploited. |
| **PhD student profile:** Architecture, Civil Engineering  |
| **UO Promoter (Name, faculty, e-mail):** prof. Dra. C. María Teresa Muñoz Castilloprof. Dr. C. Luis Enrique Bello Caballero |
| **Flemish Promoter (University/faculty, e-mail):** *prof.* PhDK. Van Balen, RLICC, KU Leuven, koenraad.vanbalen@kuleuven.be  |
| **PhD programme** (UO)**:** Tutelary PhD programme in Architecture & Urbanism |
| **PhD programme (Flemish University):** |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** The multidimensional vision of public spaces in heritage areas for the sustainable management of urban development
 |
| **Abstract** (max. 250 words): The present research aims to evaluate public spaces in heritage sites of Santiago de Cuba with a multidimensional vision that allows designing procedures aimed at their conservation and management, with the use of new ICTs, and contribute to their sustainable urban development. Taking into account that cultural heritage is a driving force for the local and regional development of cities, the proposed theme will contribute to improving the quality of life of the population through a rearrangement of urban dynamics, which will allow greater social interaction, relevance and identity with public spaces in heritage sites. Likewise, the design of procedures with the use of ICTs offered for cultural heritage as cutting-edge references, will be important for decision-makers in the city's management processes at various levels (local, provincial, regional). |
| **PhD student profile:** Architecture, Civil Engineering  |
| **UO Promoter (Name, faculty, e-mail):** prof. Dra. C. Arq. María Teresa Muñoz Castillo, Faculty of Constructions, marte7@uo.edu.cu  |
| **Flemish Promoter (University/faculty, e-mail):** * prof. PhD Andrew Vande Moere, Dept. Architecture, e-mail?
* prof. PhD K. Van Balen, RLICC, KU Leuven,koenraad.vanbalen@kuleuven.be
 |
| **PhD programme** (UO)**:** Tutelary PhD programme in Architecture & Urbanism |
| **PhD programme (Flemish University):** |
| **Local or Joint PhD:** Local PhD |
| **Subproject (SP3):** ICT and Cultural Heritage |
| 1. **PhD theme (max. 20 words):** An Internet of Things architecture for the conservation of the San Pedro de la Roca Castle
 |
| **Abstract** (max. 250 words): San Pedro de la Roca Castle (Castle of Morro) is a multi-level stone fortress at the south-eastern of Cuba. During years aggressive atmospheric agents and sources of pollution have been threaten it, mainly the ones related to wooden elements, where inappropriate timbers combined with pest attack resulted in severe degradation. The eroded walls need stabilization, other areas require consolidation, an unsightly and potentially damaging vegetal grows in walls. The property is also in active seismic zone. Because of this, the Castle CH value as it preservation are of particular interest. For conservation, the building must be kept under stable and controlled conditions, which should be monitored and registered. Many efforts for the preservation of this building has being made along the passing years, but they are time-consuming for making final assessment. The application of IoT approach would allow remote and on-line monitoring and continuous supervision of the building, given the easy access from the cloud to data recorded from electronic sensors, improving its safety and preventive conservation. Many IoT architectures have been published for the preservation of CH but only for closed environments as museums and only by monitoring microclimatic factors. Factors as soil, wood and walls are not analyzed. The objective of this research is to present IoT architecture for monitoring and conservation of the Castle of Morro, by using sensors and robots, as monitoring system with current technologies of data and image processing. An IoT architecture for structure preservation of heritage and cultural buildings is expected.  |
| **PhD student profile:** Engineering (Informatics, Automatics, Constructions) |
| **UO Promoter (Name, faculty, e-mail):** * prof. Dr. C. Maikel Noriega Aleman, Faculty of Engineering in Telecommunications, Informatics and Biomedics (FITIB), maikeln@uo.edu.cu
 |
| **Flemish Promoter (University/faculty, e-mail):**  |
| **PhD programme** (UO)**:** Automatics |
| **PhD programme (Flemish University):** |
| **Local or Joint PhD:** Undefined  |
| 1. **PhD theme (max. 20 words):** Exploitation of Augmented Reality as a tool of ICT for the management of heritage values of the city of Santiago de Cuba
 |
| **Abstract** (max. 250 words): The accelerated advance ICT makes available Augmented Reality technology (AR) which is the sum of elements of the real world with virtual components that add information such as sound, video, graphics or data of the Global Positioning System (GPS). In a virtual reality environment. The RA is increasingly present in the digital age, as a new way of knowing the world around us. There are many uses attributed to them as: education, health, architecture, advertising, entertainment and tourism. This provides a very innovative interactive component, a new way of involving tourists and visitors in the history of the city's heritage sites, which adds new value to the tourist cultural heritage. The potential of these techniques allows attracting new audiences more familiar with ICT as children and youth. Interactive exhibitions based on RA offer a more appropriate interpretive resource for knowledge and learning. The research objective is to create new computer tools for disseminate heritage of Santiago de Cuba city, say monuments, historical seats as museums using RA techniques. This system would be directed to the common user (visitors), but also to specialists and decision makers to evaluate parameters such as the state of conservation. This allows management of main city heritage values, having a positive impact on its dissemination and conservation. The ICT create a bond between heritage and visitors. This would contribute to its conservation and diffusion from an early age, contributing to computerization policy of the society. |
| **PhD student profile:** Engineering (Informatics, Automatics, Constructions) |
| **UO Promoter (Name, faculty, e-mail):** * Prof. Dr. C. Maikel Noriega Alemán. Faculty of Engineering in Telecommunications, Informatics and Biomedics (FITIB), maikeln@uo.edu.cu
 |
| **Flemish Promoter (University/faculty, e-mail):** * prof. Dr. Paolo Favero University of Antwerp
* prof. Dr. K. Van Balen, RLICC, KU Leuven
 |
| **PhD programme** (Universidad Central de Las Villas)**:** Informatics  |
| **PhD programme (Flemish University):** |
| **Local or Joint PhD:** Undefined  |
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| **Subproject (SP4):** Legal perspectives towards Cultural Heritage |

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| 1. **PhD theme (max. 20 words):** Protection and safeguard of the cultural heritage in Cuba. Bases for its improvement
 |
| **Abstract** (max. 250 words): It is considered of vital importance to investigate in how Law contribute to preservation of cultural heritage, since it’s increasingly necessary to harmonize and update the legal regime established for this purpose, with those needs to preserve and appreciate the values and distinctive features that a society estimates should be guarded. And more in the Cuban context, moved to a change to prosper, but anchored to its valuable historical-cultural foundations that identifies us and unites us with the world. The investigation is framed in the fact that substantive norm that legal operators interpret and apply in the different Cuban juridical organisms, lacks an adequate system of declaration as patrimonial goods, with its own elements that identify it in the social system and in the dynamic legal traffic, which warns the legal operator of its existence and therefore seeks the effectiveness of the regime that hangs over them; existence of a protection system based on the fundamental thing in prohibitions to the faculty of sale, administration and transformation of the good, lacking therefore rules that harmonize the faculties and powers that on them can be exercised, with those prohibitions and measures of procedural order beyond the expropriation and confiscation; as well as that the Cuban norm is omission in regulating the guiding principles of protection and patrimonial safeguard, as certain patrimonial manifestations as the international framework has rightly already done. The objective of the research is to elaborate theoretical assumptions that develop guiding principles of the system of protection and safeguarding of cultural heritage in all manifestations recognized assets that contribute to the improvement of national positive law in the current Cuban context. |
| **PhD student profile:** Laws  |
| **UO Promoter (Name, faculty, e-mail):** * Dra. C. Dra. Nilda Haydeé Rizo Pérez, hrizo@uo.edu.cu
* Dr. C. Ernesto Guevara, E-mail?

Faculty of Laws.  |
| **Flemish Promoter (University/faculty, e-mail):** Undefined  |
| **PhD programme** (UO)**:** Juridical Sciences  |
| **PhD programme (Flemish University):** |
| **Local or Joint PhD:** Joint PhD |

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| **Project name (P5)**: Obtaining, characterization and production of new materials and technologies for industrial systems |
| 1. **PhD theme (max. 20 words):** Dynamic modelling of biomass thermal conversion
 |
| **Abstract** (max. 150 words): The dynamic modelling of the biomass thermal conversion (BTC) process is an important stages for optimizing clean energy production. This topic is addressed to obtain a dynamic model to assess and optimize BTC process in order to be applied in gasification and pyrolysis plants to produce electricity/heat, dealing with one priority of the national energy strategies. Most of the published models of biomass pyrolysis are focused on stationary state. Few includes the process dynamics, but these are specific for a reactor and are non-analytical. To develop a dynamic, analytical, low order model of BTC main steps are addressed: by studying BTC kinetics using TGA experiments; by developing a mathematical model in a combined way of scaling the TGA results to a rotatory reactor oven (RRO) and modelling tuning using a metaheuristic method. The expected results are the model and the tuning method. This research is useful for the treatment of crop residues and can increase efficiency and feasibility of char production. |
| **PhD student profile:** Engineering (Mechanics, Chemistry, Automatics) |
| **UO Promoter (Name, faculty, e-mail):** * *prof.* Dr. C. Ángel Brito Sauvanell, Faculty of Mechanics & Industrial Engineering - Centre of Studies for Refrigeration (CEER), albrito@uo.edu.cu
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| **PhD programme** (UO): Tutelary PhD programme in Mechanical Engineering  |
| **Local or Joint PhD:** Local PhD |

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| 1. **PhD theme (max. 20 words):** Acoustic emission method for the porous characterization of zeolites in different adsorption systems: Heavy metals recovering/removal from mining waste streams.
 |
| **Abstract** (max. 150 words): Zeolites has been extensively used in adsorption systems such as water purification, food industry, waste stream treatment and mining. Technological limitations of Cuban industries make the porous characterization of these materials almost impossible in the country. Therefore, the study and neither optimization of industrial processes dealing with adsorption are not possible. The alternative for the exploration of new materials sources with potential applications to be produced in Cuba in order to substitute the imported materials are also limited. This would reduce the operational costs. The introduction of new technology which constitutes a priority of the Cuban government is possible. The mining industry in the eastern part of the country produces a waste stream that contains heavy metals of economic interest and how the material can be regenerated, if they could be recovered by applying a proper zeolite-base material, this would be challenging. At present, different zeolites has been not explored yet mainly because a lack development in suitable characterization methods. In this thesis a new and more suitable method based on acoustic emission is applied for the textural characterization of zeolites and its performance in the heavy-metal adsorption process.  |
| **PhD student profile:** Engineering (Chemistry, Mechanics, Automatics) |
| **UO Promoter (Name, faculty, e-mail):** * prof. Dr. C. Harold Crespo Sariol, Faculty of Chemical Engineering, harold@uo.edu.cu
 |
| **Flemish Promoter (University/faculty, e-mail):** * prof. PhD Dries Vandamme, U Hasselt, dries.vandamme@uhasselt.be
 |
| **PhD programme** (UO)**:** Tutelary PhD Programme in Chemical Engineering  |
| **PhD programme (Flemish University):** |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** Management of Hospital waste streams for the “Juan Bruno Zayas” hospital in Santiago de Cuba
 |
| **Abstract** (max. 150 words): The hospital waste streams constitute one of the most pressing environmental problems in the eastern region of Cuba. The hospital “Juan Bruno Zayas” is one of the more important Hospitals in Santiago de Cuba, not only in terms of size but also in types and number of healthcare services. The Hospital presents problems in the management strategy of the liquid and solids wastes. Although they have taken actions and certain facilities for the destruction of the solids wastes, inefficiencies and incompleteness in the management can be noticed. In this research actions will be undertaken in order to settle down an effective waste management strategy in the hospital “Juan Bruno Zayas”. Firstly, a selective separation of hazardous and non-hazardous solid waste before general collection in the hospital will be implemented. In this case, the hazardous waste still would be needed to incinerated. The non-hazardous was could then be used to study further for pyrolytic conversion. Secondly, a physical-chemical characterization and classification of the solid and liquid wastes will be carried out. Based on these results, the best treatment solution, considering the limitations in the country, will be proposed. The use of pyrolysis for selected solid waste could be one option. During pyrolysis gases are produced which are suitable for energy production, beside the production of a solid product: char. This char can as such be used (adsorber, soil amendment, energy bricks …) or further thermal treated making activated carbon from it. This char or its activated carbon or zeolites can be used to remove pollutants from the waste water from the hospital before being poured. This will reduce the contamination risk of underground water sources. The impact of this research will be significant for the oriental region of Cuba with potential applications in other hospital institutions of the country, also substantially improving the environmental politics of the Cuban health-care sector. |
| **PhD student profile:** Engineering (Mechanics, Chemistry) |
| **UO Promoter (Name, faculty, e-mail):** *prof.* Dr. C. Ángel Brito Sauvanell, Faculty of Mechanics & Industrial Engineering - Centre of Studies for Refrigeration (CEER), albrito@uo.edu.cu  |
| **PhD programme** (UO)**:** Tutelary PhD programme in Mechanical Engineering  |
| **Local or Joint PhD:** Local PhD |
| 1. **PhD theme (max. 20 words):** Static magnetic field technology for the treatment of wastewater and obtaining biomass from microalgae
 |
| **Abstract** (max. 150 words): Microalgae have generated a special interest for biomass production, thanks to its capacity to accumulate high value biomolecules of use for different industries such as: pharmaceutical, food, cosmetics and, recently, in the field of alternative energy resources from plant biological sources. Currently there are many efforts that are dedicated to increase the production of these microorganisms on a large scale. Several studies show the benefits of static magnetic field on the productivity of secondary metabolites, growth and condition of the cultures of microalgae species, among which *Chlorella*, *Spirulina* and *Dunaliella* stand out. The potential novelty of this research is an integrated magnetic treatment technology coupled to photobioreactors, to obtain biomass and wastewater treatment simultaneously from microalgae. No reports of a similar technology with magnetic treatment were found, however, this technology has as advantages the low operative cost, it has no proven toxic effects, it does not produce secondary contamination and it has a long useful life. However, a magnetic treatment technology is not yet available for this purpose. This project has the aim to develop an application methodology for this magnetic treatment by investigating the effect on the composition of the microalgae biomass and the effect on the nutrient removal as function of the microalgae growth cycle. |
| **PhD student profile:** Basic Science (Chemistry, Biology, Biochemistry), Engineering (Chemistry) |
| **UO Promoter (Name, faculty, e-mail):** * prof. Dr. C. Manuel de J. Serrat Díaz, Faculty of Basic and Natural Sciences, Centre of Studies for Industrial Biotechnology (CEBI), mserrat@uo.edu.cu
 |
| **Flemish Promoter (University/faculty, e-mail):** * prof. PhD Dries Vandamme, U Hasselt, dries.vandamme@uhasselt.be
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| **PhD programme** (UO)**:** Tutelary PhD programme in Biology  |
| **PhD programme (Flemish University):**  |
| **Local or Joint PhD:** Joint PhD |
| 1. **PhD theme (max. 20 words):** Economic assessment of the pyrolysis process of the sugar cane biomass (bagasse) in view of energy and activated carbon production for liquid waste streams treatment in sugar cane industry
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| **Abstract** (max. 150 words): Sugarcane is the crop with the highest capacity to convert solar energy into biomass. The productivity and performance of this crop depend on the soil, fertilizers and agrochemicals that are used. In Cuba, the sugar industry produces liquid waste streams loaded with sugar-derivate pollutants that affect the soil and underground water sources when landfilled. On the other hand, solid residues such as sugar bagasse can be used not only to produce energy due to their calorific value but also for activated carbon (AC) production. Pyrolysis is one of the technological options available to achieve that aim. Therefore, the economic and environmental assessment on applying of pyrolysis for energy and AC production from sugar cane biomass in the sugar industry will be carried out in this research. Optimization of the pyrolysis process and proper applications of the produced AC for liquid waste management in sugar industry will be the main objectives in this project. |
| **PhD student profile:** Economics |
| **UO Promoter (Name, faculty, e-mail):** * Undefined
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| **PhD programme** (UO)**:** Economics, Accountant & Financial Sciences  |
| **Local or Joint PhD:** Local PhD |