Research projects 2026

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Presentation

This document brings together research projects developed by the staff of Mackenzie Presbyterian University (UPM), effective in 2026. The projects are organized into seven main thematic areas, which express the academic vocation of the institution and its strategic insertion in different fields of knowledge, namely:

1. Sustainable development, infrastructure and smart cities
2. Contemporary law and new paradigms
3. Education, languages, cultures and theology
4. Entrepreneurship, business environments, operations management and market functioning
5. Innovation: materials, energy and biotechnology
6. Health and well-being in the life cycle
7. Digital technologies and artificial intelligence

The research described here corresponds to a selection of the broader set of investigations conducted at UPM, exclusively addressing projects funded by different agencies and institutions, both national and foreign. This diversity of funding sources highlights not only the relevance and competitiveness of the proposals developed, but also the external recognition of UPM's academic excellence.

The projects presented are the result of investigations guided by theoretical and methodological rigor, articulating critical reflection and commitment to the production of relevant knowledge, both in its basic and applied dimensions. In this sense, contributions that dialogue with contemporary demands stand out, promoting innovation, social impact and scientific advancement.

The UPM, therefore, consolidates itself as an institutional environment of excellence in the conduct of research projects, as well as in the training of qualified and socially committed researchers. Institutional support, combined with academic infrastructure and the tradition of the university, enhances the development of consistent research with significant reach.

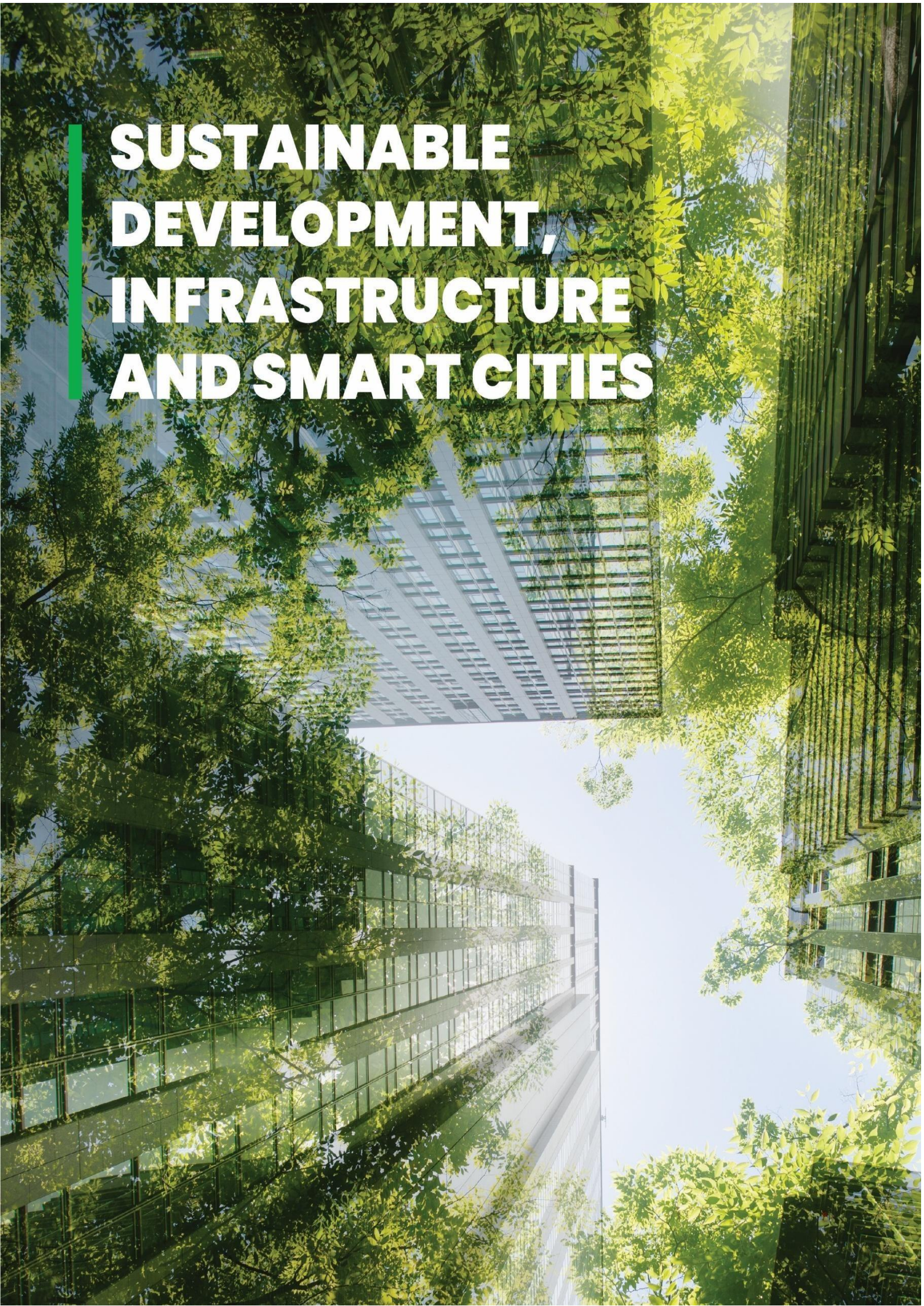
In this way, this document represents a space for recording, reflexing and disseminating the research produced at UPM, reaffirming its protagonism in the scientific scenario and the importance of continuous investment in research for social, academic and technological transformation.

Sustainable Development Goals (SDG)

The research projects presented in this document are organized according to their relationship with the Sustainable Development Goals (SDGs), established by the United Nations (UN). Each project was associated with a priority SDG, understood as the one that best represents the central purpose of the initiative, the nature of the actions involved and the intended impact.

In addition, we recognize that the complexity of social, environmental, cultural and economic challenges often means that the same project contributes to more than one dimension of sustainable development. Thus, in addition to the priority SDG, we also indicate, when relevant, secondary SDGs, which represent the complementary impacts generated by the project's activities.

To facilitate visual identification, the reader can consult the image below, which contains the official icons and the corresponding numbering of each SDG.



SUSTAINABLE DEVELOPMENT, INFRASTRUCTURE AND SMART CITIES

SDGs

6-Drinking water and sanitation

Secondary SDGs

11 and 13

Course/Program

Architecture and Urbanism

Academic unit

FAU

Funding

Mack Pesquisa

Type of funding

National

Project title

Analysis of indicators for the implementation of traditional and innovative fog receivers for the development of sustainable communities

Coordination

Loyde Vieira de Abreu Harbich

Lattes

http://lattes.cnpq.br/9845221974550386

Summary

Due to population growth, there is a tendency for the poorest to occupy vulnerable areas - areas of environmental reserve or internal geodynamic risk (earthquakes) and external geodynamics (landslides, floods, surface runoff), with partial or no water availability. The Portada community of Manchay II, in Peru, a human settlement for about 60 families built by the NGO "Peruvians without water", uses a mist water collection system called "atrapanieblas", with the possibility of obtaining about 200L/night. The objective of this proposal is to develop a traditional prototype and an innovative, low-cost prototype, which will be tested and validated at Mackenzie Presbyterian University and in the territory of Portada Manchay II. The expected result is to identify the indicators for the installation of prototype equipment for the extraction of water from the fog efficiently. This solution is expected to develop more sustainable communities in water-scarce territories and meet SDGs 1, 2, 6, 9, 11 and 13, 17.

SDGs

11-Sustainable cities and communities

Secondary SDG 12

Course/Program

Administration

Academic unit

CCT

Funding

Mack Pesquisa

Type of funding

National

Project title

Architecture of Economic Choices and Incentives: A Field Study on the Impact of *Nudges* and Cashback Systems on Selective Solid Waste Collection in Vulnerable Urban Communities

Coordination

Leila Rocha Pellegrino

Lattes

http://lattes.cnpq.br/4443663911135538

Summary

This project aims to evaluate the effectiveness of behavioral economics-based interventions to foster selective collection in low-income communities with limited access to public services. Using a randomized field trial (RCT), the study tests the impact of a *cashback* system, alone and in combination with *nudges*, on adherence rates and the volume of recyclable waste collected. The objective is to generate a scalable intervention model that promotes urban sustainability and income generation, offering subsidies for the development of innovative and efficient public policies.

SDGs

11-Sustainable cities and communities

Secondary SDG 10

Course/Program

PPGAU

Academic unit

FAU

Funding

Mack Pesquisa

Type of funding

National

Project title

The city that cares: contributions from the Brazilian context

Coordination

Luiz Guilherme Rivera de Castro

Lattes

http://lattes.cnpq.br/3552510477284234

Summary

The issues of care, present since the dawn of humanity, have become central in recent debates that highlight insufficiencies in public policies and daily practices, intensified by the pandemic and persistent in the post-pandemic. These debates go beyond the field of health, involving anthropology, sociology, philosophy and law, which reveals the interdisciplinary importance of the theme. In Brazil, although there are studies on urban health and environment, research on care in architecture and urbanism is still rare. This project seeks to identify elements, components, and processes related to care in the urban environment in the context of climate emergency, investigating their presence – or absence – in urban spaces based on gender, age, physical-cognitive capacities, and social stratum. The research will continue national and international dialogues, contributing to a network on "cities that care". Methodologically, it will use literature review, interviews, focus groups and participatory research, with members of the communities acting as co-researchers. It is expected to contribute, in an innovative way, to the identification and creation of participatory practices – community, public, private or third sector – and to the establishment of ecologies of knowledge oriented to sustainable, inclusive, resilient and caring cities.

SDGs

06-Drinking water and sanitation

Secondary SDGs

11

Course/Program

PPGAU

Academic unit

FAU

Funding

CNPq Research Productivity Grant Level 1A

Type of funding

National

Project title

From tropical nature to environmental collapse: new parameters for Architecture and Urbanism in Brazil

Coordination

Renato Luiz Sobral Anelli

Lattes

http://lattes.cnpq.br/1479357603158076

Summary

The research aims to define a specific theoretical contribution to the research group on two articulated fronts: the necessary conceptual reflection on the relationship between the environment and the city, which is capable of rescuing the role of nature for the constitution of Modern Brazilian Architecture; and a second front of action that involves experimental, analytical and propositional activities, in case studies defined by hydrographic basins in urban areas. It is intended to contribute to the construction of an urban system that guides the actions of planning and environmental urban design of the landscape.

SDGs

11-Sustainable cities and communities

Secondary SDG 16

Course/Program

PPGAU

Academic unit

FAU

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

The urban debate in São Paulo (Part V): norms and legislation

Coordination

Candido Malta Campos Neto

Lattes

http://lattes.cnpq.br/6447049589028912

Summary

Continuing the previous project (The urban debate in São Paulo, 1945-1965 (Part IV), developed between 2018 and 2021, which in turn continued the previous Research Productivity projects (The urban debate in São Paulo, 1945-1965 (Part III), developed between 2015 and 2018; The urban debate in São Paulo, 1945-1965 (Part II): Protagonists and documents, developed in the period 2009-2012; and The urban debate in São Paulo, 1945-1965: dilemmas, proposals, and contributions, developed in the period 2006-2009 - these researches gave continuity to the Doctoral Thesis defended in 1999, "The Directions of the City: Urbanism and Modernization in São Paulo", which addressed the period between the end of the nineteenth century and 1945, published in a book in 2002 - this project analyzes aspects of the development of urbanism and urban planning in the city of São Paulo in the twentieth century, focusing on the period between 1945 and 1965, with emphasis on regulations and urban legislation.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

13

Course/Programme

Information System

Academic unit

FCI

Funding

Mack Pesquisa

Type of funding

National

Project title

***Deep learning* applied to InSAR images – a method involving space and time for the detection of tailings dam landslides in mining**

Coordination

Anderson Adaime de Borba

Lattes

http://lattes.cnpq.br/5749588185802376

Summary

This project proposes to develop an innovative methodology based on Interferometry by Synthetic Aperture Radar (InSAR) to predict soil displacements, with a focus on preventive monitoring of tailings dams. InSAR technology allows remote detection of millimeter deformations of the earth's surface, even under adverse conditions, representing an important advance compared to conventional geotechnical methods, which require physical sensors and direct access to dams, increasing costs. The project integrates remote sensing and deep learning algorithms to create predictive models using high-resolution InSAR images and collaboration with institutions in Canada, New Zealand, and Brazil. In the applied field, it seeks to develop embedded *software* for unmanned aerial vehicles and satellites, expanding the use of the technology in dams, road slopes and cultivation areas. It is expected to generate high-impact publications, train qualified human resources and create an effective tool to prevent environmental disasters such as those in Brumadinho and Mariana. The initiative strengthens UPM's insertion in global networks and national capacity in SAR/InSAR technologies, in line with the development of the CBERS-6 satellite, the first Brazilian satellite with SAR technology.

SDGs

11-Sustainable cities and communities

Secondary SDG 09

Course/Program

PPGCA

Academic unit

FCI

Funding

Mack Pesquisa

Type of funding

National

Project title

Development of an urban digital twin as an obtainer of city dynamics to support sustainable planning and risk management

Coordination

Fabio Silva Lopes

Lattes

http://lattes.cnpq.br/2302666201616083

Summary

Climatic phenomena, such as extreme heat waves and floods, compromise the quality of urban life, concomitant with population growth, which increases the demands for infrastructure. In the face of this urban complexity, the analysis of different data sources for decision-making becomes arduous and time-consuming. In this context, technological resources can contribute to this demand, optimizing processes. This project explores the use of digital twin technology as a data visualization layer in a project integrator platform focused on urban dynamics, subsidizing decision-making on improvements in quality of life, governance and sustainability.

SDGs

14–Life in the water

Secondary SDGs

15, 12, 09, 06 and 03

Course/Program

PPGEMN

Academic unit

EE

Funding

CAPES

Type of funding

National

Project title

Development and construction of innovative and sustainable filtration systems based on hybrid nanostructures: environmental preservation by retention of by-products of ammunition synthesis of the army

Coordination

Thiago da Cruz Canevari

Lattes

http://lattes.cnpq.br/6149251163133726

Summary

The main factory of IMBEL – Indústria de Material Bélico do Brasil is the Presidente Vargas chemical munitions factory, located in Piquete, São Paulo. This factory began its activities in the nineteenth century and maintains them to the present day, producing TROTIL (trinitrotoluene), which is a reinforcer for grenades, mines, torpedoes, aviation bombs, blast charges and, as a component, dynamite, plastic explosives and nitrocellulose, used in the manufacture of gunpowder. This project aims to build innovative filtration systems and electronic devices coupled to smartphones, containing electrochemical nanosensors, with environmental applications, with emphasis on the retention and diagnosis of effluents generated at the Presidente Vargas chemical munitions factory.

SDGs

11-Sustainable cities and communities

Secondary SDG 13

Course/Program

PPGAU

Academic unit

FAU

Funding

Mack Pesquisa

Type of funding

National

Project title

Climate emergency and public policies in Brazilian cities: challenges of urban resilience in environmentally sensitive areas

Coordination

Angélica Aparecida Tanus Benatti Alvim

Lattes

http://lattes.cnpq.br/3698530751056051

Summary

In the context of climate change, the urban occupation of environmentally sensitive areas is often intensified by socio-spatial inequalities, highlighting the urgency of developing strategies that promote urban and environmental resilience. This research aims to investigate how urban public policies, expressed in plans, programs and projects, can be improved to mitigate socio-environmental conflicts in sensitive areas in the face of the climate emergency. It is proposed to deepen a method of analysis that incorporates the multiple dimensions of sustainability in public policies, aiming to contribute to the improvement of plans and projects that respond effectively to climate challenges and improve the quality of life of the most vulnerable communities.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

11

Course/Program

Engineering

Academic unit

CCT

Funding

Mack Pesquisa

Type of funding

National

Project title

Study of beam-column connection in precast concrete using high-strength steel

Coordination

Pablo Augusto Krahl

Lattes

http://lattes.cnpq.br/6910799550680489

Summary

High-strength steels and concretes allow the reduction of the consumption of virgin raw materials in civil construction, enabling more sustainable solutions. Steel with greater strength allows solving practical difficulties in execution, such as concreting in regions that are usually designed with high reinforcement rates. Brazil already produces concrete (55MPa to 90 MPa) and long steel (700 MPa) classified as high strength. However, the standards that recommend the design of reinforced and precast concrete structures contemplate high-strength concrete and not high-strength steel, called CA-70 here. In addition, there are still gaps in knowledge that require experimental research on this steel. Some topics include structural displacement, anchorage, and adhesion. In this context, precast concrete connections, composed of Gerber teeth and corbels, are typically regions with high reinforcement density and can benefit from the use of CA-70 steel. Therefore, the objective of this research is to investigate in the laboratory the behavior of the beam-column connection in precast concrete with CA-70 steel. It seeks to evidence the effectiveness of solutions with high-strength materials, generating solutions that increase productivity and sustainability. The project will be developed involving Mackenzie Presbyterian University (UPM) in collaboration with large companies in the segment (ArcelorMittal and Leonardi Pré-Fabricados).

SDGs

11-Sustainable cities and communities

Secondary SDG 13

Course/Program

Architecture and Urbanism

Academic unit

FAU

Funding

Mack Pesquisa

Type of funding

National

Project title

Studies and performance evaluations of sustainable urban drainage devices "rain gardens" as a solution to reduce flood risks

Coordination

Afonso Celso Vanoni de Castro

Lattes

http://lattes.cnpq.br/0870667226690661

Summary

The project addresses the effects of climate change on Brazilian cities, highlighting the increase in extreme hydrological events and their impacts on urban drainage infrastructure. It recognizes the interdependence between climate, ecosystems and urban environments and advocates the need for adaptation to mitigate impacts on human well-being and sustainable development. The strong population concentration in cities highlights the urgency of public policies aimed at adaptation. The study proposes a partnership between academia and public managers to review urban construction paradigms, focusing on nature-based solutions (NBS), such as rain gardens, which integrate vegetation and drainage systems to reduce runoff and improve rainwater quality. Although promising, such solutions lack performance evaluations and economic studies that allow them to be compared to traditional infrastructure. The project seeks to fill this gap through field evaluations carried out with academic and technical teams from the Sé Subprefecture. The research aims to understand factors that influence the performance of NBS, optimize their projects, and demonstrate their feasibility as a sustainable alternative to gray infrastructure. The ultimate goal is to contribute to more resilient public policies that are aligned with climate challenges in Brazilian cities.

SDGs

11-Sustainable cities and communities

Secondary SDG 16

Course/Program

PPGAU

Academic unit

FAU

Funding

Mack Pesquisa

Type of funding

National

Project title

Restoration factory: mobilization and training

Coordination

Nadia Somekh

Lattes

http://lattes.cnpq.br/5961049811271305

Summary

This research aims to develop and propose innovative methodologies for the management of the historical heritage of Bexiga, articulating local mobilizations and aiming at the recovery and collaborative valorization of the constructed heritage, through an effective and inclusive community participation. The methodology includes agent mapping; elaboration of cartographies; collective joint projects; documentary and oral analysis; formation of a trans-disciplinary team with the participation of residents of the area and institutions and training and restoration actions. The proposal is for the Restoration Factory to be an instrument for an effective process of creating a collective project and implementation, insofar as it presents itself as a tool for the construction of the inclusive city.

SDGs

12-Responsible consumption and production

Secondary SDGs

03 and 13

Course/Program

Engineering

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Sustainable cosmetic aerosol formulations: environmental impact, applied safety, and ESG-based technological innovation

Coordination

Marcelo Alexandre Tirelli

Lattes

http://lattes.cnpq.br/4630194230201313

Summary

This project proposes to develop cosmetic formulations in aerosols with a focus on sustainability and safety, selecting ingredients with less environmental impact. The Maximum Incremental Reactivity (MIR) metric will be used to evaluate the contribution of Volatile Organic Compounds (VOCs) in the formation of tropospheric ozone, considering different propellants, solvents and fragrances. As an innovation, extracts of *Bambusa vulgaris,* rich in bioactive compounds, will be incorporated into aerosol hydrating creams. The formulations will be optimized with low-reactivity propellants, such as dimethyl ether (DME), as well as butane and propane blends. In line with SDGs 03, 12 and 13, the project strengthens the Mackenzie-ABAS partnership.

SDGs

11-Sustainable cities and communities

Course/Program

PPGAU

Academic unit

FAU

Funding

CNPq Research Productivity Grant Level 1C

Type of funding

National

Project title

***Garden suburbs* and the control of urban sprawl: a model of English urbanism and its international appropriation: the cases of London, Dresden, Paris and São Paulo**

Coordination

José Geraldo Simões Junior

Lattes

http://lattes.cnpq.br/1220159473975458

Summary

The research is based on the understanding of the trinomial: urban expansion control; street regulations; garden suburbs as an urban pattern for the orderly occupation of peripheral areas and as a policy aimed at the provision of social housing throughout the first decades of the twentieth century. based on English theoretical references, the project for Hampste-ad and also the ideas of Camillo Sitte. And it was appropriated in France, Germany and Brazil with various forms of rereading and application. The objective of this research proposal will be, therefore, the study of these variants in four different contexts: London, Dresden, Paris and São Paulo, with the different planning regulations for the areas of urban expansion, such as the Town Planning Act (1909), the Fluchtliniengesetz (1875), the Loi Cornudet (1919) and the Streets Law (1923), based on the study of four examples of urban expansion.The garden suburbs of Hampstead (London), Hellerau (Dresden), Suresnes (Paris) and Alto da Lapa (São Paulo). The study will address not only the issues of the reformist ideology, the original urban project, but also the mutations that have occurred in these places over the last 100 years, the heritage preservation policies applied, also discussing the model of the suburb garden as an alternative to contemporary urban projects, where the environmental, social and better quality of life premises are strongly present.

SDGs

11-Sustainable cities and communities

Secondary SDGs

13, 16 and 17

Course/Program

PPGAU

Academic unit

FAU

Funding

DFG

Type of funding

National

Project title

Living laboratories: theorization of an urban scientific approach based on practical examples in Brazil and Germany

Coordination

Ana Paula Koury

Lattes

https://lattes.cnpq.br/7426027336502858

Summary

Cities around the world have adopted Real-World Labs (RWLs) – living labs or Reallabore – to test innovative solutions in climate adaptation, mobility, energy, and urban governance. These spaces bring together researchers, public administrations, civil society and economic actors to experiment with interventions in real contexts. Although it is expanding rapidly in Europe and Latin America, there are still gaps in scientific foundations, evaluation criteria, and governance models. This international project, developed between the Berlin Center for Social Sciences and Mackenzie Presbyterian University, seeks to fill this gap by proposing a robust theoretical and methodological framework for RWLs in urban planning, supported by practical experiences in Germany and Brazil, including initiatives from the INCT Klimapolis. The research analyzes ten case studies (five in each country), examining how laboratories are designed, governed, monitored, and evaluated. With comparative analyses, *workshops* in São Paulo and Berlin, and collaboration with practitioners and policymakers, the project seeks to define clear and transferable criteria for measuring social and scientific impact. By strengthening evaluation standards and theoretical foundations, it contributes to making RWLs more transparent and reliable and supporting cities in using experimental approaches to promote sustainable, democratic and socially just urban transformations, based on sound research and accountability.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

11, 12 and 13

Course/Program

Engineering

Academic unit

CCT

Funding

CNPq

Type of funding

National

Project title

Predictive models for the service life of dismountable composite beams: creation of digital twins for management of structural condition and wear overtime

Coordination

Pablo Augusto Krahl

Lattes

http://lattes.cnpq.br/6910799550680489

Summary

There is a global urgency to develop solutions capable of reducing the environmental impact of civil construction. Strategies based only on recycling, a practice that is still prevalent in countries such as Brazil, are insufficient to promote structural changes in the sector. In this context, this project proposes the development of methodologies for optimizing cross-sections of dismountable steel-concrete composite beams, using high-performance materials and circular economy concepts. The research integrates probabilistic mechanics, machine learning, and experimental data to estimate the lifespan of these structural elements and enable the creation of di-gittal twins. These digital twins consist of networks of models capable of predicting the future condition of physical systems based on real data. Experimentally, aging and degradation processes of dismountable mixed beams will be investigated by means of destructive and non-destructive tests, including exposure in a salt spray chamber. The data obtained will feed predictive models aimed at estimating the useful life in the face of chloride ion ingress in ultra-high performance concretes and corrosion in steel elements. It is expected that the methodologies developed will contribute to increase structural durability, reduce raw material consumption and encourage the reuse of structural elements.

SDGs

11-Sustainable cities and communities

Secondary SDG 15

Course/Program

PPGAU

Academic unit

FAU

Funding

CNPq Research Productivity Grant Level 1D

Type of funding

National

Project title

Urban plans and projects for Brazilian cities: Challenges of resilience in protected areas

Coordination

Angélica Aparecida Tanus Benatti Alvim

Lattes

http://lattes.cnpq.br/3698530751056051

Summary

The CNPq Research Productivity Grant project aims to consolidate a method of analysis of plans, projects and interventions in protected and environmentally vulnerable areas, identifying advances and challenges to promote sustainability and urban and environmental resilience. The application of the method will allow the recognition of limits, challenges and innovations of urban and environmental policies expressed in local plans, projects and interventions, indicating paths for the resilience of communities in socio-spatial vulnerability integrated with principles of environmental preservation and recovery. The contributions include theoretical and scientific advancement, development of methodologies for public policy analysis, training of human resources and scientific production. They are organized into five axes: (1) Knowledge bases for the public sector, through the improvement of urban and environmental instruments and the identification of resilience strategies in territories with preservation areas; (2) Teaching and training, with theoretical-methodological and instrumental deepening for the analysis of urban plans and projects in protected areas; (3) Social practices, enhancing participation, policy evaluation and shared governance for more democratic planning and management; (4) Strengthening of the national and international research network; (5) Continuous publication of results through articles, books, chapters and presentations at scientific events.

SDGs

11-Sustainable cities and communities

Secondary SDGs

Course/Program

PPGAU

Academic unit

FAU

Funding

CNPq
Research
Productivity
Grant
Level PQ-2

Type of funding

National

Project title

Urban projects, development strategy and urbanity. Principles, values and scales

Coordination

Eunice Helena Sguizzardi Abascal

Lattes

http://lattes.cnpq.br/2158833016113682

Summary

The research, proposed for renewal of the PQ Productivity Scholarship, aims to analyze the relationship between urban plan and project considering contextual and multidimensional conditions, such as institutional and regulatory context, management, technical-political context, urban instruments and forms of financing; vision of the city assumed in the conception of plans and projects; governing principles and values; priorities, hierarchy of actions and execution; forces and actors involved, consensus, conflicts and impacts; relationship of urban design with economy, innovation, technologies and multi-scale circuits; networks and integration of plans at local, regional and global scales; and articulation between discourse and execution, including meeting social demands, housing, social housing, public spaces and equipment. The specific objective is to build a methodology, for the analysis of urban plans and projects, based on the premise that principles and values are contextualized according to time and place, but that every action contains multidimensional assumptions - economic, socio-environmental, and cultural - that pragmatically and ethically structure the agenda of urban projects.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

12

Course/Program

Engineering

Academic unit

CCT

Funding

Mack Pesquisa

Type of funding

National

Project title

Reuse of steel fibers from tires in concrete with CA-70 steel armor: evaluation of mechanical properties and durability

Coordination

Mariana de Almeida Motta Rezende

Lattes

http://lattes.cnpq.br/5831585097579532

Summary

This project investigates structural concrete produced with recycled steel fibers from scrap tires and high-strength reinforcement (CA-70), aiming to increase durability in the face of carbonation and chloride penetration. The proposal continues previous studies that identified mechanical gains and challenges in the passive protection of armatures. Physical, electrochemical and microstructural tests will be conducted to understand mechanisms of corrosion and ion transport. The expected results include unpublished data, scientific publications, and technical subsidies that can support standards. The project contributes to sustainability, training of human resources and waste recovery, falling within the theme of Smart and Sustainable Cities.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

12 and 13

Course/Program

Engineering

Academic unit

CCT

Funding

Mack Pesquisa

Type of funding

National

Project title

Reuse of wastewater treatment plant waste for the development of high-strength concrete with a low CO2 footprint

Coordination

Milena Guedes Maniero Ferreira

Lattes

https://lattes.cnpq.br/3520224809866647

Summary

The cement industry is under pressure due to its considerable emissions of carbon dioxide (CO2), one of the main agents of global warming. The search for sustainable alternatives and proper waste management become crucial to promote more responsible and cost-effective practices. This project aims to evaluate the pozzolanic properties of calcined water treatment plant sludge, exploring its feasibility as a material for high-strength concrete. In this way, it is intended to contribute to mitigating the environmental impacts of cement production, reducing CO2 emissions and exploring new strategies for waste reuse.

SDGs

11–Sustainable cities and communities

Course/Program

PPGEP

Academic unit

EE

Funding

Petrópolis Group, SENAI and Embrapii

Type of funding

National

Project title

Intelligent system for glass reverse logistics

Coordination

Alaercio Nicoletti Junior

Lattes

https://lattes.cnpq.br/1007765213145350

Summary

This project aims to develop technological and innovative solutions for the Glass Circularity Ecosystem, aiming to increase the collection of urban solid glass waste and raise awareness among consumers and points of sale regarding the responsible disposal of consumed packaging, in order to provide its reinsertion in the same or in new production cycles. An application will be built to manage the collection and destination of solid glass waste and a solution will be developed for glass collection, involving equipment for crushing, weighing, separation by color (which maximizes the value received per ton of product) and other improvements. The logistics of collection with a motorcycle or truck, preferably electric, will be adopted to minimize CO2 emissions. Pilots will be carried out for the collection and destination of recycling material, as well as the testing and improvement of the application. Material will be created to raise awareness of sales points and society, as well as its application in pilots. The pilot school will be built in a container or on a mobile basis by truck.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

12

Course/Program

Production Engineering

Academic unit

EE

Funding

Petrópolis Senai

Type of funding

National

Project title

Petrópolis Glass Circularity Ecosystem Management System

Coordination

André Luís Helleno

Lattes

http://lattes.cnpq.br/7064793849391367

Summary

The project proposes to solve challenges of the Petrópolis Group's Industrial Mission through the creation of the Petró-polis Glass Circularity Ecosystem Management System, connecting consumers (condominiums, bars, restaurants and events), logistics operators, cooperatives and recyclers. Consumers will be encouraged to recycle through gamification, while the data collected will allow them to generate efficient reverse logistics routes and train the glass until it is recycled, enabling the generation of reverse logistics credits. The central innovation is the prominence of the glass cullet: the crushing close to the consumer and the separation by colors (transparent, green and amber) increase the commercial value of the material and make the operation economically viable. For this, the Mobile Intelligent Glass Shredder (TRIVIM) will be developed, responsible for crushing the glass and sending data of origin, date, time and quantity to the system. A Consolidation and Deposit Point (PCD) will also be created to store the separated glass. The proposal is the result of a partnership between the SENAI Institute of Innovation ISI-TICs and the Mackenzie Presbyterian University (Production Engineering).

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

11

Course/Program

Design

Academic unit

FAU

Funding

Mack Pesquisa

Type of funding

National

Project title

TIA MACK MOBILITY – *Macke-nzie open innovation* toolkit for mobility: co-development and validation of tools for innovation with CPTM

Coordination

Ivo Eduardo Roman Pons

Lattes

http://lattes.cnpq.br/4135742496537112

Summary

In view of CPTM's strategic transformation, this applied research project, a partnership between the company and the Design Course, aims to co-develop, create and validate "TIA MACK MOBILITY", an open innovation toolkit. The objective is to enable CPTM and the mobility ecosystem to transform operational challenges into value solutions, through a set of pioneering methodological tools, specific to the rail sector. The initiative, based on Service Design, will generate intellectual impact (unprecedented character), economic (potential for new business) and social impact (improvement of public service), strengthening university-company collaboration.

SDGs

11-Sustainable cities and communities

Course/Program

PPGAU

Academic unit

FAU

Funding

Mack Pesquisa

Type of funding

National

Project title

Urbanities as the production of places, the urban condition and the transformation of uses in the central area of São Paulo

Coordination

Eunice Helena Sguizzardi Abascal

Lattes

http://lattes.cnpq.br/2158833016113682

Summary

The group "Paradigms for the study of Ibero-American cities in the 21st century", led by Eunice Helena S. Abascal and Ricardo H. Medrano, has been investigating since 2004 the transformation of urban space in contemporary Ibero-American cities, in a comparative perspective. His studies analyze urban practices and interventions derived from programs, plans and projects aligned with the current urban policy, considering the historical conditions of the formation of cities and the impacts of these transformations on public spaces and their uses and appropriations. This project seeks to investigate the urbanities produced by pre-existing processes and urban transformation, understood as multiple spatial experiences and specific forms of sociability. The notion of urbanities underlies the production of urban spaces as systems of uses and appropriations that express ways of living and experiencing the city. It is assumed that changes in use induce new social practices and redefine everyday life. In the last 20 years, public programs, plans and projects have promoted the redesign and improvement of public spaces (Paiva; Schicchi, 2020), expanding its dynamism, while collectives and participatory processes mobilize different actors, highlighting the need for new readings of urban reality, its forms of action and appropriation of its spaces.

SDGs

11-Sustainable cities and communities

Secondary SDGs

Course/Program

PPGAU

Academic unit

FAU

Funding

CNPq

Type of funding

National

Project title

Urbanities as the production of places: the urban condition and the transformation of uses in the central area of São Paulo

Coordination

Eunice Helena Sguizzardi Abascal

Lattes

http://lattes.cnpq.br/2158833016113682

Summary

Urbanities are investigated, defined as multiple experiences of the city and specific forms of sociability. The hypothesis is that the transformations of uses, including spaces for public use, induce new social practices and transform the dimension of daily life, defining urbanities. The general objective is to investigate the production of socially significant places, in their process of trans-formation of uses and appropriations, in a way that is inseparable from the pre-existing urban space. The study area is located in the center of São Paulo, districts República, Santa Cecilia and Consolação. In this region, the following were elected: Eleva-do Costa e Silva, between Marechal Deodoro and Roosevelt Squares, Roosevelt Square and Augusta Park.

SDGs

08-Decent work and economic growth

Secondary SDG 09

Course/Program

Architecture and Urbanism

Academic unit

FAU

Funding

Mack Pesquisa

Type of funding

National

Project title

Evidence-based urbanism: notes on Street Retail Poles from geospatial data science as an instrument for the production of knowledge and support for decision-making and elaboration of Public Policies

Coordination

Larissa Garcia Campagner

Lattes

https://lattes.cnpq.br/5185610027004148

Summary

Based on evidence-based urbanism, this third stage of the research on Street Retail Poles (PVRs) aims to expand the analysis of PVRs using release 1.0 of the web platform, produced in pages 1 and 2, and developing new functionalities (release 2.0). The current database has more than 1 million entries analyzed, mapped and made available in web format. The new data insertions for this stage, anchored in a robust methodology and the improvement of an already functional system, seek to generate a dynamic tool for the observatory of commerce, a source of decision-making - investments - and the formulation of public policy.

SDGs

11-Sustainable cities and communities

Course/Program

PPGAU

Academic unit

FAU

Funding

CNPq Research Productivity Grant Level 1D

Type of funding

National

Project title

Verticalization, cultural heritage and urbanity: possible reflections and actions?

Coordination

Nadia Somekh

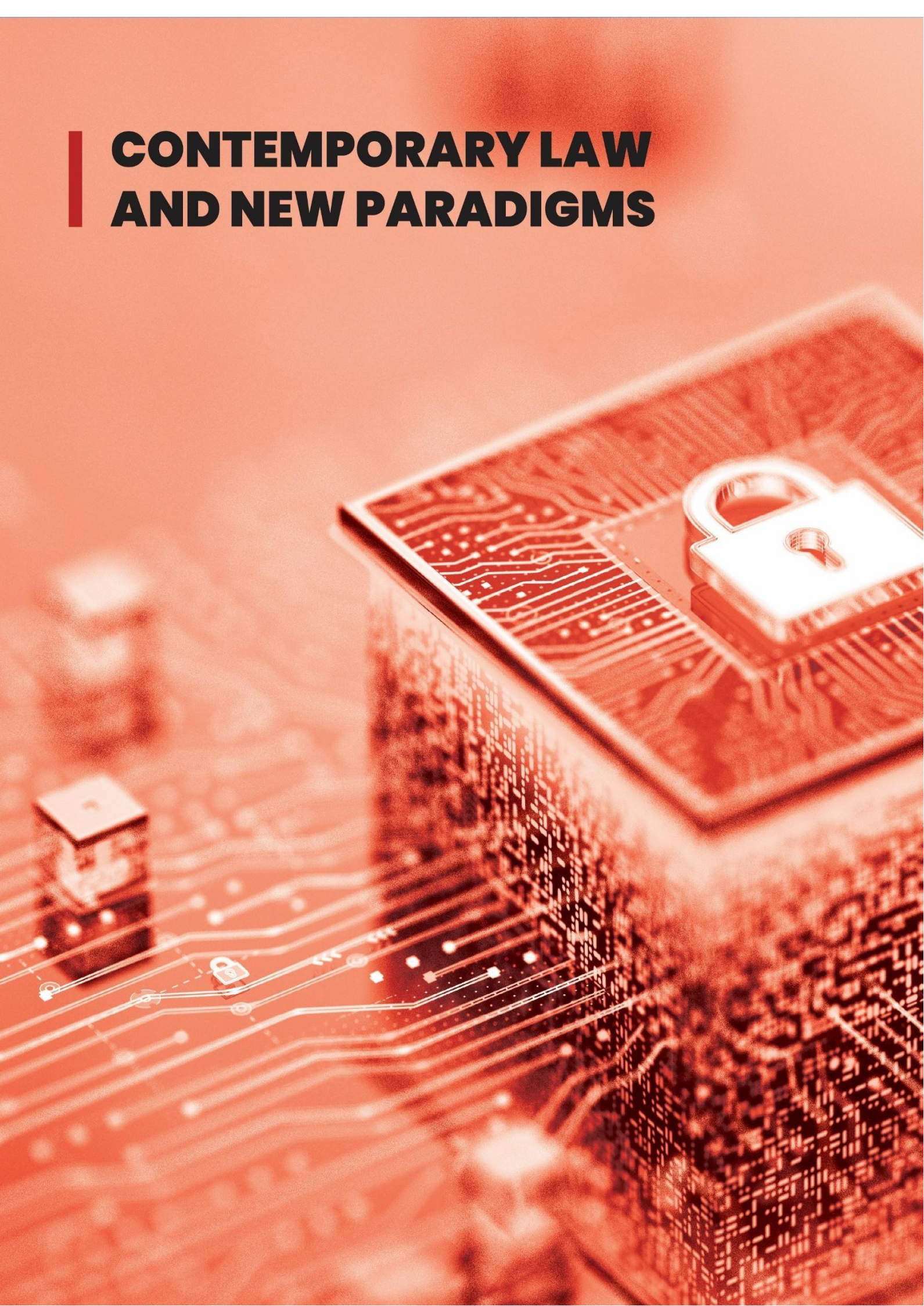
Lattes

http://lattes.cnpq.br/5961049811271305

Summary

The research presented for the renewal of the Productivity Scholarship deepens the original project on verticalization, social inclusion and urbanity. It is based on the binomial management-so-production of knowledge, in which reflection on management practices feeds back into the formulation of public policies. The work at the CAU/BR allowed us to understand the dimension of urban problems aggravated by the pandemic, guiding three axes: deepening studies on verticalization; participation in urban projects focused on urbanity; and reducing inequalities in Brazilian cities. The researcher's position in the presidency of the CAU/BR conferred an institutional critical perspective. New projects, such as Copolis, a partnership with UKleuven and the implementation of ATHIS, expand the local dimension and social participation. The advance on verticalization, densities and Compact City evidenced the urban duality and the primacy of the market in the legislation. The research evolves to new scales and to the discussion of social participation in interventions, especially in central areas subject to gentrification and material restoration focused more on heritage than on the needs of the population. Thus, it poses three main questions: how to understand the interaction between popular groups and local actions; how to formulate active methodology for urban design and public policies; and what is the role of the architect and urban planner, seeking social protagonism through mixed methodology supported by academic experiences and participatory cartography.

CONTEMPORARY LAW AND NEW PARADIGMS



SDGs

16–Peace, justice and effective institutions

Secondary SDGs

12

Course/Program

Law

Academic unit

FDIR

Funding

Mack Pesquisa

Type of funding

National

Project title

Applicability of the principles of environmental law to the digital environment

Coordination

Ricardo Libel Waldman

Lattes

http://lattes.cnpq.br/5138875442525636

Summary

This project discusses the application of the principles of environmental law to the digital environment. It is based on the provision of Brazilian law that the ways of doing, creating and living of the people are part of the cultural environment (art. 216, II, CF), which currently also occur in digital media, according to sociological analysis, and in the fact that Brazil has adopted the broad concept of environment, which includes its cultural (and, therefore, digital) dimension. It aims to investigate the legal consequences of this fact, especially regarding the principles of prevention, polluter pays and precaution, through the hypothetical-deductive method with bibliographic research and jurisprudence.

SDGs

16–Peace, Justice and Effective Institutions

Secondary SDG 17

Course/Program

PPGDPE

Academic unit

FDIR

Funding

European Union

Type of funding

Foreign

Project title

Attacks on democracy and populisms. New academic program for the strengthening of institutions in Latin America, DEMOS

Coordination

Mariana Barboza Baeta Neves Matsushita

Lattes

http://lattes.cnpq.br/5719962030118437

Summary

The general objective of the DEMOS Project is to research methods of strengthening Latin American democratic institutions, as well as ways of maintaining harmony between the three branches of the State for the maintenance of political sovereignty through popular vote. In addition, it aims to analyze governments that put democracy at risk and the consequent damage to democratic institutions. The DEMOS Project is funded by the European Union through the Capacity Building Erasmus+ Plus project. The following teaching institutions participate in the project in an international research network: Mackenzie Presbyterian University (Brazil); Unialfa (Brazil); Universidad Castilla de La Mancha (Spain); Universidad Libre (Colombia); Colegio Mayor de Nuestra Señora Del Rosario (Colombia); Universidad de Tru-jillo (Peru); Università di Bologna (Italy); Università di Siena (Italy); Pontifical Catholic University of Peru (Peru); Universidad de la Frontera (Chile); Institut d'études politiques de Paris (France).

SDGs

16–Peace, justice and effective institutions

Course/Program

PPGDPE

Academic unit

FDIR

Funding

Mack Pesquisa

Type of funding

National

Project title

Digital citizenship and artificial intelligence: ethical impacts and social policies in contemporary public policies

Coordination

Gianpaolo Poggio Smanio

Lattes

http://lattes.cnpq.br/9297681530922931

Summary

The Federal Constitution of 1988 listed citizenship as the foundation of the Federative Republic of Brazil, transforming it into an interpretative vector of the entire legal system. If in its participatory dimension citizenship is linked to the realization of fundamental rights, with the insertion of the technological paradigm, especially due to the rise of legal debates on artificial intelligence, its inclusive conception is resized with undeniable social relevance. There is a latent impact on reflections on the implementation of public policies, considering them to be instruments for guaranteeing rights. The legal challenges related to the technological paradigm are strengthened by the impact of artificial intelligence, considering the uniqueness of "automated decisions", which often disregard citizenship and the fundamental rights that guide and underpin the rule of law. The present research highlights the importance of understanding the redimensioning of citizenship and fundamental guarantees.

SDGs

16–Peace, justice and effective institutions

Secondary SDGs

09

Course/Program

PPGDPE

Academic unit

FDIR

Funding

CNPq

CNPq Research Productivity Grant Level PQ–C

Type of funding

National

Project title

Legal education and artificial intelligence: challenges and potentials

Coordination

Felipe Chiarello de Souza Pinto

Lattes

http://lattes.cnpq.br/9554142049617388

Summary

The research project investigates how new artificial intelligence (AI) technologies can contribute to the improvement of legal education and what challenges they present to the agents involved in the teaching–learning process in the field of Law. In constant contrast, tradition and innovation meet in the same scenario of emerging transformation. It is based on the premise that, in legal education, the integration of AI offers significant opportunities for the faculty and students, but it also brings ethical, methodological and pedagogical challenges, which must be overcome as a priority. These transformations require that the teaching of Law not only incorporate these themes into its curricula, which go beyond the classic regulatory and normative discussions, but also adopt an interdisciplinary pedagogical approach, which will be responsible for a solid education and dialogue with the new technologies imposed by the current social reality. It uses exploratory methodology and inductive analysis, with national and international bibliographic, documentary and technological base.

SDGs

11-Sustainable cities and communities

Secondary SDGs 14 and 15 / 07, 12 and 13 /

Course/Program

PPGDPE

Academic unit

FDIR

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Sustainable development strategies and ecological transition: the role of environmental law

Coordination

Solange Teles da Silva

Lattes

http://lattes.cnpq.br/7531637444907998

Summary

The present research project aims to analyze the role of environmental law in the construction and implementation of sustainable development and ecological transition strategies. Thus, the strategies for planning and implementing policies for the energy transition, the protection and conservation of bio-diversity - terrestrial and marine - and the control and minimization of health risks will be analyzed, inquiring about the potential of the Sustainable Development Goals to promote the ecological transition. This approach considers the centrality of the study of legal norms in the international, regional and domestic spheres and their effectiveness, reflecting on the relationship between rights, sustainable development and ecological transition. In the period from 2023 to 2025, this research project aims to deepen the analysis of structural issues in sustainable development and methodological innovations in research in environmental law that make it possible to drive the ecological transition, strengthening existing research networks.

SDGs

04-Quality education

Secondary SDGs

08 and 16

Course/Program

PPGDPE

Academic unit

FDIR

Funding

European Union

Type of funding

Foreign

Project title

Fighting labour exploitation through education - agricul-tural sector specialist training (FLEE-ASSET)

Coordination

Flavio de Leão Bastos Pereira and Fernando Rister de Sousa Lima Lattes

http://lattes.cnpq.br/0429477617811762
http://lattes.cnpq.br/0125281695257124

Summary

The project seeks to strengthen the capacity of Higher Education Institutions (HEIs) in the European Union (EU) and Latin America (LA) to develop educational tools and training programs that promote decent work standards in agricultural and trade relations between regions and combat labor exploitation. The agri-food sector often lacks protection mechanisms, making workers - especially migrants - vulnerable to abuse and forced labour. In line with the European Commission's priorities on fair trade, human rights and labour standards, and the Erasmus+ Program, the project brings together a transregional consortium of 11 HEIs in 7 countries to expand the qualification of professionals in the promotion of decent work and in the fight against trafficking in persons associated with the agricultural sector. Institutions must operate in a collaborative, transnational and market-oriented environment. The training will combine theory and practice, with case studies and problem-based learning, structured by professional profiles and centered on the student, being co-created with companies, public institutions and civil society.

SDGs

16–Peace, justice and effective institutions

Secondary SDGs

04

Course/Program

Law

Academic unit

FDIR

Funding

Mack Pesquisa

Type of funding

National

Project title

Interprêt: platform for interpreters on the digital platform of the Brazilian judiciary – PDPJ-Br

Coordination

Paulo Cezar Neves Junior

Lattes

http://lattes.cnpq.br/6750955244685882

Summary

Forensic interpreters are essential to guarantee the rights of foreigners, indigenous people, and members of the deaf community in the judicial process. In Brazil, there is a shortage of qualified forensic interpreters. The Federal Court of São Paulo has started a training program, but still faces difficulties in identifying suitable professionals. The Interprêt Project aims to solve this problem through inter-institutional and multidisciplinary activities, involving magistrates, public servants, professors and students in the areas of Law and Computer Science. The partnership between Mackenzie Presbyterian University and the Federal Regional Court of the 3rd Region will contribute to the improvement of the Brazilian judicial system.

SDGs

10-Reduction of inequalities

Secondary SDGs

16

Course/Program

PPGDPE

Academic unit

FDIR

Funding

CNPq

Type of funding

National

Project title

Data protection and digital colonialism in Latin America: a comparative study among national authorities

Coordination

Marco Antonio Loschiavo Leme de Barros

Lattes

http://lattes.cnpq.br/2434992740394198

Summary

This project aims to investigate the role of national data protection authorities in Latin America in the face of the dynamics of digital colonialism, a phenomenon characterized by the exploitation of personal data and digital infrastructure by large corporations and economically dominant countries. This process perpetuates structural inequalities between the Global North and the Global South, deepening power asymmetries that transcend individual risks to the privacy of internet users and directly affect the digital sovereignty of Latin American countries. The increasing digitalization of economies and daily life intensifies the technological dependence of countries in the Global South on infrastructure, services and regulatory standards controlled by major powers and technological conglomerates. Given this scenario, this research will adopt a comparative law approach, analyzing regulatory structures, *enforcement mechanisms* (administrative and judicial measures) and challenges faced by data protection authorities in Latin America. The project is structured around two questions: i) How are Latin American national data protection authorities reacting to the dominance of *big techs* over data and digital infrastructures in the region? ii) What strategies can be adopted to reduce technological dependence and promote greater regulatory autonomy in digital governance? The research aims to contribute to the debate on digital sovereignty, providing an analysis of regulatory and institutional alternatives that can strengthen the role of Latin American authorities in building a fairer and safer digital environment. In the end, it is expected to offer a socio-legal study on the operations of Latin American authorities, as well as to present recommendations for the development of public policies aimed at protecting privacy and reducing inequalities imposed by digital colonialism.

SDGs

08-Decent work and economic growth

Secondary SDG 16

Course/Program

PPGDPE

Academic unit

FDIR

Funding

CNPq

Type of funding

National

Project title

Courts, citizenship and access to economic activities in the digital society: a socio-legal examination of the economic demand of platforms in court

Coordination

Fernando Rister de Sousa Lima

Lattes

http://lattes.cnpq.br/0125281695257124

Summary

This international network investigates the challenges for the promotion of legal certainty and citizenship in the development of economic activities in the light of the digital society, based on decisions of the Brazilian courts. It is based on the premise that the relationship between citizenship and economic activity depends on the judicial solution of disputes involving employment, income generation and social responsibilities of companies. Thus, the growing role of judges and courts in economic oversight to ensure social welfare is highlighted. The study mobilizes social and historical literature on judicial institutions and analyzes the relationship between economic, political, and legal systems in the digital context. A digital society is understood as a social organization based on technologies such as the internet, social networks, mobile devices and artificial intelligence, which have transformed communication, created new business models - e-commerce, platforms and virtual currencies - and changed the labor market. The research also conducts a jurisprudential analysis of litigation of great economic impact, aiming to understand the role of courts in access to economic activities.

SDGs

16–Peace, justice and effective institutions

Secondary SDGs

08

Course/Program

PPGDPE

Academic unit

FDIR

Funding

Mack Pesquisa

Type of funding

National

Project title

Courts and access to economic activities in the digital society

Coordination

Fernando Rister de Sousa Lima

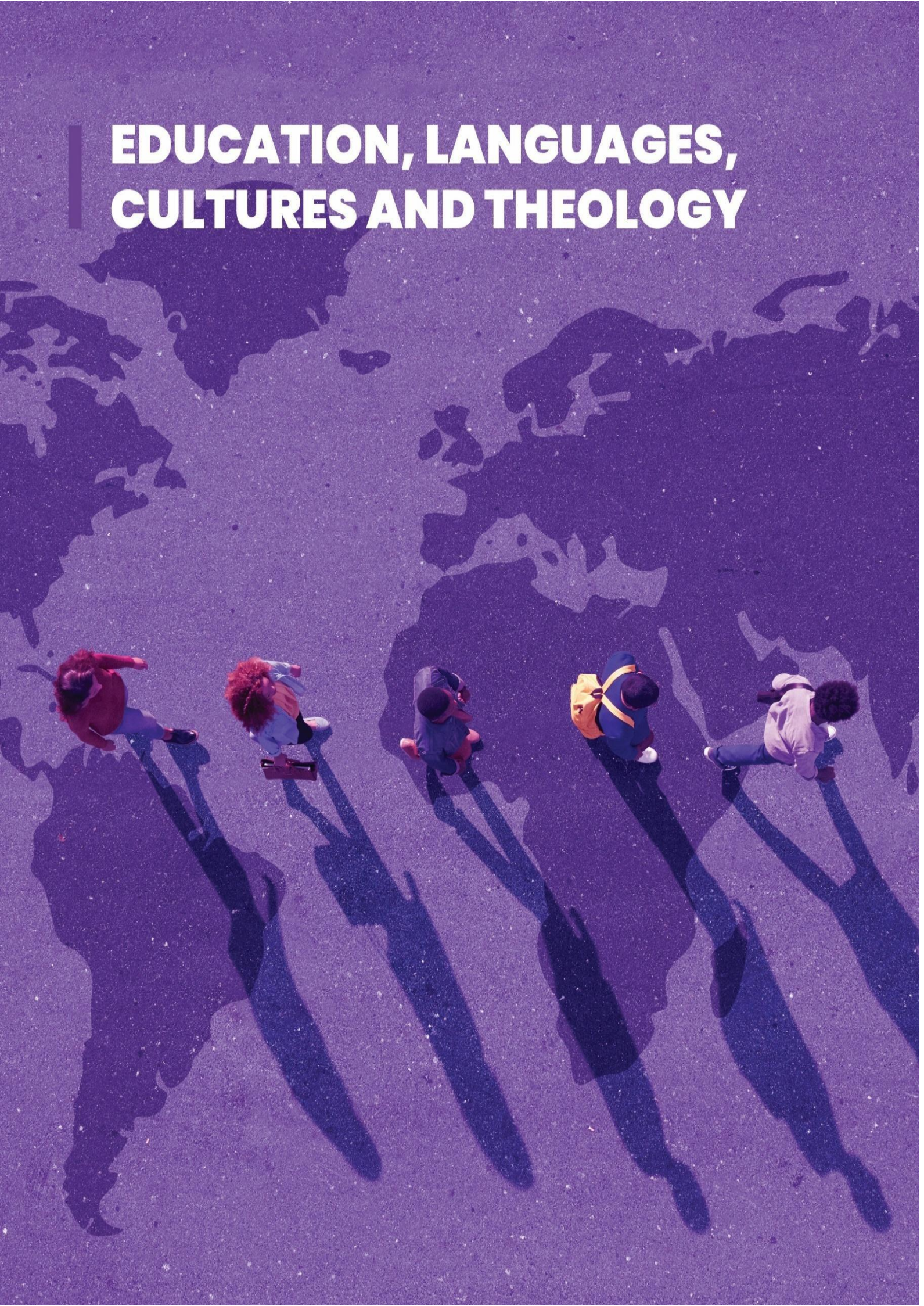
Lattes

https://lattes.cnpq.br/0125281695257124

Summary

This research investigates the challenges to promote legal certainty and citizenship in the development of economic activities in the face of the dynamics of the digital society, taking as a cut decisions of the Brazilian courts. It is based on the premise that the relationship between citizenship and economic activity depends on the solutions of judicial disputes involving employment, income generation and social responsibilities of companies, which reinforces the growing importance of the role of courts and judges to ensure that economic activity contributes to social well-being. The study mobilizes specialized literature, which analyzes sociological and historical trajectories of judicial institutions in the Brazilian economic dynamics, seeking to explain the social foundations of the relationship between economic, political and legal systems in the context of the digital society – marked by the intensive use of digital technologies, which have altered the circulation of information and enabled new business models, such as e-commerce, sharing platforms, and virtual currencies. These transformations also impacted the labor market, with automation and new professions. The research includes a jurisprudential study on litigation of great economic impact. The role of the courts in the dynamics of access to economic activities is expected to be confirmed, whether in the face of operations of deregulated platforms, which increase inequalities, or in regulated and fair scenarios, capable of promoting social inclusion and the full exercise of citizenship.

EDUCATION, LANGUAGES, CULTURES AND THEOLOGY



SDGs

04–Quality education

Secondary SDGs

10

Course/Program

PPGEAHC

Academic unit

CEFT

Funding

CNPq Research Productivity Grant Level PQ–C

Type of funding

National

Project title

Pedagogical knowledge of content and teaching cases

Coordination

Maria da Graça Nicoletti Mizukami

Lattes

http://lattes.cnpq.br/2121396261196481

Summary

The Integrative Project Weaves in the City: Languages, Cultures and Education encompasses the inter–institutional, ex–tension, innovation and research projects, with external and/or internal funding, of the Graduate Program in Education, Art and History of Culture, covering the three Research Lines: Educator training for interdisciplinarity; Languages and technologies; and Cultures and arts in contemporaneity. This Macroproject ensures the articulation with themes related to the 2030 Agenda of the United Nations (UN) for Sustainable Development, whose plan indicates goals for the promotion of a dignified life for citizens. Under the lens of interdisciplinarity, the integration of research around the Plots in the city is propitiated: urban social movements, gender and ethnic–racial issues, refugees and immigrants, people with disabilities, homeless populations, deprivation of freedom, social and public policies to guarantee human rights, teacher training, teaching learning, andpublic management and social technology, teaching and learning, education and technology, inclusive education, early childhood education, higher education, technical, vocational and different fields of non–school education, visual, performing, sound cultures and urban arts, plural artistic production processes and reception of contemporary art (in multiple social segments), poetics and aesthetics, visualization and its technologies, cinema, preservation of memory and historical heritage.

SDGs

04-Quality education

Secondary SDGs

10

Course/Program

PPGEAHC

Academic unit

CEFT

Funding

FAPESP

Type of funding

National

Project title

Teacher professional development in public schools: Teaching cases as a formative and investigative strategy

Coordination

Maria da Graça Nicoletti Mizukami

Lattes

http://lattes.cnpq.br/2121396261196481

Summary

The project investigates processes of construction of pedagogical knowledge of the content (Shulman, 1986, 1987) by teachers of the public elementary school system, a central element of the knowledge base for teaching. The case of teaching is used as a formative and investigative strategy to understand how teachers learn to teach and develop professionally. The research is guided by four questions: (a) how are the processes of construction of pedagogical knowledge of the content characterized; (b) how teachers transform content from their areas into teaching content; (c) what reflections emerge when systematizing this process in teaching cases; and (d) how these cases contribute to the improvement of teaching from the perspective of the participants. This is a constructive-collaborative qualitative research involving the university and two public schools. Data sources include interviews, teaching-learning experiences, elaboration and analysis of teaching cases, portfolios and reflective diaries. The planning is open, allowing theoretical-methodological decisions according to training needs and school demands. Teaching cases are understood as the materialization of the pedagogical knowledge of the teaching content.

SDGs

10-Reduction of inequalities

Secondary SDGs

16

Course/Program

PPGCOM

Academic unit

CCL

Funding

Mack Pesquisa

Type of funding

National

Project title

Discourses on refugees in Brazil and France: a comparative perspective on the challenges of interculturality in the migratory processes of the twenty-first century

Coordination

Denise Cristine Paiero

Lattes

http://lattes.cnpq.br/9127918119064426

Summary

This research will address how the construction of the public image of refugees in Brazil and France takes place in the face of the current migratory crisis faced in the world. To do this, we will analyze social networks of anti-immigration groups and also demonstrations in the streets that focus on this theme. Social networks and public broadcasts of groups that seek to defend refugees will also be observed. Finally, we will observe how the so-called great press covers the issue of refugees in both countries. It is intended to understand how the discourses close to refugees are constructed and disseminated. In addition to the theoretical research, it is intended to organize a publication for distribution among journalists and journalism students in Brazil, showing the results of surveys and analyses of the material produced by the press on the subject, in order to contribute to a more conscious and transparent journalistic coverage of refugees. As a final result, we will also have the development of a thematic newspaper, a photographic exhibition and a series of mini documentaries made by students and professors of journalism at UPM, which will put into practice the lessons learned during the research and will take the debate to an audience outside the University.

SDGs

08-Decent work and economic growth

Secondary SDG 09

Course/Program

PPGCOM

Academic unit

CCL

Funding

Mack Pesquisa

Type of funding

National

Project title

Interculturality at stake

Coordination

João Batista Freitas Cardoso

Lattes

https://lattes.cnpq.br/5642583841503466

Summary

The research aims to identify and categorize types of games with the potential to solve practical problems related to intercultural communication in organizations. The relevance stems from the advancement of information technologies, which intensifies the presence of intercultural interactions in the organizational environment. In the process of cultural exchanges, interactional practices are fundamental, and playfulness makes it possible to question and deconstruct crystallized meanings, in addition to transposing norms and limits of reality. It is assumed that the game, as a means of communication and interaction, can improve effectiveness at work, affecting sociocultural and economic dimensions. The descriptive research involves interviews to identify intercultural problems that can be faced by communicational actions; documentary analysis to evaluate typologies of games appropriate to the organizational context; and empirical experiment to test adaptations of the selected games and evaluate criteria that allow the delineation of categories. The results should serve as a theoretical basis for developing prototypes of playful-formative technologies aimed at critical reflection on intercultural relations in organizations.

SDGs

04-Quality education

Secondary SDGs

10

Course/Program

PPGEAHC

Academic unit

CEFT

Funding

CNPq Research Productivity Grant Level 1C

Type of funding

National

Project title

Jacó Guinsburg: professor, researcher, essayist, translator and editor

Coordination

Rosângela Patriota Ramos

Lattes

http://lattes.cnpq.br/8434935867197930

Summary

The relevance of the project *Jacó Guinsburg: professor, researcher, essayist, translator and editor* lies in the contributions it offers to the field of Cultural History. By constructing an intellectual biography of Jacó Guinsburg (1940-2018), the research expands studies on the process of cultural modernization in Brazil, especially in São Paulo, based on his classes, research, and editorial work at Editora Perspectiva. The project contributes to the debate on the circulation of authors, works and ideas that have influenced researchers in different regions of the country, in addition to instigating an original dialogue between History and Theater by thinking
the theater through the book. The investigation also discusses the historical, social and cultural impact of editorial and didactic choices on the sociocultural formation of society.
His contributions cover the Cultural History and the Intellectual History of São Paulo and Brazil, promoting dialogues between Cultural History, Theater, Book and circulation of ideas, offering theoretical and methodological contributions to the field. The results will be disseminated through articles, chapters, books and participation in academic events, as well as discussed in the International Research Network in History and Contemporary Cultures, expanding their impact and stimulating new investigations. Reflecting on Guinsburg's intellectual contribution makes it possible to articulate dialogues between past and present and to deepen analyses of the cultural, social, intellectual, and political paths of Brazil.

SDGs

04-Quality education

Secondary SDGs

10

Course/Program

PPGL

Academic unit

CCL

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Linguists between engineering and collection: formalisms and functionalisms in Brazilian linguistics

Coordination

Ronaldo de Oliveira Batista

Lattes

http://lattes.cnpq.br/4540894174449403

Summary

Theoretically and methodologically delimited to Linguistic Historiography (HL), this project aims to propose a history of episodes of Brazilian linguistics selected in the 1960-2000 time frame. The proposal is elaborated based on the following premises: a) the existence of few reflections, from an interpretative perspective, on the history of linguistics in Brazil; b) the need to understand the establishment and developments of language science in Brazil, which since its first movements of implementation has been characterized by theoretical and methodological diversity between two central theoretical currents: formalisms and functionalisms; c) the importance of, about 60 years after its definitive academic implementation, critically reflecting on the nature of Brazilian linguistics, its specificities, confluences and clashes. Considering these premises, the results of the research are expected:
a) an interpretative historiographical narrative about moments in the history of Brazilian linguistics; b) a reflection on the theoretical and methodological plurality of Brazilian linguistics and its specificity as a science of a specific social context in comparison with other national traditions of language sciences. The execution of the project, therefore, may present in terms of analytical synthesis a part of the history of Brazilian linguistics, verified in trajectories of oppositions and affiliations between researchers who were socially articulated around two theoretical axes (formalisms and functionalisms).

SDGs

04-Quality education

Secondary SDGs

Course/Program

PPGL

Academic unit

CCL

Funding

CNPq Research Productvity Grant Level 1A

Type of funding

National

Project title

Lies and truth in discourses in general and on the internet, in education and politics in particular: the question of veridiction

Coordination

Diana Luz Pessoa de Barros

Lattes

http://lattes.cnpq.br/4742321400577426

Summary

Project on linguistic intolerance and prejudice in Brazil within the scope of the LEI/USP, with four main objectives: to analyze linguistic intolerance in its relations with history, society, and teaching; to examine forms of resistance; to establish a documentary archive bringing together official materials, press materials, and reference works; and to disseminate this document. Two foci are investigated: intolerance directed at foreign languages and that directed at variants of Portuguese. I develop two subprojects: one on the rejection of the use of foreign terms, analyzing discourses of acceptance and disapproval; and another on the construction of intolerant discourses, observing linguistic and discursive procedures, framework of values, ethos of the enunciators, differences between public and private discourses and strategies of implication. The research in Theory and Analysis of Texts and Discourses, based on French narrative and discursive semiotics, articulates theoretical research, analysis of texts from Brazilian culture and contribution to the teaching of reading and written production, including studies on the organization of verbal and non-verbal texts and relations between planes of con-content and expression. The investigation on concepts and images of the norm analyzes grammars and dictionaries from the sixteenth century to the present day as discourses, characterizing concepts of norm and language, differences between Portuguese and Brazilian grammars and processes of constitution of the national language, considering modalization, linguistic categories, thematic organization and intertextual relations. He is a member of the CNPq group "Grammars: history, description and discourse".

SDGs

04-Quality education

Secondary SDGs

17

Course/Program

PPGEAHC

Academic unit

CEFT

Funding

FAPESP

Type of funding

National

Project title

Professional Master's Degree and Educational Products: Contributions to Teacher Training

Coordination

Maria de Fátima Ramos de Andrade

Lattes

http://lattes.cnpq.br/2272192785424412

Summary

Educational products from research in professional fields have been studied in different areas because they present, in addition to academic writing, practical contributions to the resolution of educational problems, being relevant both for the training of the researcher and for the improvement of pedagogical practice. Based on the analysis of products developed in Professional Master's Programs in Education in the state of São Paulo (2021-2023), the project seeks to answer: (a) whether the product was constructed from the problematization of professional practice; (b) which areas of knowledge are prioritized; (c) if there is articulation between academic knowledge and professional practice; e (d) what contributions to the construction of pedagogical knowledge of the content in different contexts. The objective is to analyze educational products that are premised on this knowledge, understood, according to Shulman, as a central component of the basis of teaching curricular content. This is a qualitative research that will analyze educational products and master's dissertations. The theoretical reference is based on authors such as Cochran-Smith, Shulman, Mizukami, Garcia, Zeichner, Loughran, Ludke, André and Gatti, who discuss professional master's degree and professional teacher development.

SDGs

04–Quality education

Secondary SDGs

12

Course/Program

PPGA

Academic unit

CCSA

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Organizing reflection to scale transformative sustainability-oriented learning

Coordination

Janette Brunstein

Lattes

http://lattes.cnpq.br/8568710701792092

Summary

This proposal is based on a partnership between research and practice and a network of partner institutions dedicated to scaling up transformative learning in university settings. The main objective of the project is to advance the theory and practice of transformative learning (TL) at the organizational level of higher education, with a view to improving education for sustainability. The research will argue that expanding TL to this level depends on the ability to organize reflection processes through teacher professional development in teaching and learning centers. These Centers, when structured with the mission of promoting transformative teaching and learning, can act as catalysts for cultural change on *campus* toward sustainability.

SDGs

10-Reduction of inequalities

Secondary SDGs

11

Course/Program

PPGL

Academic unit

CCL

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Semiotic processes and intercultural contacts

Coordination

Alexandre Marcelo Bueno

Lattes

http://lattes.cnpq.br/4102309176261051

Summary

Immigration in Brazil involves multiple meanings. In addition to work, immigrants bring religions, languages, foods, traditions, sociability's and values that make up their cultural identities. Historically, there is a gradation between groups with greater difficulty in adapting and those whose elements become part of Brazilian culture. Among these elements, the project focuses on a field that is little explored in linguistic and discursive studies: gastronomy. The research examines discursive representations, culturally determined tastes (susceptible to transformations) and linguistic and semiotic translations in the semiotic processes of the gastronomic universe of the new immigrant and refugee groups that have opened establishments in the last 15 years in São Paulo. The objective is to understand how the sensitive and intelligible meaning mobilized by foreign cuisines integrates intercultural processes marked by acceptance, refusal, integration or estrangement, confirming patterns of intercultural contact. The *corpus* will include reports on immigrant restaurants, reviews of Brazilian customers and some establishments visited in field research. The theoretical framework is based on the French semiotics, especially sociosemiotics and ethsemiotics, applied to the analysis of representations, tastes and linguistic and semiotic translations in the senses produced by the contact between Brazilians and foreigners in the gastronomic universe created by immigrants and refugees in São Paulo.

SDGs

04-Quality education

Secondary SDGs

12

Course/Program

Pedagogy

Academic unit

CEFT

Funding

Mack Pesquisa

Type of funding

National

Project title

Children's territory: enhancing research and educational experience on the floor of early childhood education school

Coordination

Debora da Silva Cardoso Silva

Lattes

http://lattes.cnpq.br/6439191287210999

Summary

This project aims to bring research closer to the educational experience on the school floor. Pedagogy students will develop the research through participant observation in the school spaces of Early Childhood Education and in teacher training meetings, crossing the walls of the University. The project aims to contribute to the continuous training of teachers of needy daycare centers through workshops and courses that consider the specificity of "Coordination" necessary for multiple childhoods, as well as to expand the concept of parenting, which is not widespread in Brazil. The actions will take place through a partnership between the Mackenzie Presbyterian University and municipalities that serve needy and affiliated daycare centers.

SDGs

16–Peace, justice and effective institutions

Secondary SDG 09

Course/Program

PPGCOM

Academic unit

CCL

Funding

Mack Pesquisa

Type of funding

National

Project title

Viaggiautori: narratives of a global Italy

Coordination

Fernanda Nardy Bellicieri

Lattes

https://lattes.cnpq.br/3369227612290273

Summary

This line of research is directed to the study and experimentation of languages and narratives in contexts of mediations that comprise distinct sets of social and cultural conventions, such as professional practices, behaviors or habits. With a view to developing an innovative communication product and process to solve problems related to intercultural practice in organizations, the line considers the emergence of new technical–expressive forms in communication, convergence and hybridism in the media, the growth in the use of artificial intelligence in the different areas of communications and the arts, and the processes of mediation and symbolic consumption. Return–
then, the analysis, creation and implementation of communication strategies that make use of the articulations between the different structures of languages, narratives, discourses and media.

ENTREPRENEURSHIP, BUSINESS ENVIRONMENTS, OPERATIONS MANAGEMENT AND MARKET FUNCTIONING

SDGs

08-Decent work and economic growth

Secondary SDG 12

Course/Program

Administration

Academic unit

CCT

Funding

Mack Pesquisa

Type of funding

National

Project title

Financial decisions for value creation in companies

Coordination

José Matias Filho

Lattes

http://lattes.cnpq.br/6881105441861735

Summary

Financial decisions should always be made in order to create value for the company. This research project aims to investigate business financial decisions, using contemporary financial theories and their application. The scenario of the discussions is the fulfillment of the SDGs – Sustainable Development Goals, proposed by the United Nations, and contemplates the social, economic and intellectual dimensions. Methods of investigation of a mainly quantitative nature, with descriptive and explanatory objectives, and qualitative, with exploratory objectives, will be used. The expected results include both practical and theoretical directions in the search for maximizing the value of companies.

SDGs

08-Decent work and economic growth

Secondary SDG 09

Course/Program

PPGADN

Academic unit

CCSA

Funding

Mack Pesquisa

Type of funding

National

Project title

Business development in collaborative retail through digital technologies

Coordination

Nelson Roberto Furquim

Lattes

http://lattes.cnpq.br/1611978161888911

Summary

This project investigates how collaborative retail, driven by digitalization, transforms business models through the interaction between consumers, companies and emerging technologies. Technological competencies generated in organizational practices will be analyzed, based on a field study carried out with eyetracking techniques in physical stores. The survey seeks to identify patterns of attention and consumer behavior, proposing indicators applicable to Brazilian retail. It is expected to generate analytical models to guide sustainable innovations, promote competitiveness and stimulate value creation in a collaborative and technological business ecosystem.

SDGs

08-Decent work and economic growth

Secondary SDG 16

Course/Program

PPGA

Academic unit

CCSA

Funding

CNPq

Type of funding

National

Project title

Organizational dignity: common perceptions in the evaluation of customers, employees and suppliers of a banking institution

Coordination

Maria Luisa Mendes Teixeira

Lattes

http://lattes.cnpq.br/2179893747302901

Summary

The project investigates organizational dignity in the banking sector, an area relevant both for the economic impact and for the high number of labor and consumer complaints. Starting from the conception of the organization as a social actor, it analyzes how different *stakeholders* – employees, customers and suppliers – perceive organizational practices and construct evaluations of institutional dignity. The research proposes that such evaluations are not independent, but influenced by a common factor shared between the groups. The objective is to verify to what extent organizational dignity can be ex-ppliated by this common factor, comparing its ex-plicative power with isolated evaluations of each *stakeholder.* The expected results contribute to the improvement of organizational management oriented to social responsibility and ethical relationship with *stakeholders,* aligning corporate practices with the UN Sustainable Development Goals (SDGs).

SDGs

12-Responsible consumption and production

Secondary SDGs

16

Course/Program

PPGA

Academic unit

CCSA

Funding

CNPq

Type of funding

National

Project title

The effect of sustainability practices on the performance of financial EC of enterprises

Coordination

Michele Nascimento Jucá

Lattes

http://lattes.cnpq.br/6770985264140454

Summary

The implementation of sustainable practices by organizations has been a growing demand from markets and society in general. It turns out that this strategic change implies higher expenses, which are compensated by risk mitigation. Consequently, it is expected that there will be a reduction in the cost of capital of these enterprises, an aspect not yet consensual by previous empirical studies. In addition, it is verified that the sustainability standards of developed countries are higher than those in developing countries. In addition, there is a tendency for the capital market regulatory entities of each country to issue rules on the obligation of companies to disclose sustainable practices. One way to monitor the level of adherence of companies to their commitment to such procedures is through the measurement and disclosure of general and specific environmental, social and governance (ESG) scores. Thus, this study seeks to verify whether the adoption and disclosure of such practices materialized in ESG scores effectively increase (reduce) the value (cost of capital) of companies. In addition, it is intended to investigate the moderating effect of the level of development and mandatory disclosure of ESG information of countries in this relationship.

SDGs

08-Decent work and economic growth

Secondary SDG 09

Course/Program

PPGA

Academic unit

CCSA

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Effects of absorption capacity and social capital on organizational ambidexterity

Coordination

Silvio Popadiuk

Lattes

http://lattes.cnpq.br/1784002683973468

Summary

In this project, three concepts will be the object of considerations: organizational ambidexterity; absorption capacity; and social capital. The objectives to be achieved are: 1. To present the state of the art on these three concepts, through a systematic review of the literature, using bibliometric analyses, both from the isolated perspective of each concept and from the perspective that considers the studies that present theoretical and empirical relationships on both; 2. To present scales used to measure these three concepts based on the analysis of a selected set of empirical studies carried out;
3. Analyze empirically how these three concepts are related, through the application of a structured and closed questionnaire in a sample of companies and analysis using structural equations.

SDGs

08–Decent work and economic growth

Secondary SDG 09

Course/Program

PPGA

Academic unit

CCSA

Funding

CNPq

Type of funding

National

Project title

Successful aging at work: a study on individual conditioning factors

Coordination

Darcy Mitiko Mori Hanashiro

Lattes

http://lattes.cnpq.br/8193396073610884

Summary

The study of aging is increasingly relevant due to its social and economic impact on the labor market. On the one hand, there is an accelerated growth of the population over 60 years old; on the other, a reduction in the youth population. Longevity in the workplace represents a challenge for both organizations and older workers, who need to develop strategies for the sustainable management of working life. In this context, the project aims to analyze the relationship between selection, optimization and compensation (SOC) strategies, adaptive competence at work (CAT) and occupational future time perception (PTFO) and successful aging at work (EBST), in order to understand how these individual factors of older workers (over 45 years old) can explain EBST. Specifically, the research aims to explore the mediating role of SOC in the relationship between PTFO and EBST and to investigate the moderating effect of chronological age on the relationships between PTFO and EBST, as well as between SOC and EBST. Exploring how these individual factors explain EBST represents a groundbreaking finding, which contributes to the advancement in the literature. Results can also guide the development of *age-friendly HR policies.*

SDGs

08-Decent work and economic growth

Secondary SDG 09

Course/Program

PPGA

Academic unit

CCSA

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Capital structure in Brazil and around the world and the effects of COVID-19

Coordination

Wilson Toshiro Nakamura

Lattes

http://lattes.cnpq.br/1327686935533816

Summary

This project develops three studies on the determination of the capital structure of companies, considering differences between accounting and market measures, effects of the pandemic and different macroeconomic contexts.

Study 1: Investigates whether the indebtedness policies of Brazilian companies reflect orientation aimed at creditors (accounting measures) or shareholders (market measures), using an econometric panel model and pre-and post-pandemic data. In addition, *sur-vey* will be applied with managers and advisors, dialoguing with classic research in the area. The study will also analyze the role of obligations to suppliers and taxes as potential components of capital structure.

Study 2: Examines the relationship between accounting indebtedness and cash generation variables - level, volatility and growth - considering their influence on the ability to pay, especially in adverse scenarios with high interest rates. The focus is on profitability and volatility, directly associated with the risk of default in the short and medium term.

Study 3: Analyzes determinants of capital structure before and after the pandemic, comparing companies from developed and developing countries, and assessing how institutional differences, governance, and market maturity affect such decisions. It also includes comparisons between market-oriented and bank-oriented countries. The set of studies updates classic evidence and seeks to identify recent structural changes.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

12

Course/Program

PPGCFTG

Academic unit

CCSA

Funding

GRUPO SEB

Type of funding

National

Project title

The impact of ESG practices on the performance of companies listed on B3

Coordination

Liliane Cristina Segura

Lattes

http://lattes.cnpq.br/0668174679142137

Summary

Sustainable practices have increased the visibility of companies in the financial market (Busch et al., 2016), especially in the face of the worsening of problems such as global warming, gas emissions, and pollution. In response to *stakeholder demands,* the market has started to consider environmental, social, and governance (ESG) factors as central to the evaluation of organizations. Regulation and social requirements have encouraged companies to adopt sustainable practices, whose benefits can positively impact corporate performance (Gallego-Álvarez & Segura, 2015). Studies indicate that better ESG performance is associated with reduced informational asymmetry and higher stock valuation (Lueg et al., 2019; Jia et al., 2020; Shakil, 2020). However, the results are still contradictory (Cornell, 2021). In Brazil, research on ESG with statistical treatment is limited and focuses mainly on corporate governance or the Corporate Sustainability Index (ISE). Thus, this research seeks to investigate the relationship between ESG practices – jointly and separately in their environmental, social and governance dimensions – and the performance of companies listed on B3.

SDGs

16–Peace, justice and effective institutions

Secondary SDGs

11

Course/Program

PPGA

Academic unit

CCSA

Funding

Mack Pesquisa

Type of funding

National

Project title

Research on the state of information technologies in São Paulo cities with a view to management standards for resilient and sustainable smart cities

Coordination

Gilberto Perez

Lattes

http://lattes.cnpq.br/8699394703578756

Summary

The main objective of this research project is to identify, analyze and demonstrate the adoption of ICT governance practices in the scope of municipal public management, with special interest to cities in the state of São Paulo, with a view to the strategic alignment between the administration and the technology area, the delivery of value to the interested parties, to risk management, resource management, and IT performance management. Among the five Specific Objectives, we highlight the application of a methodology for evaluating the use of ICT in the chosen cities (at least five cities), analyzing and reporting results, using the urbeSys® system.

SDGs

04-Quality education

Secondary SDGs

09

Course/Program

PPGA

Academic unit

CCSA

Funding

Mack Pesquisa

Type of funding

National

Project title

LAIE-Mack: generative AI lab for modeling and strategic decision support

Coordination

Fellipe Silva Martins

Lattes

http://lattes.cnpq.br/7912881403948084

Summary

LAIE-Mack is a permanent laboratory of generative artificial intelligence focused on modeling and strategic decision support, with a focus on theoretical and practical application in organizational contexts. The project integrates research, technological development, prototyping and training of human resources, combining computing and artificial intelligence techniques with managerial research objects and controlled experiments in key sectors of the Brazilian economy. The laboratory positions itself as an infrastructure to support innovation, contributing to the improvement of the quality of decisions in companies and public institutions, while advancing the frontier of knowledge in behavioral strategy and the use of AI. Deliverables include high-impact scientific production, researcher training, *software development* and open dissemination of knowledge. LAIE-Mack strengthens the integration between academia and practice, consolidating the university as a reference in innovation applied to strategic decision-making.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

08

Course/Program

PPGEP

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Methodology to aid in optimal capital structure decision making

Coordination

Marcelo Nunes Fonseca

Lattes

http://lattes.cnpq.br/9285142449945121

Summary

The objective of this project is to propose a practical model that can be used by the managers of companies in order to assist them in making decisions about the optimal capital structure. The activities will be distributed in seven stages, in which it is intended to apply the methodology, previously tested and verified in publicly traded companies, in partner companies through cooperation between the university and the corporate environment. It is expected that the proposed methodology can be used by different companies in search of maximizing their value.

SDGs

08–Decent work and economic growth

Secondary SDG 09

Course/Program

PPGEM

Academic unit

CCSA

Funding

Mack Pesquisa

Type of funding

National

Project title

Methodology for a sub-national competitiveness and business environment indicator

Coordination

Vladimir Fernandes Maciel

Lattes

http://lattes.cnpq.br/6152019735516841

Summary

Subnational competitiveness for business refers to the ability of states to provide a favorable environment for companies to operate and prosper, driving economic growth and job creation. Measuring this competitiveness makes it possible to compare the institutional performance of the regions. This project seeks to develop a subnational competitiveness indicator for business, creating a comprehensive and comparable measure of the business environment of the federative units, capable of guiding public policies that strengthen regional development. The interruption of Subnational Doing Business, previously prepared by the World Bank, has created a gap in the evaluation of policies aimed at improving the business environment, reinforcing the need for a new methodology. With the tax reform and the end of the tax war, policies that improve the business environment become even more important to attract investments. The central issue is to identify characteristics of an indicator that ensures transparency and comparability between states. The method adopted will be multivariate analysis, especially principal component analysis, a technique that reduces the dimension of correlated variables and generates synthetic indices representative of essential information.

SDGs

12-Responsible consumption and production

Secondary SDGs

13

Course/Program

PPGCFTG

Academic unit

CCSA

Funding

Mack Pesquisa

Type of funding

National

Project title

ESG practices and the mandatory regulatory aspects within the corporate strategy using VBA – Attention-Based View

Coordination

José Carlos Tiomatsu Oyadomari

Lattes

http://lattes.cnpq.br/5722412463663652

Summary

The concept of ESG (environmental, social, and governance) encompasses a variety of topics, such as carbon emissions, labor practices, and anti-corruption measures, highlighting the need for social and environmental responsibility and transparency in organizations (Zhao; Wang, 2024). Sustainability has become an essential strategic axis for the competitiveness and longevity of companies (Iriga-ray; Stocker, 2022). In the context of the project, the concept of VBA (Attention-Based View) is incorporated, which explores how attentional processes influence the monitoring and regulation of initiatives, such as those related to ESG practices in organizations. The study is based on the understanding that failures in managerial care can compromise the adoption and success of ESG policies, proposing an *innovative framework* that integrates aspects of surveillance, selection, and attentional regulation. The results intend to contribute to the improvement of managerial and practical controls, guiding companies in the mitigation of attention failures and promoting the effective advancement of corporate sustainability. The dissemination will be carried out through articles, technical conferences and specialized media, expanding the impact of the project and inspiring the adoption of increasingly robust ESG practices, with high standards of corporate governance based on integrated attentional processes.

SDGs

09-Industry, innovation and infrastructures

Course/Program

EE

Academic unit

PPGEP

Funding

Mack Pesquisa

Type of funding

National

Project title

Proposal of a new methodology for optimization of production systems aimed at the scaling and operational stabilization of semi--industrial – application to MackGraphe's semi-industrial graphene oxide plant

Coordination

André Luís Helleno

Lattes

https://lattes.cnpq.br/7064793849391367

Summary

Graphene oxide (GO) is a strategic input for composites, anticorrosive coatings, sensors, and energy applications. Although widely used in developed markets, in Brazil its research is still concentrated in laboratory environments of low technological maturity, which limits its industrial potential. The main challenge is to expand production with cost reduction, requiring optimization and stabilization of process parameters and variabilities. MackGraphe has already developed a chemical route to produce high-quality GO and implemented a semi-industrial plant, but it is necessary to increase its operational maturity to enable production scaling. This project proposes to develop and validate an optimization methodology for scaling and stabilization of semi-industrial plants, applied to the Mack-Graphe GO pilot plant. The approach will integrate Theory of Constraints (TOC), Discrete Event Simulation (DES) and statistical monitoring of critical variables, structured in five steps: diagnosis and mapping of the process; instrumentation and data collection; analysis and modeling; integration and optimization; pilot implementation, validation and standardization. It is expected to significantly increase production capacity, reduce costs and expand the insertion of GO in high value-added industrial applications, strengthening operational sustainability, technology transfer and the consolidation of an innovative supply chain based on graphene oxide.

SDGs

08-Decent work and economic growth

Secondary SDG 09

Course/Program

PPGA

Academic unit

CCSA

Funding

CNPq Research Productivity Grant Level PQ-C

Type of funding

National

Project title

Uses of Generative Artificial Intelligence by teachers of Higher Education Institutions

Coordination

Diógenes de Souza Bido

Lattes

http://lattes.cnpq.br/7757562071320086

Summary

There are many uses of GenAI that do not result in an increase in reflection and learning, but in a reduction in the time to perform simple, routine or repetitive tasks (e.g. reviewing or translating texts, generating standardized content, etc.), which can be a factor that promotes satisfaction in the teaching job, because it frees up time for more meaningful work. When the uses of GenAI are more related to the generation and exploration of ideas and clarification of doubts, the reflective process is within the use of GenAI itself, as highlighted by the second principle of Mollick (2024): Be the human in the loop. Applying the discussion made up to this point in the context of higher education teaching work, the following research question arises: Which uses of GenAI should be prioritized or avoided to reduce the time of tasks that are not considered of the signifiers or increase reflection and learning, uses that are questionable or lead to errors. Thus, the general objective of this research is to identify, analyze and classify the uses that higher education professors have made of GenAI, whether in their teaching, research or administrative activities. Separating them into: Dos, Don'ts, necessary conditions and/or sufficient conditions to promote reflection, learning and satisfaction at work.

SDGs

09-Industry, innovation and infrastructures

Course/Program

PPGA

Academic unit

CCSA

Funding

Mack Pesquisa

Type of funding

National

Project title

Volatility and stock pricing with bullish data Frequency and *machine learning models*

Coordination

Eli Hadad Junior

Lattes

http://lattes.cnpq.br/2030318390506756

Summary

The analysis of high-frequency time series represents one of the most challenging domains of econometrics and applied data science, given the expressive volume of observations, the presence of market microstructure, intraday seasonality and high-intensity stochastic noise. The main objective of the research project is the development and evaluation of methodologies based on *deep learning* for predictive modeling and identification of structural patterns of financial assets of relevance to the financial market: stock exchange indexes, the main performance indicator of stock exchanges. Values, as well as the prices and volatilities of stocks and exchange rates, which reflect the relationship between the domestic currency and the US dollar and constitute a strategic variable for domestic and international economic agents. The choice of these assets is justified by their distinct and complementary characteristics. Stock indices are strongly influenced by domestic idiosyncratic factors - such as monetary policy decisions, corporate earnings and foreign capital flows - while exchange rates respond simultaneously to local macroeconomic fundamentals and external shocks, such as changes in US monetary policy, *commodity* prices and global risk aversion, being especially relevant for understanding the dynamics of emerging financial markets, such as Brazil. From a methodological point of view, the project contemplates the investigation of neural network architectures specialized in time series prediction, such as the Neu-ral Basis Expansion Analysis (N-BEATS), Neural Hierarchical Interpolation for Time Series (N-HITS), Temporal Fusion Transformers (TFT) and models based on attention mechanisms (Transformers). The predictive performance of the proposed models will be systematically compared to *classical benchmarks, such as ARIMA, GARCH and Random Walk models,* the latter being adopted as a benchmark for market efficiency in the weak form. The performance evaluation will be conducted based on multidimensional quantitative metrics: mean squared error (RMSE), mean absolute percentage error (MAPE), directional accuracy (MDA), confounding masters and Model Confidence Set.

INNOVATION: MATERIALS, ENERGY AND BIOTECHNOLOGY

SDGs

09-Industry, innovation and infrastructures

Course/Program

PPGEMN

Academic unit

EE

Funding

FAPESP

Type of funding

National

Project title

Expansion of the infrastructure of the Multiuser Laboratory for Research in Chemistry

Coordination

Everton Bonturim

Lattes

http://lattes.cnpq.br/1155726883286152

Summary

The proposal presents objectives, diagnosis of the current situation, schedule and details of the items that can be financed for priority investment in the renovation of the facilities of the Multiuser Laboratory of Research in Chemistry, linked to the School of Engineering, ensuring adequate conditions for the installation of new equipment and better use of existing ones. The institutional trajectory is briefly highlighted: Mackenzie, traditional in basic and higher education, adopted about 25 years ago the strategy of becoming a reference in graduate studies, scientific and technological research and innovation. This motivated the hiring of two researchers and the creation of graduate programs.
-Graduation in several areas. Currently, Mackenzie Presbyterian University has 12 programs, with excellent grades in Capes. The strategic decision also prompted robust investments in laboratory infrastructure, especially in Engineering and Biological Sciences, financed by the IPM and by public and private resources obtained through agencies such as FAPESP. This plan aims to expand and adapt the working conditions of the environments that make up the Multi-User Laboratory of Research in Chemistry, reinforcing its institutional and collective function.

SDGs

09-Industry, innovation and infrastructures

Secondary SDGs

08

Course/Program

PPGEP

Academic unit

EE

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Application of Hybrid Manufacturing in the Fabrication/Repair of Metal Components with Complex Surfaces

Coordination

André Luís Helleno

Lattes

http://lattes.cnpq.br/7064793849391367

Summary

The application of metal additive manufacturing technology in the manufacture and recovery of metal components has the potential to revolutionize the industries of the metal-mechanical sector, which can be evidenced by the Brazilian strategic and technological planning in the Rota 2030 Project, through line IV of FUNDEP (Research Development Fund) on more competitive Brazilian tooling shops. As a result, this research project has the potential: economic impact; formation of qualified human capital in the area of technology of interest to society; and increase in the competitiveness of the national market in the area of Tooling. In addition, it has an intellectual impact: considering that the equipment and technology available for this research project reflect the state of the art in the area of hybrid manufacturing; The results of the research have the potential to generate knowledge of impact for the national and international academic community. As the main result of this project, it is hoped to develop a process for manufacturing and repairing metal components with complex surfaces by means of hybrid manufacturing technology. This process can be used by companies in the aeronautics, automotive and surgical prosthesis areas. It is also noteworthy that the increased application of hybrid manufacturing will contribute to the increase in demand for technological developments in other areas of the hybrid manufacturing production chain.

SDGs

09-Industry, innovation and infrastructures

Secondary SDGs

12

Course/Program

Engineering

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Mortar with pseudoboehmite treated with sodium polyacrylate

Coordination

Caroline Valadão Pacheco

Lattes

http://lattes.cnpq.br/7023353178397954

Summary

The search for mortars with higher performance and less environmental impact has driven the use of modified cementitious materials with innovative additives. Re-coatings and masonry suffer mechanical and chemical degradation over time, requiring mortars with greater durability, cohesion and adhesion. Recent research incorporates nanomaterials into cementitious matrices to improve physical, mechanical, and rheological properties. Studies show that boehmite nanoparticles increase compressive strength and reduce chemical shrinkage; pseudoboehmite gel significantly improves mechanical performance; and the boehmite present in red mud has anticorrosive potential. Thus, it is important to investigate the pseudoboehmite functionalized with sodium polyacrylate in mortars, because polyacrylate can improve the dispersion of nanoparticles, reduce agglomerations, and favor workability, water retention, strength, and adhesion. The proposal also dialogues with environmental challenges, such as intensive sand extraction, which increases costs and generates impacts. Developing solutions that combine better performance with lower consumption of natural resources is essential. The study is justified by its technical, environmental and scientific relevance, contributing to more durable, efficient and sustainable mortars.

SDGs

13-Action against global climate change

Course/Program

PPGEEC

Academic unit

EE

Funding

CNPq Research Productivity Grant Level 1B

Type of funding

National

Project title

Solar and stellar activity and planetary habitability

Coordination

Adriana Benetti Marques Valio

Lattes

http://lattes.cnpq.br/1041565102315246

Summary

The project will look at solar activity, stellar activity and exoplanets, especially the effects that this activity can have on orbiting planets. This interaction also applies to planet Earth, which is constantly hit by radiation and particles from the explosions and ejections of coronal mass *ejections* (CMEs) produced by the Sun's activity. Understanding the physical processes that trigger solar flares is critical to helping predict Space Weather and mitigate its effects on our highly technological society. Like solar activity, stellar activity manifests itself in the form of spots, faculae, explosions, and mass ejections. Spot signatures can be detected in light transit curves when a planet occults a small dark or bright region on the star's surface. This study will help us better understand the dynamo mechanism responsible for generating stellar magnetic fields. By studying stars of different spectral types and with different rotation periods, we hope to get a picture of how the dynamo varies with the mass and age of stars. Another manifestation of magnetic activity, stellar explosions, often thousands of times more energetic than solar ones, are an important source of particle acceleration and ultraviolet radiation that can negatively impact life forms present on the surface of exoplanets close to their host star. In addition to explosions, stars are also thought to produce coronal mass ejections, just like the Sun. These CMEs, when hitting planets in orbit, can have harmful effects on their atmospheres, and can even cause them to erode. Another phenomenon that can cause the loss of planetary atmosphere, in addition to photoionization by UV radiation, is stellar winds. A modeling of the stellar wind, following Parker's model for the isothermal solar wind, will be performed in order to estimate the loss of atmospheric mass over the lifetime of the planets, both the terrestrial planets of the Solar System, and the exoplanets.

SDGs

09-Industry, innovation and infrastructures

Secondary SDGs

13

Course/Program

PPGEEC

Academic unit

EE

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Long-term explosive and quiescent transient solar activity using a multi-fr diagnosis

Coordination

Jean Pierre Raulin

Lattes

http://lattes.cnpq.br/7285541024719915

Summary

The Sun-Interplanetary Medium-Atmosphere-Earth system is interconnected and governed by photonic radiation and solar particles. Its state, called Space Weather, can be disturbed during energetic events, such as solar flares and coronal mass ejections, capable of generating geomagnetic storms with consequences for technological systems on Earth and satellites. Less studied is the role of quiescent or "explosive" solar activity in current climate change and the increasing occurrence of extreme events. Changes in the solar cycle have already occurred, such as in the Maunder Minimum, associated with climate change, and the recent cycle has shown a prolonged minimum, suggesting a possible repetition of this scenario. Understanding the Sun's role in this complex system requires continuous monitoring of quiescent activity and the most energetic transient events across a wide range of the electromagnetic spectrum, from gamma rays to radio waves. It is also necessary to monitor the Earth's atmosphere, especially its lower layers, which are sensitive to external radiation and particle precipitation. South America plays an important role due to its geomagnetic topology in low places and the South Atlantic Magnetic Anomaly (AMAS), which intensifies the effects of Space Weather. Given the complexity of the system, the project adopts a multidisciplinary approach in solo, ionospheric and atmospheric physics. In addition to fundamental and applied research, it seeks to integrate national programs, such as EMBRA-CE/INPE, aiming at the future creation of a regional center for monitoring and forecasting geospatial disturbances.

SDGs

09-Industry, innovation and infrastructures

Secondary SDGs

07

Course/Program

PPGEMN

Academic unit

EE

Funding

CNPq Research Productivity Grant Level PQ-C

Type of funding

National

Project title

Comparative evaluation of the high-temperature performance of new thermal barrier coatings applied by plasma spray under thermochemical attack

Coordination

Carlos Roberto Camello Lima

Lattes

http://lattes.cnpq.br/5984234498421100

Summary

Thermal barrier coatings (TBCs) have been widely employed to thermally insulate metal compounds from hot parts, especially in gas turbine engines. Low-conductivity ceramic coatings maintain a high temperature difference between turbine gases and structural superalloy components, allowing for greater efficiency and service life when integrated into engine design. Yttria-stabilized zirconia has become the main insulation material, although advanced positions, such as zirconia with rare earth oxides in tetragonal structures or pyrochlore, are being tested. However, challenges related to durability persist, including phase transformations, residual stresses due to oxidation, changes in fracture strength, and thermochemical attack by contaminants ingested by the engine. This project aims to study the performance of conventional and alternative TBCs under thermochemical attacks and other contaminants. Among the alternative systems, compositions of zirconia with niobium pentoxide will be proposed. In addition to resistance to CMAS-induced corrosion, high-temperature oxidation, wear and mechanical resistance, its essential functions of thermal insulation and adhesive strength will be evaluated.

SDGs

03-Good health and well-being

Secondary SDGs

09

Course/Program

PPGEMN

Academic unit

EE

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Bioelectronics in graphene: in search of pre-coce diagnosis of diseases

Coordination

Cecilia de Carvalho Castro e Silva

Lattes

http://lattes.cnpq.br/6889517148629242

Summary

The objective of this project is to explore the development of arrays of GFETs-type biosensor devices for highly sensitive detection of biomarkers, using low sample volumes and allowing micro-naturized, portable devices suitable for *point-of-care use*, favoring the decentralization of medicine. The project seeks to: (1) develop and apply microchips containing GFETs for simultaneous detection of breast cancer biomarkers (HER-2, ER, PR and CEA) in a single device, suitable for blood analysis, aiding decentralized diagnosis, evaluation of therapies and reduction of false positives and negatives; (2) to develop GFETs on flexible and low-cost substrates for use as biosensor platforms in the detection of the bacterium *Pseudomonas aerugino-sa* in a hospital environment, aiming to prevent infections. The GFETs will be manufactured with graphene obtained by chemical vapor phase deposition (CVD) and conventional photolithography processes. Specific antibodies for breast cancer biomarkers and bacteriophages for the detection of *Pseudomonas aeruginosa* will be immobilized on the graphene surface in the different arrays, allowing highly sensitive multiplex detection. This is interdisciplinary research at the frontiers of nanotechnology, microelectronics and health, with the potential to have a direct impact on public health services, the economy and social well-being.

SDGs

09–Industry, innovation and infrastructure

Secondary SDGs

08

Course/Program

Chemistry

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Search for metabolites with antiparasitic and antiproliferative activity in plant species of the genus *echino-dorus alismataceae*

Coordination

Edgard Antonio Ferreira

Lattes

https://lattes.cnpq.br/1799464256608030

Summary

In view of the demands of the World Health Organization (WHO), the search for new therapeutic agents is extremely relevant for the control and eradication of Neglected Tropical Diseases (NTDs) and cancer. Parasitic diseases affect millions of people and cause thousands of deaths every year. Among the most relevant, Chagas disease and schistosomiasis stand out, caused by the parasites *Trypanosoma cruzi* and *Schistoso-ma mansoni,* respectively. Cancer, in turn, is the second leading cause of death in the world, second only to cardiovascular diseases, according to the WHO. In this context, the project aims to obtain bioactive compounds from aquatic macrophyte species with antiparasitic or antiproliferative effect against tumor cells.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

11, 12 and 13

Course/Program

Civil Engineering

Academic unit

CCT

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Mechanical behavior of very high re-resistance concrete with low CO2 emission

Coordination

Pablo Augusto Krahl

Lattes

http://lattes.cnpq.br/6910799550680489

Summary

Very high strength concrete (UHPC) has high durability and superior mechanical properties, making it possible to increase the useful life of structures and the development of thinner structural elements. These characteristics make UHPC a promising solution for prefabricated systems and for the industrialization of civil construction. However, technological challenges still limit their wide application, especially related to the high cost and high CO2 emissions associated with conventional formulations. Recent studies indicate that it is possible to significantly reduce the carbon footprint of UHPC, reaching emission rates close to 3 kg/MPa·m³, lower than the usual values between 5.5 and 7 kg/MPa·m³. In this context, this project aims to develop UHPC compositions with low CO2 emission and to investigate mechanical properties that are still little explored for structural applications. Experimental shear, bending and direct traction tests will be carried out, evaluating the influence of the orientation and distribution of the fibers on the behavior of the material. In addition, fiber pullout tests will be conducted in different configurations, corresponding to the mechanical tests mentioned. The experimental results will be used in the development of predictive models based on a mesomechanical approach, considering the behavior of the fiber-matrix interface, as well as the orientation and distribution of the fibers in the composite.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

12

Course/Program

PPGEMN

Academic unit

EE

Funding

FAPESP

Type of funding

National

Project title

Biodegradable composites based on poly(hydroxybu-tyrate-cohydroxyvalerate), nanocellulose and graphene: from rheology to microstructure

Coordination

Guilhermino José Macêdo Fechine

Lattes

http://lattes.cnpq.br/8109533360196619

Summary

Biodegradable polymers such as poly(hydroxybutyrate-co--hydroxyvalerate) (PHBV) are presented as a possible alternative to the environmental disadvantages associated with petroleum-derived polymers. However, the mechanical properties of PHBV fall short of what is desired for technological applications. The addition of graphene and derivatives, as well as nanocellulose crystals have the potential to re-strengthen PHBV, to generate composite materials with mechanical properties suitable for large-scale production and applications. This proposal presents a work plan focused on the rheological characterization, using shear and extensional flows, of PHBV-based nanocomposites and nanocellulose crystals associated with graphene and graphene oxide. The expected results include the development of a three-phase composite, and the association of the rheological behavior of composites to the morphology of the dispersed phases.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

08

Course/Program

PPGEMN

Academic unit

EE

Funding

CNPq Research Productivity Grant Level PQ-B

Type of funding

National

Project title

Development of Graphene-Reinforced Aluminum Matrix Composites for Automotive Applications

Coordination

Antonio Augusto Couto

Lattes

http://lattes.cnpq.br/2893737202813850

Summary

Additive manufacturing has attracted industries and academia because it allows high value-added parts, with different designs and the possibility of customization. However, producing components of Inconel 718 by additive manufacturing with mechanical properties equivalent to those obtained by conventional metallurgy is a challenge. The properties, especially uniaxial and multiaxial fatigue and creep in parts obtained by Laser Powder Bed Fusion (LPBF), depend on the combination of parameters such as beam power, scanning speed, spacing and layer thickness. The project seeks to understand the behavior of Inconel 718 produced by additive manufacturing when subjected to fatigue and creep, a current and still little explored topic, since incompatibilities in the process can cause premature failures. The growing interest is evidenced by sessions dedicated to the theme, such as the European Congress on Fracture (ECF23), organized by Prof. Luís Reis, who is part of this project. The additive manufacturing of Inconel 718 will be carried out by LPBF at SENAI; heat treatments, microstructural characterization and creep tests will take place at Mackenzie; and the uniaxial and multiaxial fatigue tests will be conducted at the Instituto Superior Técnico of the University of Lisbon, under the coordination of Prof. Luís Reis. The microstructure and mechanical properties of the parts obtained by additive manufacturing and conventional metallurgy will be compared.

SDGs

07-Affordable and clean energy

Secondary SDGs

09 and

Course/Program

PPGEMN

Academic unit

EE

Funding

FAPESP

Type of funding

National

Project title

Development of multiferroic thin films: nano-engineering in the modulation of optoelectro- - Magnetic emerging materials

Coordination

Everton Bonturim

Lattes

http://lattes.cnpq.br/1155726883286152

Summary

The present project proposes the development of new advanced multiferroic materials as well as the modulation of their multiferroic properties for application in logic and memory devices. Multiferroic ceramics, with their coupled optical, electrical and magnetic properties, have advantages for the creation of new electronic devices, such as processors, memories, chemical sensors, actuators, photovoltaic cells, among others, and the investigation of their characteristics and phenomena related to fundamental physical operation becomes attractive for cutting-edge technological evolution. As a guiding objective, we seek to create systems with better energy efficiency and higher density of air-storage of information per operation. To this end, the focus of the proposal is on the development of the chemical control of multiferroic thin films deposited by PVD techniques based on *radiofrequency magnetron-sputtering* and HiPIMS, motivated by the influence of the modification of its chemical composition and the deposition technique on the variability of ferroelectric domain arrangements, aiming at the understanding and modulation of ferroic properties of condensed matter.

SDGs

07-Affordable and clean energy

Secondary SDGs

09

Course/Program

PPGEMN

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Development of lead-free magnetoelectric multiferroic thin films for application in logic and memory devices

Coordination

Everton Bonturim

Lattes

http://lattes.cnpq.br/1155726883286152

Summary

The current situation of the semiconductor market makes it clear that technological demands are not being met in their entirety, mainly due to the centralization of the large holders of these technologies, evidenced by the recent and continuous news of lack of electronic components for the production of automobiles, industrial equipment, computers, *smartphones*, among others. Brazil currently has an enormous potential to enter the competitive semiconductor market, considering its broad mineral wealth and scientific potential to embark on technology, however, it is essential to invest in programs and projects of a technical nature.
-scientific. Considering the great national *deficit* for the development of promising materials and technologies to compete with the international market for logical devices (processors) and data storage (non-volatile memories), and counting on the enormous potential of human resources, infrastructure and investments of the University, the present project involves the development and research of new multiferroic materials applied in logical and data storage devices, in order to increase efficiency in processing capacity and in order to significantly reduce energy consumption per logical operation, which brings enormous potential for new proposals of energy-viable technologies for a future of large peripheral demands.

SDGs

02-Zero hunger and sustainable agriculture

Secondary SDGs

03, 09 and 12

Course/Program

Engineering

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Development of a screening method to identify veterinary drug residues in bovine milk by near-infrared, using mass spectrometry as a primary data method for calibration

Coordination

Rosineide Costa Simas

Lattes

http://lattes.cnpq.br/8767919379802600

Summary

In 2024, milk occupied the 7th position in the ranking of agricultural products, with production present in 99% of Brazilian states and generating more than 5 million direct jobs. This food is prominent on the national scene and in the world, with a composition rich in nutrients and legislation that guarantees a physical-chemical control of the product. We have a need to expand the analysis of sanitary standards, such as the detection of antibiotic residues. Therefore, it is necessary to seek solutions to increase the food safety of bovine milk, to meet the growing demand for analyses with the greatest possible accuracy, which can reduce costs and increase the number of analyses for veterinary drug residues. The Near Infrared (NIR) analysis system is extremely fast and allows multiple analyses of constituents simultaneously, requires little labor and allows lower costs, in addition to being non-polluting because it does not use chemical reagents. This work aims to use the standard analysis of liquid chromatography coupled to high-resolution mass s-spectrometry (LC-HRMS) to provide reliable results that, associated with NIR analyses, provide a screening method capable of separating by classes the different veterinary drugs that are in use in Brazil.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

04, 11, 13, 15 and 17

Course/Program

PPGEMN

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Development of a multifunctional nanostructured coating based on polyurethane modified with graphene oxide for waterproofing concrete structures

Coordination

Ricardo Jorge Espanhol Andrade

Lattes

http://lattes.cnpq.br/2704277390841473

Summary

Thermoset polyurethane has been widely used for waterproofing concrete structures. However, when exposed to the elements, degradation mechanisms can occur, leading to early failures, such as cracking, loss of adhesion and abrasion resistance. That said, this project proposes to develop a nanostructured polyurethane with graphene oxide (GO), to improve its physicochemical and mechanical properties. To do this, GO will be incorporated into the polymer matrix during its formulation. In addition, the evaluation of the photo-oxidative performance, after exposure to weathering cycles, will be carried out. As a product, it is expected to obtain a high-performance, multifunctional, and longer-lasting mem-brane.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

08

Course/Program

Mechanical Engineering

Academic unit

EE

Funding

CNPq

Type of funding

National

Project title

Development of a piezoelectric pressure sensor characterization of shock waves in the hypersonic tube

Coordination

Fábio Raia

Lattes

https://lattes.cnpq.br/2808112201398430

Summary

A shock tube consists of two axially connected tubular sections, separated by a diaphragm: the high-pressure section (*driver*) and the low-pressure section (*driven*), joined by the DDS region, where the membrane is installed. Its instrumentation uses pressure and temperature sensors, whose signals are recorded by acquisition plates and the cilscopes. The speed of the shock wave, generated by the rupture of the diaphragm, is obtained by reading the sensors positioned along the tube. These devices are essential for characterizing the shock wave and classifying the tube as hypersonic. The project proposes to develop a pressure sensor resistant to high pressures, with compatible response time, interchangeable, mounted in a single block, encapsulated in AISI 304 stainless steel and equipped with a piezoelectric transducer, with a range of 0 to 70 bar. Shock tubes are widely used in the study of hypersonics, allowing tests on aerodynamic profiles for speeds above Mach 5. In operation, the rupture of the diaphragm generates a pressure gradient that produces the shock wave. The measurement of pressures along the *drive* will be carried out by an automatic acquisition system, with a standard sensor for calibration. The sensors are expected to exhibit stability and robustness for permanent instrumentation and technology transfer potential.

SDGs

06-Drinking water and sanitation

Secondary SDGs

09

Course/Program

PPGEMN

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Development of thin-film-based SAW sensors

Coordination

Marcos Massi

Lattes

http://lattes.cnpq.br/1992108703603111

Summary

The control of the emission of pollutants in industrial processes and urban pollution more broadly has been increasingly demanded by national and international environmental organizations. The use of specific sensors with high reliability and that provide real-time information is essential for this control. Sensors based on surface acoustic waves (SAW) are part of the family of devices that contribute to this control. In this project, it is intended to model, fabricate and characterize SAW sensors with the sensitive layer with piezoelectric properties based on thin films of metal oxides (TiO2 and ZnO, for example) on silicon substrates, as a possible application in environmental control or industrial processes through the detection of gases and pollutants (NO2 and NH3, for example). Computer simulations will also be carried out with the Comsol Multiphysics tool, which will allow the extraction of the best parameters and optimal geometrics for the manufacture of the devices. Based on the simulation results, the process conditions will be defined to obtain the films that must be deposited on silicon by the *magnetron sputtering technique*. Thus, with the results obtained, the team will have mastery of the techniques of design, manufacture and characterization of SAW devices, which will allow the development of other chemical sensors for applications relevant to industrial process control and pollution control.

SDGs

03-Good health and well-being

Secondary SDGs

06

Course/Program

Engineering

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Development of an innovative filtration system from the synthesis of ceramic material with graphene species for heavy metal retention

Coordination

Renato Meneghetti Peres

Lattes

http://lattes.cnpq.br/1523766134216214

Summary

Health problems related to water quality, in addition to an environmental concern, overload the health system with diseases caused by the presence of various contaminating agents. The UN Sustainable Development Goals have universal access to quality water as one of their goals. The development of filter systems has been an important evolution for the retention of organic and inorganic molecules. The elaboration of an innovative ceramic system modified with graphene oxide aims to retain heavy metals and can be applied in residential and industrial installations or in the recovery of areas degraded by illegal mining.

SDGs

09-Industry, innovation and infrastructure

Course/Program

Engineering

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Development and characterization of heterostructures with two-dimensional nanomaterials, semiconductors and graphene

Coordination

Henrique Guimarães Rosa

Lattes

http://lattes.cnpq.br/7713098655067147

Summary

The characterization of nonlinear optical phenomena such as saturable absorption and harmonic generation in vertical heterostructures based on biimensial nanomaterials is of fundamental importance for applications of these structures in optical and optoelectronic devices. Graphene, molybdenum disaludinide, and rhenium disulfide, among other two-dimensional nanomaterials, have been widely applied in fiber optic lasers as saturable absorbers for the generation of femtosecond pulses, however the mechanisms of saturable absorption, especially for semiconductor nanomaterials and their heterostructures, are not fully elucidated and explored.tantal. In addition to the saturable absorption in the infrared, which is non-trivial for those materials that have *optical bandgap* in the visible, the two-dimensional semiconductor nanomaterials also exhibit prominent two-photon absorption when excited in the infrared. In this project, we aim to fully characterize the nonlinear optical absorption (saturable absorption and harmonic generation) in these materials as a function of extrinsic parameters, such as pulse duration, wave length and area of interaction of the excitation laser with the material, and intrinsic parameters of the materials, such as electronic relaxation time and carrier diffusion coefficient. To fulfill this objective, we will use an experimental assembly of a wavelength tuned laser microscope system for nonlinear optical characterization in two-dimensional vertical heterostructures manufactured with graphene and dicalco-genetes of transition metals.

SDGs

07-Affordable and clean energy

Secondary SDGs

09

Course/Program

PPGEMN

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Design of national cathode active materials for lithium-ion batteries obtained by the highly *scalable sprey-drying* technique and their respective *pouch* and cylindrical cells

Coordination

Josué Martins Gonçalves

Lattes

http://lattes.cnpq.br/8271818229699538

Summary

This project aims to develop nanostructured Cathode Active Materials (MACs) in *cell coin* (mo-eda) cells, with TRL 3, and *pouch* and cylindrical cells, with TRL 4-5 for the battery market. Currently, lithium iron phosphate (LFP) batteries have an in-terminal cost, lower performance, but are safer compared to batteries based on lamellar oxides of Co (LCO) and NiCoMn (NCM). However, it is possible to introduce innovations in the current LFP technology by incorporating manganese into the LFP (LMFP). In this context, it is proposed the development of an innovative, highly calonable and low-cost process for the preparation of MACs with higher energy density by means of *spray-drying*, which additionally enables the reduction of the carbon footprint of the materials and also the reduction of the costs of battery production, creating a new, more efficient technology with the objective of inducing production in Brazil. These objectives will be achieved by optimizing advanced MAC formulations and increasing energy density. This project demonstrates the commitment to promote a sustainable transformation in the battery market and a faster transition to a future with clean mobility in Brazil.

SDGs

07-Affordable and clean energy

Secondary SDGs

09

Course/Program

PPGEMN

Academic unit

EE

Funding

FAPESP

Type of funding

National

Project title

Design of new high-energy coordination compounds by *spray-drying* and their derivatives for energy conversion and storage

Coordination

Josué Martins Gonçalves

Lattes

http://lattes.cnpq.br/8271818229699538

Summary

This project aims to create, at MackGraphe – Mackenzie Presbyterian Institute (IPM), a group of excellence dedicated to the design of high-entropy coordination compounds and their derivatives. Although the institute operates in areas such as supercapacitors, it does not yet have groups focused on heterogeneous ele-trocalysis for the production of hydrogen ver-de by *water-splitting* using high-entropy materials (HEMs), especially high-entropy coordination compounds and their derivatives, also applicable as cathodes in sodium or lithium-ion batteries. The proposal seeks to fill this gap in collaboration with national and international groups. The focus will be on the design of electrodes based on high-entropy metallic glycerolates (HE-Glys) and derivatives, employing *spray-drying*, innovative and scalable synthetic route. The project is divided into: (i) controlled synthesis of HE-Glys and derived oxides; (ii) ele-trocalytic applications for green hydrogen production; (iii) use as cathodes in sodium-ion batteries; and (iv) comparison with materials obtained by solvothermal method. The initiative is strategic for the energy transition and consolidation of a new interdisciplinary area in Brazil.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

13

Course/Program

PPGEEC

Academic unit

EE

Funding

CNPq Research Productivity Grant Level 1D

Type of funding

National

Project title

Dynamics of the active solar atmosphere

Coordination

Carlos Guillermo Giménez de Castro

Lattes

http://lattes.cnpq.br/5735720962238368

Summary

The project aims to continue our line of research around the analysis of observations of solar flares at high frequencies radio through our telescopes (POEMAS, SST, mid-infrared cameras, etc.), the development of new instruments in spectral bands not yet explored, as well as the deepening of theoretical aspects of the emission. At the same time, we will continue to support other instrumental projects, with particular emphasis on the Large Latin American Millimeter Array.

SDGs

07-Affordable and clean energy

Secondary SDGs

09

Course/Program

PPGEMN

Academic unit

EE

Funding

FAPESP

Type of funding

National

Project title

Light-emitting diodes (LEDs) based on two-dimensional Van der Waals heterostructures for telecommunications and sensing applications

Coordination

Eunezio Antonio de Souza

Lattes

http://lattes.cnpq.br/9756214150140645

Summary

Van der Waals heterostructures (VDWH) formed by layer-to-layer de-position of two-dimensional materials, such as graphene and transition metal dichalcogenides (TMDs), have been extensively investigated for applications in optoelectronics and photonics. The proponent groups have experience in saturable absorbers, based on 2D fiber materials, having previously demonstrated a *high-stability graphene fiber soliton* laser. This project proposes to design, assemble and characterize more complex VDWH, going beyond a few layers of graphene, exploring 2D materials whose optimal properties can be electronically controlled. The study will focus on compact optoelectronic LEDs based on semiconductor VDWH for optical communications applications. The light emission is modulated by variation of the charge density via applied voltage. 2D materials, especially TMDs, exhibit remarkable optical and electrical properties, such as adjustable band structure, high exciton energies, and strong nonlinear conversion, making them promising candidates for visible and infrared devices. Its emission properties - photoluminescence and electroluminescence
- can be adjusted by substrate, temperature, geometry, device architecture, current injection and doping. The proposal can contribute significantly to the engineering of 2D materials in ultra-compact, high-speed transmitters such as LEDs, *lasers,* and modulators, which are essential for telecommunications and optical sensing.

SDGs

03-Good health and well-being

Secondary SDGs

09

Course/Program

PPGEEC

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

LVAD Ventricular Assist Device

Coordination

Cristiano Akamine

Lattes

http://lattes.cnpq.br/0394598624993168

Summary

In Brazil, approximately 6.5 million people suffer from advanced heart failure, a serious condition that may require transplantation as an ideal treatment. However, this alternative is limited by the high cost and scarcity of compatible donors, making it unfeasible for most patients. As an alternative, left ventricular assist devices, such as the Left Ventricular Assist Device (LVAD), emerge as an effective solution. However, the equipment currently available in the market is mostly imported and has high costs, which restricts its access in the Unified Health System (SUS) and even in a large part of the private network. This project aims to develop a national DAVE, focusing on reducing costs and expanding access to technology. In addition to the development of the device itself, the project contemplates the creation of a complete therapy ecosystem, incorporating innovative solutions such as connectivity and remote monitoring of biological signals. This will allow clinicians to monitor and adjust treatment remotely, reducing the need for frequent travel and contributing to more efficient, accessible, and sustainable care.

SDGs

12-Responsible consumption and production

Secondary SDGs

09

Course/Program

Engineering

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Hybridized flexible packaging for electromagnetic shielding of pbat-graphene-waste from the footwear industry

Coordination

Danilo Diniz Siqueira

Lattes

http://lattes.cnpq.br/2749678246476666

Summary

The research proposes the development of flexible packaging hybridized with PBAT, graphene and waste from the footwear industry containing carbon black, with a focus on shielding against electromagnetic interference (EMI). The study uses nanotechnology to create nanocomposites with superior properties, taking advantage of the strength of graph and the sustainability of reusing synthetic rubber waste. Hybridization makes it possible to combine different reinforcements, resulting in materials with better performance. The proposal aims not only at technological advances, but also at environmental and social benefits, by minimizing impacts and promoting effective solutions in the face of growing electromagnetic pollution.

SDGs

04-Quality education

Secondary SDGs

09

Course/Program

Academic unit

CCT

Funding

Mack Pesquisa

Type of funding

National

Project title

Filler 4.0 as a didactic tool for engineering education

Coordination

Antonio Alvaro de Assis Moura

Lattes

http://lattes.cnpq.br/7484658295582373

Summary

This project proposes the development of an automated filling machine connected to the internet as a didactic resource, integrating Industry 4.0 technologies (RFID, microcontro-lators and cloud computing. Applied in educational contexts, the initiative aims to promote inter-disciplinary learning in technical and higher education, stimulating student engagement and the development of practical skills. It is expected to contribute to technological training, scientific production and the establishment of institutional partnerships.

SDGs

09-Industry, innovation and infrastructure

Course/Program

PPGEMN

Academic unit

EE

Funding

CNPq

Type of funding

National

Project title

Study of the properties at elevated temperatures of the TI-6Al-4V alloy modified by surface treatments by plasma-assisted techniques

Coordination

Marcos Massi

Lattes

https://lattes.cnpq.br/1992108703603111

Summary

Despite notable advances in the development of the Ti-6Al- alloy -4V, there are limitations regarding the use of these alloys at temperatures above 600 °C. In this context, many studies have been carried out with the objective of increasing the life span of these alloys, including thermochemical treatments and coatings. Among these treatments, plasma nitriding is traditionally performed by the plasma-assisted vapor phase chemical deposition (PECVD) method. A new method of PECVD deposition using a high power pulsed source (HiPP-PECVD) can generate a plasma with a significantly higher density than the traditional one. Among the surface coatings, plasma thermal spray has been used, providing improvements in the performance of these alloys. In this project, the mechanical properties at high temperatures of the Ti-6Al-4V alloy will be studied with surface treatment of plasma nitriding performed by HiPP-PECVD and with surface coating applied by plasma thermal spray (APS), using metal and ceramic alloy. The treated surfaces of the alloy will be analyzed with respect to the microstructure by optical microscopy (OM) and scanning electron microscopy (SEM) and by X-ray diffractometry. The mechanical behavior in tensile at high temperatures and different rates of formation and creep in the constant load mode in the original Ti-6Al-4V alloy or with treatment will be investigated. The tested materials will have their fracture surface analyzed by SEM. An analysis by means of the JMatPro software will be made in order to determine the phases present, mechanical properties at elevated temperatures and creep curves of the alloy under different conditions.

SDGs

09-Industry, innovation and infrastructure

Course/Program

PPGEMN

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Study of the mechanical behavior in fatigue and creep and the microstructural characterization of inconel 718 obtained by additive manufacturing

Coordination

Antonio Augusto Couto

Lattes

https://lattes.cnpq.br/2893737202813850

Summary

Additive manufacturing has attracted great industrial and academic interest because it allows the production of high value-added parts, with complex geometries and the possibility of customization. However, obtaining Inconel 718 components by L-GMP with mechanical properties equivalent to those of conventional metallurgy is challenging, especially regarding uniaxial and multiaxial fatigue and creep, which depend on the combination of parameters such as beam power, sweep speed, spacing and layer thickness. The project seeks to understand the behavior of Inconel 718 produced by additive manufacturing when subjected to fatigue and creep, since inadequate parameters can generate premature failures. The study of the micromechanisms associated with these processes is still little explored and essential to expand the industrial use of the alloy. The production of the samples will be carried out by L-PBF at SENAI; heat treatments, microstructural characterization and creep tests will take place at the Mackenzie Presbyterian University; and the uniaxial and multiaxial fatigue tests will be conducted at the Instituto Superior Técnico of the University of Lisbon. Microstructures and mechanical properties of Inconel 718 obtained by additive manufacturing will be compared with that produced by conventional fusion, forging and rolling routes.

SDGs

07–Affordable and clean energy

Secondary SDGs

09 and 12

Course/Program

PPGEMN

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Study of the performance of conventional and alternative thermal barrier coatings applied by plasma *spray* in environments under high temperature and thermochemical attacks

Coordination

Carlos Roberto Camello Lima

Lattes

http://lattes.cnpq.br/5984234498421100

Summary

Thermal Barrier Coatings (TBC) are used to provide thermal insulation to metal components of hot parts, especially gas turbine engines. Ceramic coatings contribute to maintaining a large temperature difference between the hot gases of the turbine and the components of the structural superalloy. Increased engine efficiency and extended service life can be achieved by integrating TBCs into gas turbine components. However, in addition to the search for new ceramic compositions for insulation, much research focuses on issues of engine durability. This project aims to study the performance of TBCs under conditions of thermochemical attacks and other contaminants.

SDGs

09-Industry, innovation and infrastructure

Course/Program

Engineering

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Computational numerical study of small natural circulation circuits with nanofluid, formed by suspension of graphene oxide in water

Coordination

Edvaldo Angelo

Lattes

http://lattes.cnpq.br/3051029504172940

Summary

This project investigates the use of single-phase mini and micro natural circulation systems, with graphene oxide-based nanofluids, in the passive cooling of electronic components. Thermal stability, the effects of boundary conditions and associated challenges, such as hydrodynamic instabilities and regime transitions, will be analyzed. The methodology uses three-dimensional numerical simulations with finite volumes in ANSYS CFX®, applying the k-#1013 model and dimensionless parameters. The requested infrastructure includes software license, server upgrade, and workstations. It is expected to advance the thermal efficiency of passive cooling systems in electronics.

SDGs

4-Quality Education

Secondary SDGs

09

Course/Program

PPGEMN

Academic unit

EE

Funding

Finep
EMPRESA BRASILEIRA DE INOVAÇÃO E PESQUISA

Type of funding

National

Project title

Expansion and modernization of integrated materials characterization and processing laboratories

Coordination

Guilhermino José Macêdo Fechine

Lattes

https://lattes.cnpq.br/8109533360196619

Summary

The main objective of this subproject is to expand the laboratories of the Mackenzie Presbyterian Institute (IPM), both in the School of Engineering of the Mackenzie Presbyterian University and in the premises of the Mackenzie Institute for Research in Graphene and Nanotechnologies (MackGraphe), linked to the characterization and processing of materials, focusing mainly on materials and processes correlated to nanotechnology. In this sense, MackExpMat seeks to contribute to the growth and competitiveness (national and foreign) of the infrastructure directly linked to the area of characterization on a micro/nanometric scale and in the production/characterization of high-performance polymeric nanocomposites. Continuing, MackExpMat will provide the academic community and partners in the productive sector (*startups* and industries) with an infrastructure of laboratories aimed at the characterization and development of materials based on nanotechnologies, aiming to achieve national autonomy and Brazil's protagonism in Latin America. MackExpMat also aims, through the expansion of its multi-user structure of laboratories, to contribute to the formation of highly qualified human resources and an interdisciplinary environment in the area of Materials Engineering and Nanotechnologies.

SDGs

09-Industry, innovation and infrastructure

Course/Program

PPGEEC

Academic unit

EE

Funding

CNPq

Type of funding

National

Project title

Exploring semiconductor thin films produced by *Sputtering* and its applications in devices and sensors

Coordination

Mariana Amorim Fraga

Lattes

http://lattes.cnpq.br/5099968396115915

Summary

The purpose of this research project is to study different conditions of deposition by *sputtering*, which enables the production of semiconductor thin films of aluminum nitride (AlN), silicon carbide (SiC) and zinc oxide (ZnO) with properties similar to those of their substrates, which can be applied in the manufacture of sensors and heterojunction diodes. It is expected that the deposition parameters will be optimized to produce high quality films that meet the proposed applications. The choice of materials that will be produced was due to their electronic and transducing properties. AlN and ZnO are piezoelectric materials, whereas SiC is a pie-zoresistive material. In addition, thin films of these materials have been explored for applications in electronic devices for applications in harsh environments, where silicon has limited performance.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

13

Course/Program

Engineering

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Sheet metal extrusion

Coordination

Juliano Martins Barbosa

Lattes

http://lattes.cnpq.br/3824323081408422

Summary

Pseudoboehmite is non-toxic and studies have demonstrated applications in polymeric nanocomposites, allowing use in packaging. The objective of the project is to evaluate the mechanical and thermal properties of thermoformed products from extruded sheets of HIPS (high impact polystyrene)/Pseudoboehmite nanocomposites, containing different concentrations of treated nanoparticles, enhancing their dispersion in the matrix. The processability of the nanocomposites will be evaluated according to the extrusion parameters and, finally, as applied research, the sheets will be thermoformed into disposable articles (cups or packaging), ascertaining the final characteristics of the product. The addition of inorganic fillers in polymers reduces the non-renewable content in the composition, as well as improving properties and recyclability.

SDGs

09-Industry, innovation and infrastructure

Course/Program

PPGEEC

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Manufacture and characterization of optical modulators for application as magnetimeters

Coordination

Bruno Luis Soares de Lima

Lattes

http://lattes.cnpq.br/8752251074252426

Summary

The work aims to develop and manufacture an optical modular based on magnetostrictive film for application as a magnetometer. The modeling was carried out using *software* with calculation by FEA and had the purpose of iteratively assisting the manufacturing and design processes of the modulator. The manufacture of the proposed optical modular was carried out using techniques and concepts of integrated optimal. The working principle of the proposed optical modulator is based on the modulation of the waveguide by the application of external magnetic fields. The applied magnetic field will deform the magnetostrictive material which will induce a proportional stress profile on the substrate. The substrate will have its optical properties altered, which will cause changes in the properties of the transmitted light. The work will initially address a study and characterization of magnetostrictive films of Terfenol (TbFe2) and Terfenol D (TbFeD) that will be deposited by *sputtering* on transparent optical substrates. A methodology for sample preparation and magneto-trication measurement will be established for these films. After the study of the adhesion of the films on the substrate and the parameterization of the manufacturing process, the optical modulator will be manufactured. At the end of the work, the response of the modulator to the application of applied external magnetic fields will be verified.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

12

Course/Program

PPGEEC

Academic unit

EE

Funding

CNPq

Type of funding

National

Project title

Thin films of graphene obtained by *blade coating technique* for electronic and optical applications

Coordination

Lucia Akemi Miyazato Saito

Lattes

http://lattes.cnpq.br/0915583034741895

Summary

The project aims to develop applications based on thin films of graphene oxide (Graphene Oxide – GO) using the *blade coating technique* with the objective of precisely controlling thickness and homogeneity, in addition to developing a process with the possibility of large-scale manufacturing. The first application is in the area of sensing with the proposal of manufacturing *strain gauge*, based on graphene on rigid substrates applying directly to the target substrate (without the need for transfer techniques) and flexible substrates exploring the area of flexible electronic sensors. One of the techniques for reducing graphene oxide is through localized heating via light incidence, in which the samples acquire electrical conduction properties with resistance in the order of tens to hundreds of Ohm. The second application to be studied is in the area of optical sensing, in which a layer of GO is applied over metallic films for SPR measurements.

SDGs

07-Affordable and clean energy

Secondary SDGs

09

Course/Program

PPGEEC

Academic unit

EE

Funding

HUAWEI

MCTI

Type of funding

Foreign

Project title

Inova Solar: performance evaluation of lithium-ion battery systems

Coordination

Bruno Luis Soares de Lima

Lattes

http://lattes.cnpq.br/8752251074252426

Summary

One front of the study is to design, install and operate a photovoltaic solar plant in a building at Mackenzie Presbyterian University, with the purpose of carrying out power generation tests and offering personnel training. In addition, design, install and operate a laboratory to perform arc flash detection and interruption tests on inverters. Such a laboratory will make it possible to compare different models of inverters from different manufacturers. The tests may contribute to the establishment of a methodology for the approval of inverters regarding the performance of electrical protections in relation to electric arcs in DC circuits. Such a methodology could serve as a reference for the establishment of national standards in the future. The studies will be carried out by monitoring the operation of the equipment, through analytical and numerical techniques. The contribution is socio-economic and environmental in nature, as it aims to sensitize society and the authorities in relation to the technical and training needs, to enable the advancement of the installation of photovoltaic generation units in Brazil.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

04 and 17

Course/Program

PPGEEC

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Instrumentation and communication of a *point-in-point system-of-care* for photonic biosensing based on graphene and other nanomaterials

Coordination

Lucia Akemi Miyazato Saito

Lattes

http://lattes.cnpq.br/0915583034741895

Summary

This project proposes the development of a *point-of-care* touchscreen system using integrated optical components for measurements in an environment outside the photonics laboratory. The first part involves the preparation of substrates with thin films of graphene oxide, using the *blade coating technique* with the objective of manufacturing it in large scales, precisely controlling the thickness and homogeneity. The second part proposes the development of a system with automated optical instrumentation, with reproducible results, compact and integrated with an inter-face of detection, data analysis and transmission.

SDGs

03-Good health and well-being

Secondary SDGs

09

Course/Program

PPGEMN

Academic unit

EE

Funding

CNPq

CNPq Research Productivity Grant Level 1C

Type of funding

National

Project title

2D light-material interaction for spectroscopy and photonic biosensing

Coordination

Christiano José Santiago de Matos

Lattes

http://lattes.cnpq.br/6843256597783676

Summary

Optical sensing and spectroscopy methods hold promise for areas such as health and security because they can in principle be fast, sensitive, accurate, and non-destructive. When combined with modern integrated photonics techniques, they can also generate extremely compact, portable devices that require small volumes of analyte. Two-dimensional (2D) materials also have enormous potential for chemical and biological sensing, since their enormous specific surface area makes them extremely sensitive to the environment. These materials also have a strong interaction with light, as well as high efficiency in non-linear, plasmonic and photocatalytic processes. In this project, it is intended to apply the proponent's vast experience in the area of optics and photonics in 2D materials in the study of methods aimed at spectroscopy and sensing of chemical and biological materials.

SDGs

13-Action against global climate change

Course/Program

PPGEEC

Academic unit

EE

Funding

FAPESP

Type of funding

National

Project title

Modeling of energy processes in the solar atmosphere using Monte Carlo simulation packages

Coordination

Sérgio Szpigel

Lattes

http://lattes.cnpq.br/2578978663165124

Summary

The objective of this project is to develop and validate tools based on the Monte Carlo FLUKA and GEANT4 simulation packages for the modeling of energetic processes occurring in the solar atmosphere. Specifically, we will investigate the emission of hard X-rays and gamma rays in the energy range of keV to GeV, produced by electrons and ions accelerated in solar flares, and the emission of gamma rays from the quiescent Sun in the energy range of GeV to TeV, produced by *galactic cosmic rays* - GCR). The exact mechanisms involved in the process of sudden release of energy stored in the mag-netic field and in the processes of acceleration and transport of electrons and ions, which occur in solar flares, are not yet fully understood. We hope that the modeling developed in this project will contribute to a better understanding of the mechanisms of acceleration and transport of electrons and energetic ions and of the structure and evolution of the ambient magneto-active plasma. Regarding the emission of gamma rays from the quiescent Sun, none of the approaches proposed in the literature so far is able to satisfactorily describe the characteristics observed for the emission component of the solar disk, produced by collisions of GCR nuclei with nuclei of the ambient solar atmosphere. One of the fundamental ingredients involved in modeling the observations of gamma-ray emission from the solar disk is the structure considered for the solar magnetic field. We hope that the modeling developed in this project will contribute to a better understanding of the mechanisms involved in the emission of gamma rays from the Sun produced by GCR nuclei.

SDGs

07-Affordable and clean energy

Secondary SDGs

09

Course/Program

PPGEEC

Academic unit

EE

Funding

CNPq Research

Level PQ-2

Type of funding

National

Project title

Optical modulators and sensors based on graphene and other two-dimensional materials

Coordination

Lucia Akemi Miyazato Saito

Lattes

http://lattes.cnpq.br/0915583034741895

Summary

The increase in data flow, partially strengthened by the Internet of Things (IoT) and 5G networks, sends a considerable growth in the rate of transmission and new sensing and communication devices, making it important to develop disruptive technologies integrating microelectronics, photonics and nanotechnology. In this context, the proposal of this project is the development and construction of photonic, optical, electro-optical and optoelectronic devices based on graphene and other two-dimensional (2D) materials. The first stage (already underway and with recent preliminary results) begins with the design and simulation of graphene-based devices for the construction of integrated optical modulators and sensors with a view to possible compatibility with silicon photonics, polymers and optical fiber technologies. The main challenges will be: 1) study of new configurations of photonic devices based on two-dimensional materials; 2) development of the stages of the manufacturing process of devices based on graphene and new two-dimensional materials compatible with integrated optics platforms (silicon, polymer and others);
3) determine the calibration characterizations of each stage of manufacturing the optical modulators and sensors.

SDGs

07-Affordable and clean energy

Secondary SDGs

09

Course/Program

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Niobium multistructures applied in energy storage systems

Coordination

Benedito Guimarães Aguiar Neto

Lattes

https://lattes.cnpq.br/3405447548131544

Summary

Energy storage devices are increasingly present in our lives, and the need for more efficient, safer and miniaturized systems is increasing. In this sense, the development of new nanocomposites, using nanomaterials with different energy storage mechanisms, and that can be used as more effective electrodes in batteries and/or supercapacitors is essential. Thus, the main objective of this proposal is to evaluate the use of niobium as the main component in a nanocomposite of the NbS2-Nb2O5/rGO type, which, in turn, will be used with electrochemically active material in the development of more efficient batteries and supercapacitors.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

12

Course/Program

PPGEMN

Academic unit

EE

Funding

CNPq Research Productivity Grant Level PQ-B

Type of funding

National

Project title

High-performance ecologically friendly polymeric nanocomposites: production and applications

Coordination

Guilhermino José Macêdo Fechine

Lattes

http://lattes.cnpq.br/8109533360196619

Summary

Most applications of biodegradable polymers (PBs) are "single-use", and few of these materials have an environmentally appropriate destination, such as landfills or composting plants. This reduces their use and devalues materials whose cost is higher than that of conventional non-biodegradable polymers. The project seeks to explore innovative and technologically advanced applications for PBs, targeting high-performance smart materials. These products can present multifunctionality with the insertion of nanoparticles, combining high mechanical performance with improvements in gas barrier and thermal and electrical conductivity. The focus of the applications will be the production of materials for 3D printing and multilayer films obtained by extrusion. For this, polymeric nanocomposites based on PLA, PHA, PCL, PBAT, PBS and PBSA will be developed, incorporating different nanomaterials as fillers: cellulose nanoparticles (nanocrystals and nanofibrils), carbon nanotubes (NTC) and two-dimensional materials (grana-feno, graphene oxide and hexagonal boron nitride - hBN). The project includes biodegradability, toxicity and ecotoxicity assessments to verify whether the addition of nanoparticles alters intrinsic properties of PBs and how such alterations impact human health and aquatic and terrestrial ecosystems.

SDGs

06-Drinking water and sanitation

Secondary SDGs

09

Course/Program

PPGEMN

Academic unit

EE

Funding

Technological Development Productivity Scholarship

CNPq Level DT-2

Type of funding

National

Project title

Innovative electrochemical nanofilters and nanosensors based on multifunctional nanoarchitectures

Coordination

Thiago da Cruz Canevari

Lattes

http://lattes.cnpq.br/6149251163133726

Summary

Development of new, highly efficient nanomaterials that will be applied in the construction of nanofilters to remove these analytes, which contaminate water and effluents. Thus, this project aims to develop, characterize and apply multifunctional hybrid nanoarchitectures based on NbxOy and SnxOy. These hybrid nanoarchitectures will be employed in the construction of innovative filter membranes and electrochemical nanosensors. The hybrid nanoarchitectures will be formed by the combination and synergistic effect of carbon quantum dots, Cdot-F and Cdot-N, with silver nanoparticles (AgNPS), niobium oxide nanorods (NbxOy, x and y are related to the oxidation state of Nb) and tin oxide nanorods, graphene species and mesoporous silica. The nanofilters formed on PES and nylon support will have environmental applications, aiming at the production of drinking water and effluent treatment, especially in relation to the retention of endocrine interferers, pesticides and metal ions.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

14 and 13

Course/Program

PPGEMN

Academic unit

EE

Funding

Finep
EMPRESA BRASILEIRA DE INOVAÇÃO E PESQUISA

Type of funding

National

Project title

Multifunctional nanofluids in oil exploration offshore

Coordination

Ricardo Jorge Espanhol Andrade

Lattes

http://lattes.cnpq.br/2704277390841473

Summary

It is observed that more and more well drilling is carried out in deep waters under extreme conditions of temperature and pressure, which results in even greater demands on drilling fluids. The quality of the drilling fluid directly influences the final cost and safety of an oil well. This project aims at the development of multifunctional drilling nanofluids through the use of graphene (Gr) and derivatives and bo-rohexagonal nitride (h-BN) as additives. Gr and h-BN have different mechanical and thermal properties, and for this reason, they can act to improve the rheological and thermal properties of the fluid, leading to greater efficiency in more aggressive environments, such as *offshore*. The project brings together the expertise of the Multifunctional Materials (MM) Research Group of the School of Engineering of Mackenzie Presbyterian University (UPM), in São Paulo, and the Rheology Group (GReo) of the Pontifical Catholic University of Rio de Janeiro (PUC-Rio). In this way, the results obtained in this project will enable more productive, safer operations at a lower cost.

SDGs

09-Industry, innovation and infrastrucutre

Course/Program

Engineering

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Nanomaterials in cementitious matrices for applications in civil construction and infrastructure works

Coordination

Patricia Barboza da Silva

Lattes

http://lattes.cnpq.br/5463594623918212

Summary

The present research project proposes to investigate the use of nanomaterials in cementitious matrices with the objective of improving the mechanical performance, durability and sustainability of materials used in civil construction and infrastructure works. For the development of the research, synthesis of nanomaterials, production of additives, dosage of Portland cement mortars with the addition of the studied nanomaterials, chemical characterization, microstructure and analysis of the mechanical behavior of the mortars will be carried out. The research is expected to contribute to the reduction of environmental impacts, such as waste generation and CO2 emissions, due to the greater durability of the structures. The study also seeks to expand knowledge about the interaction between nanomaterials and Portland cement, promoting advances in high-performance cementitious materials.

SDGs

06-Drinking water and sanitation

Secondary SDGs

13

Course/Program

PPGEMN

Academic unit

EE

Funding

Finep
EMPRESA BRASILEIRA DE INOVAÇÃO E PESQUISA

Type of funding

National

Project title

NMS - Multifunctional hybrid nanostructures of Nb2O5, ZrO2 and TiO2 employed in the construction of innovative filter nano-membranes

Coordination

Thiago da Cruz Canevari

Lattes

http://lattes.cnpq.br/6149251163133726

Summary

This project aims to develop multi-functional hybrid nanostructures that will be employed to fabricate filter membranes and build electrochemical nanosensors. The hybrid nanostructures will be formed by the combination and synergistic effect of *carbon quantum dots*, Cdots, with the metallic nanoparticles of silver (AgNPS) and MxOy (M= Nb, Zr and Ti), graphene species and silica layer (*shell*). The filtering nanomembranes formed will have environmental applications, emphasizing the abatement and sequestration of polluting and greenhouse gases and the production of drinking water and effluent treatment. The efficiency of the nanomembranes formed with the hybrid nanostructures will be proven by electrochemical nanosensors and mass spectrometry with the use of the revolutionary Mass Spec pen, which will verify the presence of impurities or the formation of new products, through the interaction of the membrane with polluting gases, water and effluents, which may interfere with the application of the product.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

03

Course/Program

PPGEMN

Academic unit

EE

Funding

CNPq Research Productivity Grant Level 1B

Type of funding

National

Project title

New applications of mass spectrometry and creation of a new laboratory World reference

Coordination

Marcos Nogueira Eberlin

Lattes

http://lattes.cnpq.br/9866858833240787

Summary

This project aims, more than conducting high-level scientific research, to consolidate, at the School of Engineering of Mackenzie Presbyterian University, a new international center of excellence in mass spectrometry: the MACKMASS Laboratory. We will strengthen and expand a reference center in mass spectrometry, contributing to position Mackenzie and Brazil among the global protagonists in the development and application of advanced technologies in this area, which is currently central to science. The project also plays a strategic role in the training of a new generation of Brazilian scientists, focusing on the most innovative areas of science, particularly at the inter-face between chemistry, biology, and medical and life sciences. The laboratory has already stood out in the national and international scientific scene for the development and application of revolutionary techniques created in part or in full by its researchers and collaborators, including ambient ionization techniques and the MasSpec Pen ("cancer pen"). These methodologies allow for fast, direct, and high-resolution molecular analysis and will be explored in this project in various scientific and technological applications. The project also aims to establish new lines of research in medical and life sciences, with applications in clinical diagnostics, translational medicine, biochemistry and pharmacology, through national and international collaborations, which will certainly generate high-impact scientific publications.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

04

Course/Program

PPGEEC

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Solar observations in infrared light

Coordination

Carlos Guillermo Giménez de Castro

Lattes

http://lattes.cnpq.br/5735720962238368

Summary

The present project aims to study the solar chromosphere, through observations in the extended infrared band (10 μm to 10mm) using instruments owned and operated by the Mackenzie Radio Astronomy and Astrophysics Center (CRAAM). From our own observations and in other frequency bands publicly offered by other observatories, unprecedented diagnoses of chromospheric dynamics will be made, in their calm, quiescent and active behaviors. The project involves researchers and students from CRAAM and institutions outside the country, remarking its international character. This project complements the activities that have already been developed through funding granted by FAPESP.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

03

Course/Program

PPGEMN

Academic unit

EE

Funding

CNPq Research Productivity Grant Level PQ-C

Type of funding

National

Project title

Obtaining and characterizing van der Waals heterostructures based on 2D materials and molecules

Coordination

Dunieskys Roberto González Larrudé

Lattes

http://lattes.cnpq.br/6135770670487445

Summary

This project aims to develop highly sensitive sensors for the real-time detection of counting gases, with a special focus on hydrogen and H2S. Using graphene and other nanomaterials, such as metallic nanoparticles and metallic organic molecules, it is intended to explore electrical, optical and large surface area properties to increase selectivity and sensitivity to specific gases. Hybrid organic-inorganic heterostructures will be formed, combining graphene obtained by CVD and organic molecules, in order to preserve original properties and improve the efficiency of the sensor. The interdigitated electrode structure will be the sensor platform. In addition to the evaluation of sensor characteristics, such as response and recovery times, detection limit and thermal stability, a proof of concept of the integration of the sensors with RFID devices for monitoring will be carried out

wireles

SDGs

03-Good health and well-being

Secondary SDGs

09

Course/Program

PPGEMN

Academic unit

EE

Funding

Finep
EMPRESA BRASILEIRA DE INOVAÇÃO E PESQUISA

Type of funding

National

Project title

PHOBIO2DM – Photonic biosensors based on two-dimensional (2D) materials for the development of viral tests

Coordination

Christiano José Santiago de Matos

Lattes

http://lattes.cnpq.br/6843256597783676

Summary

The main objective of this proposal is to develop *point-of-care* photonic biosensants based on 2D nanomaterials/nanostructures (such as graphene), which are capable of detecting with high sensitivity and specificity viral structures of SARS-COV-2 and its anticolors. In this sense, the present proposal seeks to develop sensors that can be used in the field, less invasive (using samples such as saliva, for example), that operate with small sample volumes, extremely sensitive, with low response time and easy manipulation by the end user. One of the priorities of the project is also the establishment of partnership between the executing institutions, with extensive experience in the production of scientific knowledge in the areas of advanced materials and health and in the transfer of technology to society, through the productive sector, in order to ensure that the project has a direct impact on the economy and social welfare.

SDGs

03-Good health and well-being

Secondary SDGs

09

Course/Program

PPGEMN

Academic unit

EE

Funding

CNPq

Type of funding

National

Project title

Integrated Microfluidic Platforms: Enhancing the Preparation of Nanomaterials for Health and Environmental Applications – MicroPlat

Coordination

Cecilia de Carvalho Castro e Silva

Lattes

http://lattes.cnpq.br/6889517148629242

Summary

Microfluidics, an interdisciplinary science that studies fluid behavior at the micro- and nanoscale, has driven advances in microelectronics, flow monitoring, and clinical diagnostics. Fluid control by hydrodynamic focalization allows optimizing processes of extraction, separation and synthesis of nanostructures. This proposal presents four objectives: (1) development of microfluidic microreactors for the preparation of nanostructured materials, such as graphene fibers; (2) integration of these nanostructures into electrical sensors (field-effect and capacitive transistors) for the creation of sensitive and portable microfluidic biosensors for clinical diagnosis;
(3) real-time electronic monitoring of separation processes in micro/nanofluidic devices with embedded electronics, with environmental applications; and (4) modification and simulation by computational fluid dynamics and molecular dynamics for optimization of devices and evaluation of experimental parameters. The MicroPlat project seeks to generate knowledge and technologies that can be transferred to the productive sector, with economic and social impact.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

12

Course/Program

PPGEMN

Academic unit

EE

Funding

CNPq Research Productivity Grant Level PQ-C

Type of funding

National

Project title

Production of multifunctional polymeric composites based on chemically modified hybrid nanostructures

Coordination

Hélio Ribeiro

Lattes

http://lattes.cnpq.br/0766240077339002

Summary

The project "Production of multifunctional polymeric composites based on chemically modified hybrid nanostructures" aims to develop advanced polymeric nanocomposites with superior structural and functional properties, through the incorporation of chemically modified 2D hybrid nanostructures.of the The proposal is based on the interfacial engineering between thermoset and/or thermoplastic polymeric matrices and nanomaterials such as graphene/graphene oxide (GO/rGO), hexagonal boron nitride (hBN), metal disulfides, and hybrid systems (e.g., GO/hBN), in order to optimize dispersion, chemical compatibility, and thermal and mechanical charge transfer. The controlled surface functionalization of nanostructures seeks to maximize interfacial adhesion, reduce structural defects, and promote efficient percolative networks. The materials developed will be evaluated for mechanical, thermal, electrical and thermooxidative stability properties, using techniques such as DSC, TGA, DMA, Raman, FTIR, XRD and electron microscopy. The project targets strategic applications in thermal management, functional coatings, electronic devices, le-ve structural materials and high-performance multifunctional systems. The approach combines chemical modification, controlled processing and advanced characterization, contributing to scientific advancement in the area of polymeric nanocomposites and to national technological development in multifunctional materials.

SDGs

09-Industry, innovation and infrastructure

Course/Program

PPGEMN

Academic unit

EE

Funding

FAPESP

Type of funding

National

Project title

Production of multifunctional polymeric composites based on chemically modified hybrid nanostructures

Coordination

Hélio Ribeiro

Lattes

http://lattes.cnpq.br/0766240077339002

Summary

The development of composites based on two-dimensional (2D) nanomaterials has enabled remarkable technological achievements that were previously unknown. These nanomaterials have enormous potential for various applications due to their exceptional physical properties when compared to conventional materials. This research project aims to explore these properties expected for graphene, and its derivatives, as well as the combination of these with other nanomaterials, such as molybdenum disulfide (MoS2), hexagonal boron nitride (hBN), among others, forming modified and/or hybrid nanostructures with specific and desired physicochemical properties. Polymeric nanocomposites based on these nanoparticles will be produced that meet the growing needs in various industrial and technological sectors, with a focus on obtaining gains from these properties, aiming at reducing mass and cost, in relation to current technologies. Due to the fact that 2D nanomaterials are rarely found in isolation under experimental conditions, the transfer of their potential properties to the host material strongly depends on the dispersability and compatibility of these materials with the host matrix of interest. In this sense, this project has as its main approach: (1) The development of strategies for chemical modification/exfoliation of 2D nanostructures in different solvents or matrices that allow their better dispersion in these systems. For this it will be necessary to study various processes of surface chemical modification via reactions assisted by microwave radiation. (2) Production of multifunctional polymeric nanocomposites from these modified nanostructures or through the combination of them in hybrid form, when applicable, so that a synergistic effect is produced in the improvement of their thermal and mechanical properties, anticorrosive action and electromagnetic shielding effect. The success of this research proposal depends fundamentally on the production of compatible and strategic two-dimensional (2D) materials for their insertion in different polymeric matrices.

SDGs

07-Affordable and clean energy

Secondary SDGs

09

Course/Program

PPGEEC

Academic unit

EE

Funding

Technological development productive scholarship of CNPq Level C

Type of funding

Project title

Production of piezoelectric thin films for applications in sensors and power-generating devices

Coordination

Mariana Amorim Fraga

Lattes

http://lattes.cnpq.br/5099968396115915

Summary

This project has as its main objective the study of the synthesis of piezoelectric thin films of aluminum nitride (AlN) and zinc oxide (ZnO) by *sputtering*. The choice of these materials was motivated by their excellent piezoelectric properties and compatibility with microfabrication processes. The deposition parameters that affect the properties of the piezoelectric films obtained will be investigated. Structural, morphological and electrical analyses will also be carried out to evaluate the performance of the films in terms of sensitivity, stability and energy conversion capacity. The films produced from each material that have the best properties will be used in the manufacture of piezoelectric sensors and energy-generating devices.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

07

Course/Program

PPGEMN

Academic unit

EE

Funding

CNPq Research Productivity Grant Level 1C

Type of funding

National

Project title

Design, fabrication, and characterization of SAW devices based on thin films of metal oxides

Coordination

Marcos Massi

Lattes

http://lattes.cnpq.br/1992108703603111

Summary

Despite advances in the development of the Ti-6Al-4V alloy, its use above 600 °C is still limited, motivating research aimed at increasing its useful life through thermochemical treatments and coatings. Plasma nitriding is traditionally performed by PECVD, while an alternative method, HiPP-PECVD, uses a high-power pulsed source, generating higher density plasma. Coatings applied by plasma thermal spray have also improved the performance of the alloy. This project will study the mechanical properties of Ti-6Al-4V at high temperatures after nitriding by HiPP-PECVD and after re-coating by APS, with metal and ceramic alloys. The treated surfaces will be analyzed for microstructure by optical microscopy, SEM and X-ray diffraction. The mechanical behavior will be investigated in tensile tests at different temperatures and strain rates, as well as fluence under constant load, both in the original and treated alloys. Fracture surfaces will be examined by SEM. Analysis will also be carried out by the JMatPro software to determine the phases present, mechanical properties at high temperatures and flow curves in different conditions.

SDGs

09-Industry, innovation and infrastructure

Course/Program

PPGEMN

Academic unit

EE

Funding

Finep
EMPRESA BRASILEIRA DE INOVAÇÃO E PESQUISA

Type of funding

National

Project title

Recovery and update of Mackenzie's RD&I environment

Coordination

Christiano José Santiago de Matos

Lattes

http://lattes.cnpq.br/6843256597783676

Summary

The project "Recovery and Updating of Mackenzie's RD&I Environment (RecuperaMack)" aims, in 24 months, to recover and modernize strategic equipment for the full development of research in engineering, materials sciences, neurosciences and human development sciences. The initiative serves the internal community, partner institutions and the productive sector, in line with policies for the use of multi-user equipment. The modernization prepares the laboratories to work on topics of national interest, such as Quantum Technologies; TV 3.0; Health and Biotechnology (new treatments and medical technologies); ICTs (AI, cloud computing, cybersecurity, IoT); Renewable Energy and Sustainability (solar, wind, biomass, hydrogen); Environmental Technologies (climate mitigation and adaptation, resource management, waste and degraded areas); Biotechnology and Bioeconomy (biomolecules, bio-products, biofuels); Advanced Materials and Nanotechnology (nanomaterials, smart materials, composites, electronics and energy); and S&T training for professional training. It is expected: i) to recover and expand the capacity of the laboratories; ii) strengthen the multi-user policy; iii) to expand national and international interactions; iv) to consolidate research in RD&I; v) to qualify human resources;
vi) favor collaborative projects with companies; vii) to expand specialized services and industry-university interaction. The project contributes to all axes of the National Strategy for Science, Technology and Innovation.

SDGs

07-Clean energy and Affordable

Secondary SDGs

09

Course/Program

PPGEMN

Academic unit

EE

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Rheology of nanostructured complex fluids with two-dimensional (2D) materials

Coordination

Ricardo Jorge Espanhol Andrade

Lattes

http://lattes.cnpq.br/2704277390841473

Summary

Energy consumption has been growing since the 1990s and, despite the search for alternative sources, the exploitation of increasingly deeper oil fields persists, where extreme conditions of temperature and pressure generate operational challenges. Drilling fluid is crucial to the cost and safety of the well, and should ensure fast and stable drilling, minimizing damage to the drill bit and formation. Its functions include stabilizing the well, transporting boring caps, lubricating and cooling the drill bit, and controlling hydrostatic pressure; Failures can cause loss of circulation and spinal entrapment. This project aims to analyze, under different pressures, the rheological and thermal behavior of drilling fluids with nanoparticles as additives, seeking greater efficiency. Nanofluids containing graphene oxide (GO) and its derivatives, as well as hexagonal boron nitride (hBN) will be studied. These two-dimensional materials exhibit thermal and mechanical properties that can improve the rheological and thermal performance of fluids, increasing efficiency in harsh environments. The results may enable safer and more economical operations and contribute to the advancement of the study of these nanofluids, which is still incipient in the literature, in addition to generating secondary applications in other processes of the petroleum industry, such as secondary recovery, and in related areas.

SDGs

09-Industry, innovation and infrastructure

Course/Program

PPGEMN

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Coating copper particles with graphene oxide for additive manufacturing applications

Coordination

Camila Marchetti Maroneze

Lattes

https://lattes.cnpq.br/2414168927233444

Summary

Additive manufacturing (AM) has revolutionized the production of complex components, but 3D printing of materials, especially pure copper, still faces challenges due to the material's high reflectivity and high thermal conductivity, which reduce the efficiency of infrared (IR) laser processes. This project proposes to develop a scalable route to fabricate copper microparticles re-coated with graphene oxide (GO) or reduced (rGO), capable of absorbing IR radiation and enabling the printing of dense and functional metal parts. The work will be organized in five phases: (1) production of GO in a pi-loto plant at MackGraphe; (2) formulation of Cu/GO(rGO) powders by liquid dispersion and thermal drying or *spray-drying*;
(3) morphological, structural and optical characterization of the particles; (4) optimization of LPBF printing parameters to obtain parts with a density greater than 97%; and (5) manufacturing and testing of functional prototypes, such as micro-heat exchangers and watertight valves. The final stage involves prospecting for industrial partnerships and preparing a business plan for commercial scalability. It is expected to boost the adoption of copper in industry 4.0, promoting sustainability, innovation in nanomaterials and strengthening the national technological chain.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

08 and 11

Course/Program

PPGEP

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Intelligent system for collecting, crushing, separating and co-mercializing post-consumer glass: consolidation of implantation, calculation of results, patents and publications – phase 2

Coordination

Alaercio Nicoletti Junior

Lattes

https://lattes.cnpq.br/1007765213145350

Summary

In the first phase of the project, initial prototypes of the Mobile Glass Crusher (TRIVIM) and the collection and routing management application were developed and tested, with results that validated the technical and operational feasibility of the solution in a real environment. This stage allowed structuring the technological base, involving strategic partners, and generating fundamental learning for expansion. The current stage aims to consolidate and expand these results, advancing from initial validation to scale implementation and field monitoring. The focus is on the use and improvement of TRIVIM, as well as the application, integrating the reverse logistics chain of glass with traceability, automation and productive inclusion. The activities will begin in February 2026, including operational tests, technical adjustments, monitoring of indicators and generation of data for economic-environmental validation of the solution. In addition to the expansion of the collection and shredding of post-consumer packaging, this phase provides for the submission of a patent for TRIVIM with the creation of all the necessary documentation for this, the registration of the *developed software*, the consolidation of the project documentation with the creation of training for the operation of the equipment and *software* and the production of scientific publications. high weight and risks of accidents, adding to logistical difficulties associated with long distances to primary producers, which increases costs and CO2 emissions. The project seeks to develop solutions that expand and enable the collection of post-consumer glass at points of sale and with consumers, ensuring its return to recyclers and strengthening the circular economy. It is proposed to create a mobile application for integrated chain management and technologies that make capture economically viable, such as devices for breaking packaging and sorting by color (amber, green and transparent). The research, of a theoretical-experimental nature, involves literature review, construction of prototypes, tests and validation for subsequent expansion. The project has Grupo Petrópolis, Recitotal (Ambipar), SENAI and partners. The new phase, starting in October 2025, aims to consolidate and expand results through field validation, development of patents and scientific publications, using equipment already acquired and integrating master's students, strengthening the articulation between teaching, applied research and technological innovation.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

07

Course/Program

PPGEEC

Academic unit

EE

Funding

CNPq Research Productivity Grant Level PQ-C

Type of funding

National

Project title

Graphene Wide-angle Twistronics

Coordination

Dario Andres Bahamon Ardila

Lattes

http://lattes.cnpq.br/4024191340514093

Summary

Refuting the common opinion, recent experiments on graphene bilayers at 30^o rounds show that there is rich and interesting physics for large torsional angles. On the one hand, this system offers a new type of quasicrystal that unites the quasicrystal nature of the dodecagonal with the relativistic properties of graphene. On the other hand, it shows that there is a strong coupling between layers. Since both cases are beyond the scope of previous work on moiré and quasicrystal systems, in this research project we will study the electronic and transport properties of commensurate and incommensurable graphene wheeled systems for large torsional angles > 10^o and with a large number of atoms. Our approach is based on the *tight-binding representation* and the Chebyshev method of polynomials.

SDGs

06-Drinking water and sanitation

Secondary SDGs

03

Course/Program

PPGEMN

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Use of nanostructured materials to contain emerging contaminants

Coordination

Camila Marchetti Maroneze

Lattes

https://lattes.cnpq.br/2414168927233444

Summary

The present project aims at the development of unstructured graphene oxide (GO) and reduced graphene-no oxide (rGO) materials, for application in effective membranes and filters for the removal of contaminants of emerging concern (CECs), with a main focus on perfluoroalkyl (PFAS). Their high surface area, porosity, versatility and large-scale production capability make them ideal candidates for the proposal. The parameterization of the synthesis of GO and the deposition of the structures by different methods will be investigated. We will characterize and monitor the adsorption efficiency of CECs. Finally, a prototype will be developed for application in water filtration systems.

HEALTH AND WELL-BEING IN THE LIFE CYCLE

SDGs

03-Good health and well-being

Secondary SDGs

04

Course/Program

PPGCDH

Academic unit

CCBS

Funding

London School of Economics

Type of funding

Foreign

Project title

Adaptation, implementation and evaluation of the impact of a digital therapy on the mental health of low-income university students from different regions of Brazil: a randomized clinical trial

Coordination

Cristiane Silvestre de Paula

Lattes

http://lattes.cnpq.br/8241114701792148

Summary

Mental health problems usually begin in childhood/adolescence, are frequent and persistent, and cause damage in various domains of human development, including reducing life opportunities in the short and long term. At the same time, young people who live in situations of social vulnerability (61% around the world are under 24 years of age) are at greater risk of having mental health problems. This scenario is especially important in Brazil, with high rates of social inequality and where the youth population is among those that have the most difficulty in obtaining treatment for their mental health problems. This context perpetuates the vicious cycle between poverty and mental health problems. Aiming to increase life opportunities and access to quality treatment, the main objectives of this research are: (i) to adapt to the Brazilian reality an *online* group intervention (in the cognitive-behavioral approach) proven effective in other countries for the promotion of mental health in youth and (ii) to test the effectiveness of the adapted version of the intervention with low-income university students from different regions of Brazil according to a clinical trial randomized.

SDGs

4–Education Quality

Secondary SDGs

10

Course/Program

Nutrition

Academic unit

CCBS

Funding

Mack Pesquisa

Type of funding

National

Project title

Food and academic success – changes in diet and their influence on the academic success of university students

Coordination

Juliana Masami Morimoto

Lattes

https://lattes.cnpq.br/5921911630589621

Summary

Food is a constant concern throughout society, since its inadequacy is related to the increased risk of diseases, especially chronic non-communicable diseases, whose prevalence in Brazil has grown. Therefore, actions that teach healthy eating habits, especially in young people, are essential to reduce the risk of diseases, perhaps for life. University students have advantages for being in an environment conducive to education, which favors their participation in health education actions. The objective of this study is to evaluate changes in the diet of university students, after food and nutrition education actions, and their influence on health and academic success.

SDGs

03-Good health and well-being

Secondary SDGs

04 and 09

Course/Program

PPGCDH

Academic unit

CCBS

Funding

FAPESP

Type of funding

National

Project title

Vivariums and Biosafety – Track A. "Vivarium Infrastructure". Acquisition of equipment and adaptation of the physical space for the Central Vivarium of Mackenzie Presbyterian University

Coordination

Miriam Oliveira Ribeiro

Lattes

http://lattes.cnpq.br/7069953370349465

Summary

This proposal aims at the modernization and expansion of the Central Vivarium of the Mackenzie Presbyterian University. It includes the acquisition of structuring equipment – such as ventilated racks with HEPA filters, air conditioning systems, automated water cooler washer and changing cabin – as well as structural modifications to ensure compliance with CONCEA guidelines. The present project is aligned with the principles of the 3Rs and seeks to meet the growing demand for facilities suitable for the maintenance of genetically modified strains that cannot be acquired from commercial vivariums. Currently, the Central Vivarium houses lineages such as Thr92-D2/Ala-92-D2 and Adr3KO, which are essential for several studies funded by FAPESP in the areas of neuroscience, endocrinology, behavior and biotechnology. The expected impacts include: increased experimental capacity, improved scientific reproducibility, strengthening of national and international collaborations, training of human resources, and consolidation of UPM as a center of excellence in animal research. The proposal reinforces the institutional commitment to animal welfare, biosecurity and sustainability, aligning with the UN Sustainable Development Goals (SDGs 3, 4 and 9).

SDGs

03-Good health and well-being

Secondary SDGs

09

Course/Program

Life Sciences

Academic unit

CCBS

Funding

FAPESP

Type of funding

National

Project title

Construction of *pipelines* for metabolomics analysis, in *silico genetic conservation*, and new techniques for evaluating the safety and efficacy of drugs in zebrafish embryos, aiming at the expansion and scalability of the global technological platform

Coordination

Patricia Fiorino

Lattes

https://lattes.cnpq.br/7129896001718135

Summary

In Brazil, the number of companies dedicated to research, development and innovation (R&DI) of molecules with therapeutic potential is growing. However, the development of a new drug can take more than 10 years, with estimated costs of US$ 2.5 billion and a low success rate, making time, cost and predictability the main challenges of the sector. In the PIPE-CT Phase 1 project (R$ 300,000), functional methodologies for cardiovascular and cardiotoxicity evaluation in ze-brafish (Danio rerio) embryos were developed and validated, structuring an experimental platform for early screening of molecules with the highest potential for preclinical success. PIPE Phase 2 proposes to expand and consolidate this platform, with a focus on scalability, reproducibility, and intellectual protection. The technology combines functional analysis and high-throughput assays to accelerate safety and efficacy assessment, reducing costs and development time, in alignment with the 3Rs guidelines. Initially, aimed at the pharmaceutical and biotechnology industries, the platform also has potential applications in translational medicine, functional foods, agrochemicals, and basic research.

SDGs

10–Reduction of inequalities

Secondary SDGs

16

Course/Program

PPGCDH

Academic unit

CCBS

Funding

Duke University

Type of funding

Foreign

Project title

Building empathy to listen, learn, and depolarize in the U.S. and Brazil

Coordination

Paulo Sérgio Boggio

Lattes

http://lattes.cnpq.br/

Summary

International project aimed at the development and adaptation of a mobile application for the Brazilian context, focusing on reducing polarization and promoting democratic attitudes. The initiative involves overseeing the cultural adaptation of the tool, in collaboration with a U.S. team, integrating evidence produced in both countries to improve its functionality. Empirical studies are planned and implemented in the Brazilian political and cultural scenario to test the effectiveness of the proposed interventions. The collection and analysis of data, through qualitative and quantitative methods, allow the evaluation of impacts and guide strategic adjustments throughout the execution. The project includes the leadership of a team of researchers in Brazil, the international coordination of goals, methodologies and schedules, budget management according to funding requirements and the assurance of ethical compliance at all stages. As expected results, it is expected the delivery of a culturally adapted application ready for implementation in Brazil, comprehensive technical reports and relevant scientific production, including peer-reviewed academic articles and dissemination texts.

SDGs

10-Reduction of inequalities

Secondary SDGs

04

Course/Program

PPGCDH

Academic unit

CCBS

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Neuroimaging and psychophysiological correlates of the Social touch in early childhood

Coordination

Ana Alexandra Caldas Osório

Lattes

http://lattes.cnpq.br/9011606474221997

Summary

Touch is essential for the establishment of affective bonds and for our well-being. The experience of interpersonal touch is particularly important in early childhood, as it is the most fundamental form of parental care. However, the study of this sensory modality remains surprisingly neglected. More concretely, little is known about the perception and processing of social touch in infants. This proposal is organized into two studies focusing on complementary research issues and methods that, together, aim to bring substantial contributions to scientific knowledge about social touch in childhood. Study 1 aims to clarify the patterns of neural activation in response to social touch in infants, while study 2 will look at the impact of partner identity (mother *versus* unknown woman) on neural and cardiac responses to social touch in the first year of life. The main objective of this proposal is to significantly expand the scientific knowledge about the characterization and importance of social touch in childhood, integrating functional neuroimaging and psychophysiology at a critical age for socio-emotional development.

SDGs

03-Good health and well-being

Secondary SDGs

09 and 12

Course/Program

Life Sciences

Academic unit

CCBS

Funding

Mack Pesquisa

Type of funding

National

Project title

Development of biodegradable bioadhesives for the treatment of dermatological diseases

Coordination

Marcelo Guimarães

Lattes

http://lattes.cnpq.br/9401356206412269

Summary

This project aims to develop biodegradable bioadhesive systems for controlled release of ketoconazole and diclofenac sodium, addressing the need for efficient topical systems for dermatological conditions. Using polymers such as PLA, PVA and Poloxamer 407®, the formulations will be obtained by *solvent casting* and characterized by physicochemical and structural techniques (MEV, FTIR, DSC, TG, DLS), in addition to *in vitro release assays* in Franz cells. The proposal includes the establishment of a reproducible and scalable protocol, with potential therapeutic application in dermatoses, contributing to innovation in sustainable topical delivery systems and strengthening translational research in the pharmaceutical area.

SDGs

03-Good health and well-being

Secondary SDGs

09

Course/Program

Pharmacy

Academic unit

CCBS

Funding

Mack Pesquisa

Type of funding

National

Project title

Development of nanoemulsion from the d-pha-se method, containing pitanga oil and evaluation of cica-toxin, antioxidant and dermal irritability in *vitro activities* for use in the treatment of acne

Coordination

Leticia Caramori Cefali

Lattes

http://lattes.cnpq.br/0021319958755737

Summary

The work aims to obtain oil from the leaves of the cherry tree to be used in the preparation of nano-emulsion for the treatment of acne. For this, the oil will be obtained and submitted to the quantification of bioactive components and the evaluation of healing and antioxidant activities *in vitro.* The oil will be used for the development of the nanoemulsion, which will be evaluated for structural characteristics and submitted to the stability test, skin permeation and dermal irritability. The oil must have bioactive components and anti-oxidant and healing activities, and the nanoemulsion must be stable and not present dermal irritability.

SDGs

03-Good health and well-being

Secondary SDGs

09

Course/Program

Life Sciences

Academic unit

CCBS

Funding

Mack Pesquisa

Type of funding

National

Project title

Development of workflows for translational studies of pharmacokinetics and pharmacodynamics of new biopharmaceuticals in zebrafish embryos

Coordination

Patricia Fiorino

Lattes

https://lattes.cnpq.br/7129896001718135

Summary

The zebrafish embryo (ZF) is an important model organism in translational studies, due to its high genetic homology with humans, rapid reproduction and embryonic transparency. Despite this, there is a gap of studies in pharmacokinetics (Fc) and pharmacodynamics (Fd) in zebrafish, crucial for validating and optimizing therapeutic strategies. Developing *workflows* to characterize the Fc and Fd of different drugs in ZF embryos is essential to improve the validity and reliability of new biopharmaceutical research. This study aims to contribute by providing accurate information on the administration, distribution, metabolism and biological effects of drugs, promoting advances in clinical practice.

SDGs

03-Good health and well-being

Secondary SDGs

10

Course/Program

PPGCA

Academic unit

FCI

Funding

Mack Pesquisa

Type of funding

National

Project title

Development and validity evidence of a musical augmented reality tool in the motor and cognitive rehabilitation of people with cerebral palsy

Coordination

Ana Grasielle Dionísio Corrêa

Lattes

http://lattes.cnpq.br/0441908602444068

Summary

The rehabilitation of people with cerebral palsy faces challenges that require personalized and effective interventions. Technologies such as augmented reality can expand therapeutic opportunities, but their adoption depends on scientific validation and adequate infrastructure. This project aims to develop and validate an augmented reality tool for rehabilitation, promoting motor and cognitive improvements through customized interventions. The research, lasting 24 months, comprises stages of development, implementation and validation. The development phase involves creating the *software* and acquiring equipment. In the implementation, health professionals will be trained to use the tool, and post-task use questionnaires will be applied. In the validation, the technology will be tested by professionals and individuals with cerebral palsy in controlled sessions, with quantitative and qualitative data collection and analysis to assess efficacy and acceptance. The tool is expected to generate significant gains in motor and cognitive skills, offering an alternative to traditional rehabilitation methodologies. The project also seeks to strengthen telehealth and digital health, demonstrating the feasibility of innovative technological solutions and their potential for large-scale adoption, promoting inclusion and autonomy.

SDGs

03-Good health and well-being

Secondary SDGs

09 and 12

Course/Program

Life Sciences

Academic unit

CCBS

Funding

CNPq

Type of funding

National

Project title

Development and validation of an in*vitro-in* vivo correlation model (CIVIV) using zebrafish embryos to predict the bioequivalence of generic drugs

Coordination

Patricia Fiorino

Lattes

https://lattes.cnpq.br/7129896001718135

Summary

This project proposes the development and validation of an *in vitro-in* vivo correlation model (CIVIV) using zebrafish (Danio rerio) embryos as a biopredictive tool for the development and evaluation of generic drugs. In view of Anvisa's growing regulatory requirements for proof of quality, safety, and effectiveness, it is essential to use methods that allow predicting *in vivo* behavior from data obtained in *in vitro* assays, such as dissolution profiles. The proposal establishes an intermediate system between exclusively *in vitro methods* and traditional mammalian studies, allowing the estimation of absorption parameters and the construction of quantitative relationships between dissolution and bioavailability. The model combines experimental speed, lower operational cost and high screening capacity, increasing pharmacokinetic predictability in early stages of development, in addition to aligning with the ethical guidelines of the 3R's. As an innovation, the project aims to structure a predictive tool applicable to the national pharmaceutical industry, capable of accelerating the development of generics, reducing R&D costs and increasing industrial competitiveness. The expected impact includes greater efficiency in the registration of medications and a direct contribution to the Unified Health System (SUS), by favoring more agile access to safe, effective, and affordable treatments.

SDGs

03-Good health and well-being

Course/Program

PPGEMN

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Immediate point-of-care *diagnosis and prognosis* of cervical cancer by biomarkers

Coordination

Marcos Nogueira Eberlin

Lattes

http://lattes.cnpq.br/9866858833240787

Summary

The present project aims to develop an innovative analytical methodology for the diagnosis and prognosis of cervical cancer, based on the rapid and direct detection of molecular biomarkers associated with the pathology. The proposal aims to overcome limitations of conventional cytological examination (Pap smear) by introducing an instantaneous, highly sensitive and molecularly informative analytical approach, capable of providing results at the *point-of-care*. The core strategy is the application of advanced ambient mass spectrometry techniques, in particular the Detached Pen-MS and MasSpec Pen-MS methodologies, which allow the smooth extraction and direct analysis of metabolites, lipids and other relevant biomarkers from biological samples with minimal preparation. This approach enables rapid, comprehensive, and quantitative molecular characterization of chemical signatures associated with different stages of the disease. Based on the molecular profiles obtained, it is intended to identify panels of diagnostic and prognostic biomarkers, capable of significantly increasing the sensitivity, specificity and speed of detection of cervical cancer. In addition to the direct application in *point-of-care* mass spectrometry, the project also provides for the translation of these biomarkers into potentially portable and low-cost biosensory platforms. This strategy paves the way for the development of new patentable diagnostic technologies, with high potential for technology transfer and commercialization. The implementation of biosensors based on these biomarkers can substantially expand access to early diagnosis, particularly in regions with limited laboratory infrastructure, contributing to reduce the morbidity and mortality associated with cervical cancer on a global scale.

SDGs

03-Good health and well-being

Secondary SDGs

04

Course/Program

PPGCDH

Academic unit

CCBS

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Effect of multisensory stimulation on cognitive impairments induced by the genetic polymorphism of D2 de-siodase (Ala92-Dio2).

Coordination

Miriam Oliveira Ribeiro

Lattes

http://lattes.cnpq.br/7069953370349465

Summary

The Ala92-Dio2 polymorphism is a product of the pontual mutation (SNP) in the DIO2 gene (rs225014) present in about 12 to 36 of the human population. Mice carrying Ala92-Dio2 exhibit moderate cognitive impairments at 2 months of age that become significantly more severe with aging, affecting declarative and visual-spatial memory, as well as working memory. Surprisingly, the similar phenotype was found in young Ala92-Dio2 females (3-4 months of age). However, despite the high prevalence of this polymorphism in the population, to date no major cognitive alterations have been associated in humans expressing Ala92-DIO2. Thus, we hypothesize that the various stimuli experienced by humans throughout their development may be responsible for compensating for the cognitive changes induced by Ala92-Dio2. Our hypothesis is based on previous studies by our group that showed the efficiency of multisensory stimulation (MS) protocols in reversing the cognitive impairments observed in other animal models. Thus, the long-term goal of this study is to evaluate whether the multisensory stimulation (EM) technique can correct the impairments in cognition exhibited by Ala92-Dio2 animals.

SDGs

03-Good health and well-being

Course/Program

Life Sciences

Academic unit

CCBS

Funding

Mack Pesquisa

Type of funding

National

Project title

Effects of early supplementation with prebiotics (Inulin and FOS) in childhood on metabolic and cognitive parameters in rats submitted to neonatal overnutrition and its translational potential for prevention of childhood obesity and comorbidities

Coordination

Esther Lopes Ricci Adari Camargo

Lattes

http://lattes.cnpq.br/8451825631942743

Summary

Childhood obesity is a public health challenge, with long-term impacts on metabolism and behavior. Neonatal overnutrition is recognized as a critical factor in the programming of physiological dysfunctions in adult life. This project investigates the preventive potential of early supplementation with prebiotics in rats submitted to the overnutrition model by litter reduction. Physical, neuromotor, behavioral and microbiological parameters will be evaluated. The hypothesis is that prebiotics, by modulating the gut microbiota, can attenuate the deleterious effects of early overnutrition, offering support for accessible and translational preventive strategies against childhood obesity.

SDGs

03-Good health and well-being

Course/Program

PPGCDH

Academic unit

CCBS

Funding

Mack Pesquisa

Type of funding

National

Project title

Longitudinal effects on mental health after the Covid-19 pandemic

Coordination

Jessica Mayumi Maruyama

Lattes

http://lattes.cnpq.br/3290800852728020

Summary

The objective of the research project is to investigate the effects and changes that occurred in the post-Covid-19 pandemic period on behavioral, physical health, mental health, and quality of life indicators in a sample of SUS health professionals. The present study is an extension of a multicenter project that collected data at four points in time between May 2020 and February 2022. As expected results, we intend to contribute with evidence on the dimensions most affected by the pandemic and identify the groups most vulnerable to persistent negative effects, assisting in the formulation of evidence-based public policies.

SDGs

03-Good health and well-being

Secondary SDGs

04, 10 and 17

Course/Program

PPGCDH

Academic unit

CCBS

Funding

CNPq

Type of funding

National

Project title

Effectiveness and psychometric properties of an application for monitoring language development in children from zero to five years old

Coordination

Cibelle Albuquerque de La Higuera Amato

Lattes

https://lattes.cnpq.br/6553933195554203

Summary

Language development in early childhood is an important indicator of the overall development of the child. Early assessment and intervention in this skill can generate significant gains throughout life. This study aims to adapt and verify the psycho-cometric properties of an app called Tagarela, aimed at identifying and stimulating language disorders in children from zero to five years old. Scientific evidence indicates that speech deficits are among the most common difficulties in childhood, affecting about 1 in 12 children, especially at preschool age. However, assessment instruments developed or adapted for this age group are still scarce, which makes screening and early intervention by parents and professionals difficult. A good screening instrument should be brief, inexpensive, easy to administer and interpret. Enabling its use by health professionals, educators and family members expands the reach and favors the early identification of risk signs. Thus, concluding and validating a digital tool for large-scale screening, with the potential to indicate which children need in-depth evaluation, makes it possible to
a priority. In this context, the Tagarela app was developed to identify and stimulate language skills in Brazilian children, being an accessible, practical and applicable tool in different contexts.

SDGs

03-Good health and well-being

Secondary SDGs

04

Course/Program

PPGCDH

Academic unit

CCBS

Funding

CNPq Research Productivity Grant Level 1A

Type of funding

National

Project title

Executive functions and literacy: interventions in Elementary School I

Coordination

Alessandra Gotuzo Seabra

Lattes

http://lattes.cnpq.br/7828325860191703

Summary

The project focuses on the early years of Elementary School, a decisive stage for school success. Interventions in this period have positive effects on cognitive development, especially in contexts of social vulnerability. The objective is to develop and evaluate an intervention program for students in the 1st and 2nd years of Elementary School, in addition to training teachers to apply it, analyzing effects in the short and medium term. The intervention will involve oral and written language (phonological awareness, phonic teaching, fluency and comprehension), executive functions and self-regulation. It is intended to:
(1) identify, with teachers, essential skills and frequent difficulties; (2) to develop the program based on the literature and methodological criteria; (3) to verify its immediate efficacy on cognitive and behavioral outcomes;
(4) to evaluate longitudinal effects on reading, writing and mathematics; and (5) provide you with a validated, low-cost, online access program free of charge. The method will have four phases: a survey of 100 teachers; development and validation of the program; application by 12 public school teachers, with about 400 students divided into experimental groups (only executive functions, only literacy, complete) and active control; and pre-, post- and *follow-up evaluations*. The project involves partnerships with the University of Surrey (UK) and the University of Notre Dame (USA) and will allow the development and evaluation of the intervention and its free availability.

SDGs

16–Peace, justice and effective institutions

Secondary SDGs

05

Course/Program

PPGCDH

Academic unit

CCBS

Funding

CNPq Research Productivity Grant Level 1B

Type of funding

National

Project title

Identity, morality and cooperation: interventions for groups with divergent worldviews

Coordination

Paulo Sérgio Boggio

Lattes

http://lattes.cnpq.br/0659408656635728

Summary

The project explores the mechanisms underlying polarisation and intergroup conflicts, generating insights into social behaviour and promoting the development of evidence-based interventions characterised by simplicity, low cost and scalability. Different scales will be dealt with in the area of psychology and moral philosophy and political psychology, providing reliable tools for researchers in psychology and social and affective neuroscience. In addition, interventions will be adapted to different cultural contexts in order to broaden the cross-cultural understanding of the phenomena investigated. The effects of the interventions will be through the use of behavioral games, such as the Public Goods Game and the Ulti-matum Game, customizing them for different scenarios and large-scale data collection in virtual environments. Socially, the project seeks to promote cooperation between individuals and groups with divergent worldviews, contributing to the reduction of conflicts, the encouragement of dialogue and the strengthening of democracy. Aligned with the UN 2030 Agenda, it addresses critical issues such as gender equality and climate change, demonstrating a commitment to making real impact. Thus, the project not only advances the fields of psychology and neuroscience, but also contributes to practical and social solutions in a scenario of increasing polarization.

SDGs

03-Good health and well-being

Secondary SDGs

04 and 10

Course/Program

PPGCDH

Academic unit

CCBS

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Impact of digital group therapy for the mental health of low-income university students

Coordination

Cristiane Silvestre de Paula

Lattes

http://lattes.cnpq.br/8241114701792148

Summary

Mental health problems usually arise in childhood/adolescence, are frequent and persistent, and impair various developmental domains, reducing life opportunities. Young people in social vulnerability - the world's majority group - are at greater risk and, in Brazil, face even more barriers to access treatment, perpetuating the cycle between poverty and mental problems. The study aims to adapt to the Brazilian context an *online* group intervention based on CBT, proven effective in other countries, and to test its effectiveness with low-income university students through a randomized clinical trial. The research will have three phases: (1) translation and construction of the implementation model of the intervention in co-participation with young people and actors from the health and education sectors; (2) pilot of the Brazilian version, including additional strategies of conditional cash transfer and peer-to-peer support; (3) blinded and controlled clinical trial with four arms. The pilot will include 32 young people aged 18 to 30 years, distributed between isolated intervention, intervention with TCR, intervention with peer support and intervention with TCR and support. The final version will have 1,958 university students from different regions. Before and after the sessions, seven questionnaires will be applied on mental health, stigma, substance use, emotional regulation and well-being. Semi-structured interviews will complement the understanding of the results. The analyses will include qualitative procedures for identifying patterns and ANOVA (Analysis of Variance) to assess the effectiveness of the intervention.

SDGs

10-Reduction of inequalities

Secondary SDGs

16

Course/Program

PPGCDH

Academic unit

CCBS

Funding

CNPq

Type of funding

National

Project title

INCT-SANI – National Institute of Science and Technology in Social and Affective Neuroscience

Coordination

Paulo Sérgio Boggio

Lattes

http://lattes.cnpq.br/0659408656635728

Summary

The National Institute of Science and Technology in Social and Affective Neuroscience (INCT-SANI) investigates individual and collective phenomena to develop theories and tools applicable to contemporary problems, such as social inequality, intergroup conflicts, political radicalization, and climate change. Multicentric experiments will be conducted on topics of social and affective neuroscience, including decision-making in cooperation and competition, moral judgment, influence of cognitive and social biases, conspiracy beliefs and *fake news*. The methodological approach combines electrophysiological techniques, neuroimaging and eye screening, online questionnaires in large cross-cultural samples, studies with ecological validity in real contexts (schools, companies and public spaces) and analysis of data from social networks. Classical techniques from psychology and neuroscience will also be integrated with machine learning for data analysis. The studies will allow us to investigate, at neurophysiological, behavioral and cultural levels, how individual (sociodemographic, cognitive and personality) and group (political, social and economic identity) factors influence perception and behavior. The ultimate goal is to apply the knowledge produced to contribute to a fairer and more sustainable society, in line with the UN Sustainable Development Goals.

SDGs

03-Good health and well-being

Secondary SDGs

04

Course/Program

PPGCDH

Academic unit

CCBS

Funding

FAPESP

Type of funding

National

Project title

Influence of exposure to endocrine disruptors on cognitive changes induced by the genetic polymorphism of type 2 deiodase (Ala92-D2)

Coordination

Miriam Oliveira Ribeiro

Lattes

http://lattes.cnpq.br/7069953370349465

Summary

The T4 prohormone enters cells by membrane transporters and is converted to T3 by deiodinase. Between 12% and 36% of the population has the SNP rs225014 in the DIO2 gene, generating the Ala92-D2 polymorphism. Studies by the group show that Ala92-D2 mice have memory deficits - moderate in males and more severe and early in females - possibly due to local hypothyroidism in regions such as the striatum, amygdala, prefrontal cortex, hippocampus and cerebellum, despite systemic euthyroidism. Alterations in neuroinflammation and apop-tosis pathways also contribute to the phenotype. Considering the increasing exposure to endocrine disruptors (EDs), associated with hormonal dysfunction and neuroinflammation, greater behavioral susceptibility is hypothesized in individuals with ALA92-D2. Previous results indicate greater glial activation evaluated by PET with 11C-PK11195. The aim is to evaluate whether intrauterine exposure to DEs (bisphenol A, triclosan, and methylparaben) increases cognitive impairment in Ala-92-D2 animals. Behavioral tests and molecular analyses will be performed in the hippocampus, amygdala, and prefrontal cortex, including declarative, spatial, work, and locomotor activity memory, as well as evaluation of neuroinflammation by PET, inflammatory cytokines, and immunohistochemistry for Iba-1 and GFAP.

SDGs

4-Education Quality

Course/Program

PPGCDH

Academic unit

CCBS

Funding

Mack Pesquisa

Type of funding

National

Project title

Interventions in elementary education

Coordination

Alessandra Gotuzo Seabra

Lattes

http://lattes.cnpq.br/7828325860191703

Summary

This research aims to continue the development of the Interdisciplinary Intervention Program for Fundamental Education (PIIEF), which already has modules for the promotion of literacy, executive functions, motor functions and behavioral management. In this project, two more modules will be developed: mathematics and visuospatial processing. For the mathematics module, theoretical models of numerical cognition and development of the concept of numbers will be used. The module will include structured, playful activities aimed at promoting number sense, numerical processing and calculation. There will be activities of recognition and memorization of quantities, understanding of operational symbols, consolidation of arithmetic facts and sequential organization of solving procedures. A visuospatial processing module will also be developed, based on neurocognitive models on this skill. The activities will stimulate mental rotation, visualization and spatial perception, fundamental for the concept of the number line, understanding spatial relationships between numbers, and solving mathematical problems. After the development of the modules, they will be implemented by elementary school teachers, with a quasi-experimental design, to analyze the effects of their application. Given the relationship between mathematics and visuospatial processing, it is expected that the combined use of these modules will yield gains on mathematics performance.

SDGs

03-Good health and well-being

Course/Program

Physiotherapy

Academic unit

CCBS

Funding

Mack Pesquisa

Type of funding

National

Project title

Prevention of musculoskeletal dysfunctions in young adults: effects of pilates and myofascial release on fascial mobility, autonomic modulation and neuromuscular function

Coordination

Susi Mary de Souza Fernandes

Lattes

http://lattes.cnpq.br/1297612291168621

Summary

This study investigates the effects of the combination of myofascial liberation with foam roller and the contemporary Pilates method on fascial mobility, autonomic modulation and neuromuscular function in young adults. Variables such as range of motion, dynamic balance, trunk rotation, vertical jump and heart rate variability will be evaluated. This is a randomized clinical trial with preventive, clinical, and educational application, contributing to fascial science and evidence-based practice in musculoskeletal physical therapy.

SDGs

03-Good health and well-being

Secondary SDGs

04

Course/Program

PPGCDH

Academic unit

CCBS

Funding

CNPq Research Productivity Grant Level 1D

Type of funding

National

Project title

Attentional and inhibitory processes and dimensional analysis of ADHD

Coordination

Luiz Renato Rodrigues Carreiro

Lattes

http://lattes.cnpq.br/0203967709311323

Summary

ADHD affects 5-6% of the population, manifesting inattention, hyperactivity, and impulsivity, with impairments in different attentional mechanisms. Although described in diagnostic manuals as a categorical entity, there are evidences of its dimensional condition. The project proposes the use of Eye tracking combined with computerized tasks to assess automatic and voluntary spatial orientation, sustaining and temporal orientation of attention, investigating how attentional aspects vary according to ADHD symptoms. Eye tracking provides measurements of saccadic latencies, fixations, pupillary dilation, and blink rate, complementary to reaction time and accuracy. The study will include 200 participants, between the ages of 18 and 28, with complaints of ADHD. The sample size was defined by the PASS program as having a prevalence of 5.8%, $\alpha = 5\%$, power of 80%, and tolerable error of 6%. Computerized neuropsychological evaluation of attention, ocular recording and electromyography of the hand used for responses will be applied. The analyses will involve Latent Class Analysis to identify attentional clusters, simple linear regression to check physiological predictors, and Network Analysis to interpret associations between variables. The findings may demonstrate how the integration of physiological and behavioral measures assesses cognitive impairment in ADHD.

SDGs

4-Education Quality

Secondary SDGs

03

Course/Program

PPGCDH

Academic unit

CCBS

Funding

Mack Pesquisa

Type of funding

National

Project title

Stop and Think 2 Program

Coordination

Elizeu Coutinho de Macedo

Lattes

http://lattes.cnpq.br/0683719309513445

Summary

Executive Functions (EF) are essential cognitive skills for maintaining attention, solving problems, organizing oneself, making decisions, planning, correcting mistakes, setting goals, and controlling impulses, and are important predictors of school success, health, and quality of life. At school, EF is fundamental for learning, but still little developed in the educational routine. The main objective of the project is to develop versions of the Stop and Think-2 program for 6th and 7th grade students and to evaluate the effects of an intervention to promote EF-related skills in public school students. Among the secondary objectives are the creation of a digital platform for training, coordination and capacity building for the application of the program. Improvements in executive skills assessed by parents, teachers, and students, advances in neuropsychological tests, better performance in tasks that simulate real study situations, and gains in school indicators, such as attendance, performance, transition, and coordination effort, are expected. The project also complies with MackPesquisa Public Notice 4 in the line "Basic Education – Social Pedagogy; School psychology; Life Project; Active methodologies; Mathematics Teaching – Laboratory; Natural Sciences".

SDGs

03-Good health and well-being

Secondary SDGs

04

Course/Program

PPGCDH

Academic unit

CCBS

Funding

CNPq Research Productivity Grant Level PQ-C

Type of funding

National

Project title

Promotion of Executive Functions in Elementary School students: "Stop and Think" program associated with computerized intervention

Coordination

Elizeu Coutinho de Macedo

Lattes

http://lattes.cnpq.br/0683719309513445

Summary

Executive Functions (EF) are cognitive skills that allow you to maintain attentional focus, solve problems, organize, make decisions, plan, correct mistakes, set goals, and control impulses and behavior, and are strong predictors of school success, health, and quality of life. In the classroom, EF is essential for learning, although it is still underdeveloped in the school context. This project aims to evaluate the effect of a hybrid intervention to promote EF-related skills in public school students, through the simultaneous application of two programs: Stop and Think, carried out in the classroom by the teacher, and a computerized program used individually as a digital game. Among the secondary objectives are the development of Visual Search Multitasking in a school environment (MBV--School), the creation of a digital platform for teacher training in FE and the elaboration of versions of Stop and Think for 3rd and 4th grade students. It is expected that students will improve in tasks related to EF, evaluated by parents, teachers and the students themselves, in addition to gains in neuropsychological tests, in tests that simulate everyday study situations and in indicators of school trajectory, such as class attendance, performance, school transition and teaching effort.

SDGs

4–Education Quality

Secondary SDGs

16

Course/Program

Psychology

Academic unit

CCBS

Funding

Mack Pesquisa

Type of funding

National

Project title

The psychology of religion in psychology training in São Paulo institutions of confessional higher education: absence or presence as a cross-cutting theme?

Coordination

Marcelo Coelho Almeida

Lattes

http://lattes.cnpq.br/8022213865920477

Summary

This project investigates the insertion of disciplines of Psychology of Religion (PR) or of a cross-cutting theme alluding to PR in the training of psychologists in confessional higher education institutions in the State of São Paulo. Documentary analysis of syllabuses and teaching plans will be carried out, in addition to the application of questionnaires and interviews with teachers and students to map knowledge, perceptions and topics on the subject. A comparison with recent research will complement the analysis. It seeks to stimulate curricular reflections and promote professionals who are more sensitive to the religious and spiritual dimensions of their future clients, thus contributing to culturally contextualized and more effective psychological practices.

SDGs

03-Good health and well-being

Secondary SDGs

04

Course/Program

PPGCDH

Academic unit

CCBS

Funding

FAPESP

Type of funding

National

Project title

The importance of social touch for infant social-emotional development: Integrating neuroimaging, psychophysiological, endocrine, and behavioral Evidence.

Coordination

Ana Alexandra Caldas Osório

Lattes

http://lattes.cnpq.br/9011606474221997

Summary

Touch is fundamental for the establishment of affective bonds and for well-being, especially in early childhood, when it constitutes the most basic form of parental care. Despite this, the study of interpersonal touch remains neglected, with gaps in its perception, processing, and impact on adaptive responses to stress in infants. This proposal for a FAPESP Young Researcher (Phase 2) is organized into four complementary studies. Study 1 will investigate patterns of neural activation in response to social touch in infants. Study 2 will look at the impact of partner identity (mother *ver-sus* unknown woman) on neural and cardiac responses to touch in the first year of life. Study 3 will examine the mediating role of neural and cardiac activation in the relationship between maternal touch behaviors and endocrine and behavioral responses to stress. Finally, Study 4 will develop a *hyperscanning protocol* with fNIRS for infant-caregiver interactions, allowing to assess the neural and cardiac synchrony of the dyad during touch. The proposal integrates functional neuroimaging, psychophysiology, endocrinology and behavior to expand knowledge about the importance of social touch in socio-emotional development.

SDGs

03-Good health and well-being

Secondary SDGs

04

Course/Program

PPGCDH

Academic unit

CCBS

Funding

Newton Fund

Type of funding

Foreign

Project title

The influence of cash transfer Program on mental health and school performance among young people expo-sed to violence in Brazil

Coordination

Cristiane Silvestre de Paula

Lattes

http://lattes.cnpq.br/8241114701792148

Summary

Mental health problems (MHP) are one of the main causes of disability in children and adolescents worldwide and are linked to poverty and violence, leading to restrictions on income, school performance and access to the labour market, in a vicious cycle with long-lasting effects. Effective interventions during childhood and adolescence can reduce the impact of poverty and/or prevent MHPs, increasing future life chances. Objective: To examine the impact of a Bolsa Família Cash Transfer Program (PTRF) on the mental health and school performance of children and adolescents in a poor city in Brazil, considering their exposure to violence and stressful life events.

SDGs

03-Good health and well-being

Secondary SDGs

04

Course/Program

PPGCDH

Academic unit

CCBS

Funding

CNPq Research Productivity Grant Level 1C

Type of funding

National

Project title

Translation, cultural adaptation, evidence of validity and accuracy, and standardization of ABAS-3

Coordination

Maria Cristina Triguero Veloz Teixeira

Lattes

http://lattes.cnpq.br/6002004614786497

Summary

Adaptive functioning (AF) comprises conceptual, social, and practical skills essential to daily living and is a central criterion for the diagnosis of intellectual disability, as well as relevant in other neurodevelopmental conditions and neurodegenerative disorders. This project aims to translate, culturally adapt and validate the third edition of the Adaptive Behavior Assessment System (ABAS-3) into Brazilian Portuguese. Its psychometric properties will be evaluated and Brazilian norms will be established for individuals aged 0 to 89 years, including groups with intellectual disabilities, specific learning difficulties and ADHD.

SDGs

03-Good health and well-being

Secondary SDGs

04 and 10

Course/Program

PPGCDH

Academic unit

CCBS

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Developmental disorders of coordination and executive functions: intervention for public education

Coordination

Silvana Maria Blascovi de Assis

Lattes

http://lattes.cnpq.br/6553900966729412

Summary

Discussions about the association between Coordination Development Disorder (BDD) and Executive Functions (EF) have aroused increasing interest in the literature. The proposal presented here is linked to a broader project that involves an interdisciplinary team, whose goal is to assist in promoting the performance and learning of children from public schools. The objective is to evaluate motor and cognitive aspects (executive functions, self-regulation and attention) of children attending elementary school and to develop, implement and analyze the effectiveness of an intervention program focusing on the variables of broad and fine motor coordination, executive functions, attention and self-regulation. The method includes the training of teachers in programs for the development of broad and fine motor skills, attention, executive functions and self-regulation and a period of evaluations of skills related to attention, executive functions, self-regulation and motor skills of students who attend public schools in the Municipality of Embu das Artes. The proposed program will undergo content validation, with the preparation of a handout to guide the action of the participating teachers. As a result of the study, it is expected that there will be a better development of motor coordination, EF and attention skills, in addition to the free availability of validated materials aimed at teachers, with illustrated handouts and accessible language and an *online course* explaining the activities in a practical way.

SDGs

03-Good health and well-being

Secondary SDGs

09

Course/Program

PPGEEC

Academic unit

FCI

Funding

Mack Pesquisa

Type of funding

National

Project title

Use of deep neural networks in the determination of skeletal maturity of childhood and puberty

Coordination

Leandro Augusto da Silva

Lattes

http://lattes.cnpq.br/1396385111251741

Summary

Determining skeletal maturity is crucial for the diagnosis and treatment of diseases that interfere with growth such as hypothyroidism, celiac disease, or growth hormone deficiency. For decades, this evaluation has been done by means of simple hand radiography in a manual process, time-consuming and dependent on the experience of the evaluator. The existing automations for this process still provide results well below those obtained by an experienced professional. However, more recently, studies using machine learning have been obtaining increasingly better estimates. This research investigates and implements deep neural network models for bone age determination, and provides a practical application for clinical use. Original radiographs of Brazilian patients are used, including data on associated diseases.

DIGITAL TECHNOLOGIES AND ARTIFICIAL INTELLIGENCE

SDGs

11-Sustainable cities and communities

Secondary SDGs

09 and 12

Course/Program

PPGEEC

Academic unit

EE

Funding

Cenep

Type of funding

National

Project title

Application of MEMS sensors for monitoring and monitoring operations in the port sector

Coordination

Mariana Amorim Fraga

Lattes

http://lattes.cnpq.br/5099968396115915

Summary

The project aims to explore the use of MEMS (*Micro-Electro-Mechanical Systems*) sensors to monitor and optimize operations in the port sector, with a focus on improving safety and operational efficiency. The sector faces challenges related to the detection of structural damage and the safety of operations, such as the lack of effective monitoring. MEMS sensors, due to their compact size, low power consumption, and high accuracy, are ideal for integrating port systems, allowing continuous, real-time monitoring. The project will be divided into two subprojects: a master's degree, which will focus on the implementation and validation of MEMS sensors for monitoring fenders, crucial structures for port safety, and another for scientific initiation, which will focus on data collection using sensors applied to the monitoring of cranes. The objective is to promote the early detection of damage and optimize port operations, increasing the safety, efficiency and sustainability of the sector.

SDGs

11-Sustainable cities and communities

Secondary SDGs

04

Course/Program

PPGCA

Academic unit

FCI

Funding

Mack Pesquisa

Type of funding

National

Project title

Digital Memory Center – a semantic repository of data for the preservation of the memory of the collection of the Mackenzie Historical and Cultural Center

Coordination

Maria Amelia Eliseo

Lattes

http://lattes.cnpq.br/5813743488218949

Summary

Memory centers are spaces dedicated to the preservation of institutional historical heritage and have become more frequent in Brazil since the 2000s. They bring together documents, catalogues, photographs, books, sculptures and other items, combining characteristics of archives, libraries and museums. This hybrid nature makes the registration and retrieval of information complex, as there is a lack of tools that integrate different types of collection. The project proposes to develop a multidisciplinary computer system for structuring and public access via the web, aimed at the management of hybrid collections. The innovation lies in the use of semantic technologies and language models to improve the organization of archival, bibliographic, and museological data and metadata, optimizing the intelligent search. The system will use ontologies of cultural heritage, allowing historical and chronological inferences, and will have language models aimed at semantic search. The prototype will be tested at the Macke-nzie Historical and Cultural Center (CHCM), which has a hybrid collection. As a contribution, the project will support researchers, facilitate the understanding of the relationships between items in the collection, and expand the dissemination and appreciation of cultural heritage, promoting democratic access through advanced search resources.

SDGs

12-Responsible consumption and production

Course/Program

PPGEP

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Classification of patterns by integration of machine learning and artificial intelligence, applied to mass spectrometry analysis – approach to the development of a computational platform for interpretation and recognition

Coordination

Maria Celia de Oliveira

Lattes

http://lattes.cnpq.br/2087722471904061

Summary

Mass spectrometry is widely used to identify, quantify, and characterize substances, allowing the determination of the "fingerprint" of materials. However, complex mixtures, such as food, pose challenges due to signal superposition, spectral similarity, and high dimensionality. This project seeks to investigate mathematical, statistical and multicriteria decision methods integrated with machine learning models and artificial intelligence (AI) techniques for advanced analysis of spectrometric data. The application will be aimed at verifying the authenticity and quality of commercial olive oils, which are often adulterated. The samples will be analyzed at Labmass, linked to MackGraphe, following standardized acquisition protocols. The methodology includes five steps involving theoretical and practical studies for the development of a computational platform capable of recognizing and interpreting spectral patterns associated with tampering. It is expected to meet the demand for more accurate and accessible analytical methods for detecting fraud in olive oils, contributing to greater security and transparency in the production chain.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

16

Course/Program

PPGEEC

Academic unit

FCI

Funding

CNPq Research Productivity Grant Level Q-2

Type of funding

National

Project title

Distributed consensus with deterministic networks of automata

Coordination

Pedro Paulo Balbi de Oliveira

Lattes

http://lattes.cnpq.br/9556738277476279

Summary

The project has multiple coordination, one per country: M.M. Medel (Chile), P.P. Balbi (Brazil) and G. Theyssier (France). Given a set of binary opinions {0,1} in one-dimensional or two-dimensional grids, we propose procedures that bring the system to consensus states (0* or 1*). We work in the context of cellular automata, redefining rules (majority function at each stage), neighborhoods, and modes of interaction to allow, at least partially, convergence at fixed points. In two dimensions, using asynchronous updating (one site per step), we will characterize neighborhoods and local functions that ensure consensus. We will also evaluate the quality of these processes through the classical density problem in AC: a binary initial condition evolves under a local rule until it reaches consensus a*, where a is the initially most frequent state. Considering two principles of local majority functions (treatment of ties and majorities), we will reclassify ECAs (one-dimensional three-neighbor elementary cellular automata, with immediate and near neighbors) and extend the resulting rules to two-dimensional grids in order to study their compositional complexity. Both problems - consensus and characterization - will be addressed theoretically and through large-scale computer simulations.

SDGs

09-Industry, innovation and infrastructure

Course/Program

PPGEP

Academic unit

EE

Funding

CNPq

Type of funding

National

Project title

Construction of robust composite indicators: new methods based on multicriteria decision support and applications

Coordination

Renata Pelissari Infante

Lattes

https://lattes.cnpq.br/4642836982364582

Summary

Composite indicators have been gaining increasing popularity in a wide variety of research areas. Its adoption by global institutions such as the OECD, the WHO and the UN has further attracted the attention of the media and policymakers around the world, and its number of applications has increased since then. This new scenario has raised an alert for methodological issues adopted in the construction of composite indicators, especially with regard to weighting and aggregation. The literature indicates that these two phases of the construction of composite indicators are where the main criticisms lie and also the main opportunities for the development of new research. In fact, indicators that take into account multiple dimensions should be aggregated and weighted accordingly, considering issues of correlation and compensability between indicators and avoiding subjective weighting approaches. The robustness analysis shall be carried out to assess the impact of the defined assumptions and assumptions in terms of the choice of weights and the aggregation method. Motivated by the requirements that are usually behind the development of robust indicators, this research project aims to identify the main problems in the assumptions adopted in the construction of these indicators, to propose new methodological structures based on the support of multicriteria decision-making, overcoming the problems identified, and to apply these new structures in the construction of indicators related to the development of artificial intelligence. Social vulnerability, sustainability and supplier performance. The main results of the project are expected to be the development of new methodologies for the construction of robust indicators and the solution of practical problems through the proposal of new indicators.

SDGs

03-Good health and well-being

Course/Program

Engineering

Academic unit

EE

Funding

CNPq

Type of funding

National

Project title

Development of Artificial Intelligence applied to the predictive analysis of recurrence and personalization of medical treatment of patients with breast and lung carcinoma

Coordination

Mariana Zuliani Theodoro de Lima

Lattes

http://lattes.cnpq.br/1974608269182326

Summary

This project aims to develop and validate Artificial Intelligence models applied to predictive analysis of recurrence and therapeutic personalization in patients with breast and lung carcinoma. The proposal integrates clinical, anatomopathological and, when available, genomic data, to build algorithms capable of estimating the individual risk of tumor recurrence with greater precision than traditional methods based exclusively on staging and histological characteristics. The initiative seeks to reduce subjectivity in medical decision-making, minimize overtreatment in low-risk patients, and avoid undertreatment in high-risk cases, promoting a precision medicine approach. The project includes algorithmic development, retrospective and prospective validation in clinical cohorts, and clinical and economic impact assessment, especially in the context of the Brazilian health system. The tool is expected to contribute to the optimization of follow-up protocols, better allocation of resources, and improvement of clinical outcomes.

SDGs

04-Education Quality

Secondary SDGs

09

Course/Program

Engineering

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Development of a mobile application to support the preparation of the National Nanotechnology Olympiad – a virtual nanoscience learning environment

Coordination

Delmárcio Gomes da Silva

Lattes

http://lattes.cnpq.br/3600869365872425

Summary

The National Nanotechnology Olympiad (ONANO) has shown significant growth, engaging thousands of students throughout Brazil. This project proposes the development of a multi-platform gamified mobile application (iOS/Android) for ONANO, designed not only as an operational support tool, but as an innovative pedagogical platform. The main objective is to create a virtual learning environment (VLE), capable of accompanying and promoting the integral development of students in their journey of discovery and deepening in nanotechnology. In addition to serving as a strategic channel for communication and dissemination of the Olympiad, the application will offer interactive training trails, enriched study materials, gamified challenges, and features for continuous monitoring of progress. Gamification, personalization of learning, continuous monitoring of progress, and integration with active methodologies are pillars that will support the pedagogical architecture of this application, aiming not only at preparing for the Olympiad, but at building meaningful and lasting knowledge. It is expected that the application will contribute to the expansion of ONANO, the democratization of access to knowledge in nanotechnology and the stimulation of scientific interest among young people, positively impacting scientific education in the country.

SDGs

09-Industry, innovation and infrastructure

Secondary SDG 17

Course/Program

PPGEEC

Academic unit

EE

Funding

HUAWEI

MCTI

Type of funding

Foreign

Project title

Development of a technical and support system for the AI-based client

Coordination

Bruno Luis Soares de Lima

Lattes

http://lattes.cnpq.br/8752251074252426

Summary

After surveying Huawei professionals of the tasks to be automated in the areas of EBG, the architecture and modeling of systems for two applications will be developed, defining technologies, protocols, APIs, services and IT infrastructure. At the same time, candidate models of response generation will be tested and compared. With the architecture and model defined, the *software modules* that will make up the *chatbots* of the applications will be developed. In the final stage, the solutions will be tested and validated by the Mackenzie and Huawei teams, with subsequent adjustments. On another front, metrics will be defined for monitoring on a *dashboard,* as well as the databases responsible for providing the information. Strategies will be established for the creation, standardization or integration of existing databases with other systems. Together with Huawei, requirements analysis and elaboration of *interface wireframes* will be carried out, including setting alarms to the user. After modeling, the dashboard will be developed, field-tested, and adjusted. Huawei is expected to evolve the pilot system into integrated application, incorporating new data in the future.

SDGs

09–Industry, innovation and infrastructure

Course/Program

PPGEEC

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Development and implementation of *a smart campus* pilot at Mackenzie Higienópolis

Coordination

Bruno Luis Soares de Lima

Lattes

http://lattes.cnpq.br/8752251074252426

Summary

In recent years, great advances in information and communication technology (ICT) have been promoting a revolution in several areas such as the labor market, transport, industry, entertainment, education, and in the very way people relate to themselves, to other people, and to the environment where they live, that is, it generates a great impact on society. ICT has brought significant advances, including the concept of smart cities. A smart city uses ICTs to share information, which allows for the provision of efficient services. Everyday activities, such as water and energy use, are important points to be addressed and are in line with the SDGs. In this work, a system will be developed to monitor the energy and water consumption of the Higienópolis campus of the Mackenzie Presbyterian University. For this, concepts of IoT, BigData, and AI will be used. The objective of the system will be to provide parameters for the reduction and efficiency of energy and water consumption.

SDGs

09-Industry, innovation and infrastructure

Secondary SDG 03

Course/Program

PPGEEC

Academic unit

FCI

Funding

CNPq Research Productivity Grant Level 1C

Type of funding

National

Project title

Dynamics of complex biological, mental, and social systems

Coordination

Luiz Henrique Alves Monteiro

Lattes

http://lattes.cnpq.br/1820487447148268

Summary

In a simplistic way, a complex system is defined as one formed by a collection of elements with their own dynamics, connected by a random graph with non-trivial topology. In the coming years, it is intended to continue the research related to the current productivity grant, studying complex biological, mental and social systems, considering adaptivity and heterogeneity in the dynamics of the connected elements and/or in the coupling topology. In these works, to be done in an analytical and numerical way, we seek to investigate how topological structures affect collective behaviors and how the dynamics of nodes alter the topologies of the underlying networks. It is intended to deal with neural networks, mental processes and social networks. It aims to: explore the relationship between topology and synchronism in neurological disorders (such as autism, Parkinson's disease, epilepsy, schizophrenia, Alzheimer's disease); investigate the properties and laws of formation of healthy neural networks; study the generation of spiral spatial patterns related to heart diseases and neuropathies; propose image processing and optimization algorithms inspired by neuroplasticity and neuropathies.chronicle; understand the role of emotion in decision-making moments; establish the mathematical foundations of an artificial consciousness; and to determine control measures that minimize the spread of contagious diseases (such as Covid-19 and measles), psychopathologies (such as depression), and behaviors considered unwanted by society (such as corruption, dissemination of fake news, injustice, and racism).

SDGs

08-Decent work and economic growth

Secondary SDGs

09, 11 and 17

Course/Program

Engineering

Academic unit

EE

Funding

SOLVÍ Group

Type of funding

National

Project title

Operational efficiency and management of production systems

Coordination

Marcelo Nunes Fonseca

Lattes

https://lattes.cnpq.br/9285142449945121

Summary

The project aims to develop and apply methodologies of Production Engineering aimed at the analysis and improvement of organizational systems. The research addresses process management tools, continuous improvement, economic and financial feasibility assessment, resource optimization and project management. Methodologically, it adopts an applied approach, using case studies, organizational diagnostics, and quantitative and qualitative analyses. It is expected to generate diagnoses, feasibility studies and proposals for operational improvement, as well as technical reports, scientific publications and academic projects aimed at the training of students. The project seeks to strengthen the integration between universities and organizations, contributing to greater productive efficiency and better decision-making.

SDGs

10-Reduction of inequalities

Secondary SDGs

05 and 09

Course/Program

PPGEP

Academic unit

EE

Funding

FAPESP

Type of funding

National

Project title

Fairness in multicriteria classification problems

Coordination

Renata Pelissari Infante

Lattes

https://lattes.cnpq.br/4642836982364582

Summary

Recent studies show that algorithmic decision-making can be inherently prone to injustice. Certainly, the increasing use of machine learning algorithms for decision-making in various areas has highlighted the problem of unintended replication of historical discriminations embedded in data on sensitive attributes such as gender, race, skin color, and nationality. Although the discussion about algorithmic justice is being developed, especially in the field of Machine Learning research, other areas of research, such as Multicriteria Decision Support, have also begun to explore the topic. Because in Multicriteria Decision Support, decisions are based on the opinions of decision-makers rather than training data, bias can arise from the discriminatory views of decision-makers themselves. In this context, most studies have focused on problems of planning, leaving unexplored the challenges related to equity in multi-criteria classification. The objective of this research proposal is to develop new multicriteria classification methods capable of addressing equity issues, in addition to conducting applied studies to illustrate the applicability of these methods.

SDGs

09-Industry, innovation and infrastructure

Secondary SDG 17

Course/Program

PPGEEC

Academic unit

EE

Funding

CNPq Research Productivity Grant Level PQ-2

Type of funding

National

Project title

Study of the optical continuum and THz in solar flares and east flares

Coordination

Paulo José de Aguiar Simões

Lattes

http://lattes.cnpq.br/9281522944369099

Summary

Solar flares, or flares, are one of the most energetic phenomena in our solar system and one of the main agents of space weather. Understanding the physics of these events is critical to space weather prediction efforts, as well as promoting a better understanding of flares in other active stars. From our recent studies on the origin of the emission of the optical continuum, the so-called *white-light flares*, we have obtained promising preliminary results indicating that this emission is formed from the recombination spectrum of hydrogen in the solar chromosphere, as a consequence of the ionization of this element due to plasma heating. Observational data from recent flares in the visible band and THz were crucial to verify the consistency of our radiative-hydrodynamic simulations, and to mark the necessary warming conditions for the rare events already observed simultaneously in the two bands. In this project, we propose to consolidate our discovery through new multispectral analyses of solar flares, relying on the THz telescopes of CRAAM, in addition to the new HATS telescope, in addition to the use of radiative-hydrodynamic models. With probable identification of the origin of the optical continuum in solar flares, we propose to extend our studies to stellar flares, applying the hydrogen recombination model to model and obtain the energy and emitting area of these events. As observations of stellar flares have been carried out by broadband filters (Kepler, TESS), we also propose to investigate the relative contribution of spectral lines and continuum to the observed luminosity.

SDGs

09-Industry, innovation and infrastructure

Secondary SDG 11

Course/Program

PPGEEC

Academic unit

EE

Funding

Finep
EMPRESA BRASILEIRA DE INOVAÇÃO E PESQUISA

Type of funding

National

Project title

Study, development and characterization of the new generation of digital TV (TV 3.0) in Brazil

Coordination

Cristiano Akamine

Lattes

http://lattes.cnpq.br/0394598624993168

Summary

The objective is to research, develop and characterize the physical layer and transport of TV 3.0 (new Brazilian digital TV standard). The physical layer encompasses the transmit/propagation/receive stages and uses the ATSC 3.0 standard with extensions to the 2x2 Multiple Input Multiple Ou-tput (MIMO). The transport layer defined for the TV 3.0 is Real-time Object delivery over Unidirectional Trans-port / MPEG Dynamic Adaptive Streaming over HTTP (ROU-TE/DASH) and allows audio/video/data/application/ emergency alert content to be transported over AR (Radio Frequency) and/or internet.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

11 and 12

Course/Program

PPGEEC

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Exploring the Use of Sensors and Integrated Circuits for Smart and Sustainable Cities

Coordination

Mariana Amorim Fraga

Lattes

http://lattes.cnpq.br/5099968396115915

Summary

This project seeks to develop technological solutions for contemporary urban challenges, with the aim of transforming traditional cities into smart and sustainable urban spaces. The proposed electronic system will consist of low-cost sensors and integrated circuits, embedded in a printed circuit board (PCB) with multiple functionalities. These components will be applied in a variety of areas, including environmental monitoring, energy efficiency, traffic management, and efficient water use. By providing accurate and real-time data, the electronic system will facilitate more informed decision-making by urban managers, contributing to the development of effective public policies and the optimization of resources. In addition, the project aims to explore innovation opportunities to develop prototypes of electronic systems tailored to the specific needs of modern cities. In line with the UN Sustainable Development Goals (SDGs), especially SDG 11 (Sustainable cities and communities), the project also seeks to contribute to making cities more sustainable, inclusive, safe and resilient, integrating advanced sensing and automation technologies to improve resource management, energy efficiency, urban mobility and citizens' quality of life. It is expected that the results of this research, which has the support of the Plantar Environmental Association (AAP) and the company Visão Equipamentos for testing the electronic system in real urban scenarios, will provide important data that will boost the adoption of intelligent and sustainable technologies in cities.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

04 and 11

Course/Program

PPGEEC

Academic unit

EE

Funding

Type of funding

Foreign

Project title

Space Geodesy in the Northeast Space Observatory Radio (ROEN)

Coordination

Jean Pierre Raulin

Lattes

https://lattes.cnpq.br/7285541024719915

Summary

Conducting research and services under a renewed contract (2025-2029) NASA-IPM, inserted in the AEB-NASA bilateral agreement. Mackenzie officially represents AEB before NASA in space geodesy. Objectives: 1. operationalize and observe VLBI-geodetic (radio interferometry of very long baseline), GNSS satellites, from the ROEN-Rádio Observatório Espacial do Nordeste in Eusébio, CE, (near Fortaleza), on the premises and with the collaboration of INPE, mobilizing the 14.2 m antenna, frontier instrumentation, hydrogen atomic standard, the first and most accurate in Brazil. The operations are carried out under NASA's Space Geodesy Program (SGP) project; 2. To carry out research in the area of geophysics such as the study of variations in the length of the day (LoD) and their geophysical causes, radio propagation, radio-meteorology; 3. Install and operate in the coming years a new VLBI terminal for the generation of fiducial terminals, called VGOS, in partnership with NASA. Integration with the Global Geodetic Observatory System, GGOS, partnerships B.K. Geodäsie (Germany) and NASA.

SDGs

04-Education Quality

Secondary SDGs

09

Course/Program

PPGEEC

Academic unit

FCI

Funding

CNPq Level C Productivity Scholarship in Technological Development

Type of funding

National

Project title

The integration of Artificial Intelligence (AI) in educational environments

Coordination

Ismar Frango Silveira

Lattes

http://lattes.cnpq.br/3894359521286830

Summary

The integration of Artificial Intelligence (AI), especially Generative AI, in educational contexts has expanded the possibilities of personalized and adaptive learning. Virtual Humans (HV) stand out, avatars operated by algorithms that interact in real time, offering individualized guidance and emotional support, increasing engagement and optimizing results. As learning is unique and influenced by personal characteristics, the traditional offer of collective materials does not meet the specific needs of students, especially those with learning difficulties, dyslexia or ADHD. Automated content adaptation thus becomes essential to promote inclusion, equity and maximization of individual potential. Adaptive Learning was already looking for personalization, but technological limitations restricted its reach; GenAI allows you to adjust content - not just reorganize it - quickly and scalably. However, such adaptations do not always guarantee accessibility and engagement. In this scenario, HV can improve the experience by incorporating expressions, body language, and intonation, reducing isolation in distance learning and making the process more welcoming. The combination of GenAI and HV is a relevant advance in educational personalization and accessibility. General objective: to develop and apply a computational solution for content adaptation with Generative AI and HV, analyzing impact and adoption strategies in Brazil. Specific objectives: to enhance existing HV solutions, incorporate GenAI in content adaptation, and evaluate quality, acceptability, and impact, as well as examine challenges and ethical issues of HV use.

SDGs

09–Industry, innovation and infrastructure

Secondary SDGs

11 and 13

Course/Program

Engineering

Academic unit

CCT

Funding

Mack Pesquisa

Type of funding

National

Project title

Artificial intelligence applied to the optimal planning of cargo distribution routes considering economic, social and environmental aspects

Coordination

Diogo Rupolo

Lattes

http://lattes.cnpq.br/3268055259299128

Summary

Cargo transport in Brazil occurs predominantly by road. In general, many of these cargo transport vehicles depart from a distribution center or factory and need to deliver goods to several different destinations. Thus, logistics distribution companies are increasingly interested in finding delivery routes for their products to various customers at the lowest aggregate cost. However, customers want to receive their goods in the shortest possible time and with the lowest possible shipping cost. Thus, the government sector must be concerned with the infrastructure available for cargo transportation, the levels of pollution generated by vehicles, risks of accidents and wear and tear on highways, streets and avenues. Therefore, in this research project, optimization models for the optimal routing of cargo transport vehicles should be developed, which meet all these aspects simultaneously. Therefore, exact optimization methods, combined with artificial intelligence techniques, are powerful tools in the search for solutions that contemplate more viable goods distribution routes for companies, customers and governments and simultaneously meet economic, social and environmental aspects.

SDGs

04-Education Quality

Secondary SDGs

09

Course/Program

PPGCA

Academic unit

FCI

Funding

Mack Pesquisa

Type of funding

National

Project title

Generative Artificial Intelligence nd Virtual Humans for Dynamic adaptation of educational content

Coordination

Ismar Frango Silveira

Lattes

http://lattes.cnpq.br/3894359521286830

Summary

Recent developments in Artificial Intelligence (AI), especially Generative AI, have transformed human interaction with digital devices and enabled new ways of organizing information. In Education, these technologies expand opportunities for personalized, humanized and adaptive learning. In this context, the following stands out:
Virtual Humans (HV), AI-controlled avatars capable of interacting in real time with students, offering individualized guidance, stimulation of engagement and emotional support. In addition, they can act as tutors, provide additional explanations, identify doubts and generate analytical reports for coordinators, in addition to favoring the development of *soft skills*. The project investigates the integrated role of Generative AI and HV in promoting adaptive learning by analyzing their ability to dynamically adjust content to students' needs. The research will use a HV technological base from the University of Florida, with improvements for the local reality, in partnership with the Federal University of Uberlândia (UFU) and the Federal University of Bahia (UFBA). A proof of concept will be carried out in FCI disciplines of the Mackenzie Presbyterian University (UPM), evaluating acceptability, usability and usefulness. Ethical implications will also be examined, aiming to ensure effective, inclusive experiences aligned with the preservation of the central role of the teacher, respecting privacy, cultural diversity and student autonomy.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

10

Course/Program

Engineering

Academic unit

EE

Funding

FAPESP

Type of funding

National

Project title

Interpretability and equity in machine learning based on Shapley's value

Coordination

Guilherme Dean Pelegrina

Lattes

http://lattes.cnpq.br/9984556081239908

Summary

Often, practical situations require the application of complex machine learning methods in order to model the relationships between the input and output data of the system. As a rule, these methods are difficult to interpret, which brings a disadvantage when one wants to understand the impact of the attributes on the result obtained. As a solution, recent research has been developing agnostic methods that can be used to extract inter-pretability from such models. An example is models based on the Shapley value, a concept coming from cooperative game theory and which provides the margin contribution of each attribute in the performance of the trained machine. With this tool, then, it is possible to interpret the impact of each attribute in the trained model. This impact can be both in relation to the performance of the model and other metrics, such as equity. Equity in machine learning has been much discussed in the literature, since automatic decision models can generate ethical disparities. In this scenario, this research project aims to develop methods based on Shapley's value to achieve interpretability and investigate equity in machine learning.

SDGs

4-Quality Education

Secundary SDGs

09

Course/Program

PPGCA

Academic unit

FCI

Funding

Technological Development Productivity Scholarship CNPq Level DT-2

Type of funding

Nacional

Project title

Digital games based on business processes: application in process training

Coordination

Renata Mendes de Araujo

Slats

http://lattes.cnpq.br/3589012014320121

Summary

The present project aims to continue the activities of a previous research project funded by a grant for Technological Development and Innovative Extension (DT/CNPq), aimed at the design, development, evaluation and application of digital games based on business processes to promote the participatory management of organizational processes. The history of development of this research program had as its main domain the management of public services. The results obtained so far demonstrate the potential to also encompass participatory management relationships in business organizations in general. The expected results of this project are: i) reengineering of tools for generating digital games from business process models and their integration into process management platforms; ii) conceptual definition of gameplay for digital games based on processes and methods for the design of gameplay in this genre of games; iii) definition of methods for evaluating games based on business processes; iv) experimental studies of the application of digital games based on business processes; and v) development of products, methods, tools for design and games for distribution and partnerships with the industry.

ODS

03-Good health and well-being

Secundary SDGs

09

Course/Program

PPGEEC

Academic unit

EE

Funding

Finep
EMPRESA BRASILEIRA DE INOVAÇÃO E PESQUISA

Type of funding

National

Project title

KPumpMack – Development of a mechanical circulatory assistance device (artificial heart) with 5G control technology

Coordination

Cristiano Akamine

Lattes

http://lattes.cnpq.br/0394598624993168

Summary

The present proposal consists of the development of electronic interface and the implementation of a 5G communication control and monitoring system for a ventricular assist device, known as artificial co-ration. Regarding the electronic part, sensors and control systems for the pumping mechanisms will be implemented, in order to enable monitoring and adjustments necessary for the proper operation of the aforementioned device, through the monitoring of a qualified professional. The sending of vital signs and relevant sensing measures will be sent via the private 5G network, so that it is possible to carry out the supervision, operation and diagnosis of patients. It is worth mentioning that the use of 5G will allow greater security, low latency, a connection with data rates 10 to 100 times higher than 4G and the possibility of simultaneous support to several patients through an interface made available on a mobile device (*smartphone* and *smartwatch*).

ODS

4- Quality Education

Secundarys SDGs

08

Course/Program

Mechanical Engineering

Academic unit

EE

Funding

HUAWEI
MCTI

Type of funding

Foreign

Project title

Storage and Datacom and Commercial Market Laboratory (MOOC)

Coordination

Silvia Maria Stortini Gonzalez Velazquez

Lattes

http://lattes.cnpq.br/3592271618601621

Summary

Laboratories will be set up for testing, training and practices with Huawei devices in the Datacom area. The live *online* training, with hands-on methodology, will cover networking fundamentals, Ethernet switching, IP routing protocols, configuration and management of routers and *switches,* network security and enterprise solutions. Another laboratory will be dedicated to training in storage systems, including structures and components, RAID concepts, Fiber Channel and Ethernet technologies for SAN networks, *backup*, disaster recovery, cloud computing and Big Data. Students will also get to know the OceanStor V3 family, aimed at developing solutions. The laboratories will also allow performance tests, expanding opportunities for joint research between the University and Huawei. After the training, students will produce MOOCs and webinars in Portuguese about the products studied, with technical and teacher support. This stage will consolidate knowledge, develop *soft skills* and allow participants to be evaluated, in addition to disseminating the content produced.

ODS

09-09-Industry, innovation and infrastructure

Secundarys SDGs

16

Course/Program

PPGCA

Academic unit

FCI

Funding

Mack Pesquisa

Type of Funding

National

Project title

Mining and visualizing arguments on social networks

Coordination

Renata Mendes de Araujo

Lattes

http://lattes.cnpq.br/3589012014320121

Summary

The aim of the project is to broaden the understanding, modelling, design and use of data science technologies in a world that is continuously becoming digital. The project aims to advance scientifically and innovate in technological solutions for data science for social good: science based on the informed, conscientious and voluntary participation of thousands of citizens, not necessarily professional scientists, to analyze large volumes of data, share their knowledge, discuss, present the results and make decisions, possibly dedicating their intelligence, their technological resources and availability of time to find results of social utility. Specifically, the project intends to generate computational solutions that facilitate the understanding of the debate and discussions on social networks, stimulating the critical thinking of its users. The solution intended by the project is a platform composed of a set of computational tools capable of supporting a process of curation, mining and visualization of the debate in social networks for users of these networks, based on modern techniques of argument mining.

SGGs

09-Industry, innovation and infrastructure

Secundarys SDGs

04 e 15

Course/Program

PPGEEC

Academic unit

EE

Funding

CNPq

Type of funding

National

Project title

Monitoring of the lower ionosphere using the VLF technique

Coordination

Jean Pierre Raulin

Lattes

https://lattes.cnpq.br/7285541024719915

Summary

Solar or cosmic geophysical disturbances affect technological systems in orbit and on Earth, and are detrimental to crewing and activities dependent on GNSS, telecommunications and geopositioning. Given society's growing technological dependence, it is essential to study such effects from the source in order to predict or mitigate them. Many of these impacts result from the entry of photons and energetic particles into the atmosphere, altering electrical conductivity by ionization. Such effects are visible in the lower ionosphere (D-region, 60-90 km), a weakly ionized medium and difficult to access, but characterized by VLF waves in the Earth-Ionosphere (EIW) waveguide. It is proposed to monitor disturbances in the D-region via VLF anomalies received in Brazil, with emphasis on solar flares that cause HF radio blackouts - phenomena still without reliable prediction. In quiet periods, we will indirectly monitor Lyman radiation.
-alpha, responsible for the D-region and lacking in on-site observations. With the experience of the SAVNET network, we installed new VLF sensors using SDR technology and cognitive analytics, ensuring high-quality data, temporal resolution, and easy distribution.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

11

Course/Program

PPGEEC

Academic unit

EE

Funding

Teletronix

Type of funding

National

Project title

MPX over IP Link

Coordination

Cristiano Akamine

Lattes

http://lattes.cnpq.br/0394598624993168

Summary

This project aimed to develop and validate a system for the transmission and reception of the MPX (Multiplex) composite signal for FM broadcasting through IP networks. The developed solution allowed the transport of the multiplexed signal between studios and transmitters using communication infrastructures based on public internet or dedicated networks, maintaining the integrity of the components of the FM signal, including stereo audio, sub-carriers and associated data. The project considered the performance requirements necessary for professional broadcasting applications, with an emphasis on reliability, low latency and accurate synchronization between different points in the network. During development, encapsulation and transport architectures of the MPX signal over IP were studied, as well as synchronization and control mechanisms capable of ensuring proper operation in geographically distributed distribution scenarios. Hardware and software prototypes were implemented and evaluated in a laboratory environment, allowing validating the operation of the system under different network conditions. The system is designed to support applications in Single Frequency Network (SFN), enabling the synchronized distribution of the broadcast signal to multiple transmitters. As a result, a technological solution was obtained capable of increasing the flexibility and efficiency in the distribution of FM broadcasting signals, reducing operational costs and facilitating integration with modern IP-based communication infrastructures.

SDGs

10-Reduce inequalities

Course/Program

Engineer

Academic unit

EE

Funding

CNPq

Type of funding

National

Project title

New methods for exploiting fairness in the three steps of machine learning: pre-processing, training, and post-processing

Coordination

Guilherme Dean Pelegrina

Lattes

http://lattes.cnpq.br/9984556081239908

Summary

The growing use of machine learning models (ML) in the most diverse practical situations is remarkable. Since, in many of them, the decision made has a direct implication in the lives of the people involved, studies have been carried out to create models of bullying that avoid ethical disparities between sensitive groups of the population (such as those defined by race or gender). As a rule, the search for this equity focuses on one of the three stages of building a ML model: pre-processing, training, and post-processing. Although there are studies in these three stages, this field of study is recent and there is still a lack of more robust solutions in the literature that look at specific issues of each of them. For example, the search for equity in the pre-process does not look at the relationship of the input data to the output vector, this impartiality is usually not transmitted to the final goal (equity in classification, for example). In the other stages, it also happens that the proposed solutions combine performance and equity in optimization, without analyzing the objectives simultaneously. Motivated by this vast field of study and by the gaps observed in the existing literature, this research project intends to develop techniques that seek equity in the three stages. In the pre-processing step, we will approach supervised principal component analysis in order to adjust the data so that there is an equal performance in the final task of the problem for different sensitive groups. In the training stage, we will propose an extension of the Random Forest model, in which the search for equity based on a multiobjective analysis also occurs in the definition of the set of decision trees that make up such a model. Finally, in post-processing, the idea is to develop a multi-criteria analysis that evaluates the compromise between performance and equity, both in relation to different MA models and the decision threshold in classification problems.

SDGs

09–Industry Innovation and infrastructure

Course/Program

PPGEEC

Academic unit

EE

Funding

HITACHI

Type of funding

National

Project title

Intellectual Property (IP) Core of the ATSC 3.0 Single Input Single Output (SISO) Lite Modulator based on software-defined radio

Coordination

Cristiano Akamine

Lattes

http://lattes.cnpq.br/0394598624993168

Summary

This project aimed to develop an IP core for ATSC 3.0 modulation in the SISO Lite configuration, implemented in a software-defined radio (SDR) platform. The solution developed allowed the generation of SI-nals compatible with the ATSC 3.0 standard, enabling its use in research activities, technological development, interoperability tests and validation of new generation digital broadcasting equipment. The SDR-based approach provided greater flexibility for implementation and experimentation of different parameters of the transmission system, favoring the adaptation of the modulator to various test scenarios and experimental applications. During the development of the project, the main functional blocks of the modulation system defined by the ATSC 3.0 standard were implemented and integrated, including the mechanisms of channel coding, *interleaving,* constellation mapping and OFDM modulation. Studies were also carried out to optimize the computational performance of the system, considering the execution in programmable architectures and digital signal processing platforms. Functional prototypes were developed and evaluated in a laboratory environment, allowing the validation of the generation and transmission of digital signals according to the technical specifications of the standard. As a result, a flexible and reusable modulation core was obtained, capable of being integrated into different transmission platforms and used as a basis for the development of equipment and experimental systems for digital broadcasting compatible with the ATSC 3.0 standard.

SDGs

03-Good health and well-being

Secondary SDGs

09

Course/Program

Enginner

Academic unit

EE

Funding

Mack Pesquisa

Type of funding

National

Project title

Digital dentistry: application of generative artificial intelligence models in the diagnosis, prevention and treatment indication of malocclusion, apnea and snoring

Coordination

Cláudia Josimar Abrão

Lattes

http://lattes.cnpq.br/9556374634294751

Summary

The incorporation of teledentistry and emerging digital technologies has reformulated dental practice, promoting greater accessibility, efficiency, and prevention in oral health. In this context, this project proposes the development of an integrated technological solution aimed at screening, education and re-mobile follow-up of pediatric patients with alterations in the growth and development of occlusion, in addition to associated conditions such as apnea and snoring. The proposal includes the use of generative artificial intelligence and digital communication tools to enable personalized guidance, automated screenings, and recommendations on the ideal time to seek dental care. The solution will consist of a multiplatform application and an educational *e-book*, developed based on updated scientific literature. In addition, the clinical and behavioral data collected by the application will compose a structured base, allowing statistical studies and predictive analysis to be carried out with *data science* techniques. Such analyses will enable the identification of epidemiological patterns and the continuous improvement of oral health intervention strategies. The project thus seeks to contribute to the training of professionals trained to work in a digitalized scenario, while supporting the guidelines of the SUS and the World Health Organization for the promotion of preventive, inclusive and evidence-based oral health.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

11

Course/Program

PPGEEC

Academic unit

EE

Funding

intelbras

Type of funding

National

Project title

Research Project for research and development of indoor and outdoor reception antennas compatible with TV 3.0 2x2 MIMO technology

Coordination

Cristiano Akamine

Lattes

http://lattes.cnpq.br/0394598624993168

Summary

This project aimed at the research, development and validation of indoor and outdoor reception antennas compatible with the MIMO 2×2 technology adopted by the new generation Brazilian digital television system, TV 3.0 (DTV+). The use of Multiple Input Multiple Output (MIMO) techniques represented a significant advance in digital broadcasting, allowing for greater signal robustness, better spectral efficiency and increased transmission capacity in complex urban environments. In this context, the project involved the study of different antenna architectures, focusing on spatial diversity and polarization, seeking suitable solutions for both indoor domestic reception and outdoor installation in homes and buildings. Activities included modeling and electromagnetic simulation of antenna structures, analysis of radiation patterns, and optimization of parameters such as gain, band width, and isolation between MIMO elements. Experimental prototypes were developed that went through characterization processes in the laboratory, including measurements in an anechoic chamber, as well as performance tests in real digital TV signal reception scenarios. The project also considered practical aspects of implementation, such as manufacturing cost, ease of installation and compatibility with receivers and set-top bo-xes equipment for TV 3.0. As a result, efficient and low-cost antenna solutions were obtained, capable of significantly improving the reception quality of the next generation digital television system in Brazil.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

16

Course/Program

PPGEEC

Academic unit

EE

Funding

Seja Digital

Dist

Type of funding

National

Project title

TV 3.0 Project - EAD

Coordination

Cristiano Akamine

Lattes

http://lattes.cnpq.br/0394598624993168

Summary

The objective is to research, develop and characterize the physical layer and transport of TV 3.0 (new Brazilian digital TV standard). The physical layer encompasses the transmit/propagation/receive stages and uses the ATSC 3.0 standard with extensions to the 2x2 Multiple Input Multiple Ou-tput (MIMO). The transport layer defined for the TV
3.0 is Real-time Object delivery over Unidirectional Trans-port/MPEG Dynamic Adaptive Streaming over HTTP (ROUTE/DASH) and allows audio/video/data/application/emergency alert content to be transported over AR (Radio Frequency) and/or internet.

SDGs

07-Affordable and clean energy

Secondary SDGs

09

Course/Program

PPGEEC

Academic unit

EE

Funding

Technological Development Productivity Scholarship CNPq Level DT-2

Type of funding

National

Project title

TV 3.0 Project: next generation of digital TV for Brazil

Coordination

Cristiano Akamine

Lattes

http://lattes.cnpq.br/0394598624993168

Summary

This technological development grant aimed to support research, development and innovation activities in advanced digital radio broadcasting systems, with a focus on technologies associated with new generation digital television (TV 3.0), digital communications and hybrid broadcast-broadband architectures. The activities developed contributed to the advancement of technological solutions aimed at the transmission, reception and processing of digital signals in broadcasting environments and convergent networks. Within the scope of the fellowship, activities were carried out related to the development of experimental prototypes, implementation and evaluation of algorithms for digital signal processing, as well as the integration of *hardware* and *software* modules used in digital communications research platforms. Experimental tests were also conducted in a laboratory environment, including functional validation of transmission and reception systems, analysis of algorithm performance, and evaluation of new communication architectures aimed at the distribution of audiovisual content. The activities developed resulted in the production of scientific publications in indexed journals and in annals of national and international congresses, contributing to the dissemination of the results obtained and to the advancement of the state of the art in the area. In addition, participation in national and international congresses made it possible to present research results, exchange knowledge with the scientific community, and strengthen academic and technological collaborations in the area of advanced digital communications and broadcasting.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

11

Course/Program

PPGEEC

Academic unit

EE

Funding

intelbras

Type of funding

National

Project title

Set-Top-Box (STB) for TV 3.0 (DTV+)

Coordination

Cristiano Akamine

Lattes

http://lattes.cnpq.br/0394598624993168

Summary

This project aimed to develop a prototype Set-Top-Box (STB) compatible with the new generation Brazilian digital television system, TV 3.0 (DTV+). The developed solution integrated advanced capabilities for receiving digital broadcasting signals with broadband connectivity, allowing convergence between broadcast and internet environments. The platform is designed to support the execution of interactive applications and hybrid *broadcast-broadband* services, enabling the delivery of personalized content, on-demand services and interactive applications based on web technologies. During the project, *hardwood architectures* and *software* suitable for the implementation of receivers compatible with the technical specifications defined for TV 3.0 were investigated. The development involved the integration of modules for receiving digital broadcasting signals, decoding audio and video in advanced formats, as well as the implementation of *middleware* and execution environments for interactive applications. Aspects of interoperability with content distribution platforms, as well as remote updating mechanisms and support for connected services, were also considered. Functional prototypes of the Set-Top-Box were developed and evaluated in a laboratory environment, allowing to validate the operation of the system in reception and connectivity scenarios typical of the home environment. As a result, the project contributed to the advancement of technologies associated with the TV 3.0 ecosystem in Brazil, demonstrating the feasibility of hybrid receivers capable of efficiently integrating broadcasting and internet services.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

11

Course/Program

PPGEEC

Academic unit

EE

Funding

ZTE

Type of funding

National

Project title

Set-Top-Box EAF DVB-S2/S2X according to current ETSI and NorDig technical standards and GAISPI/EAF/GT specifications SET Migration

Coordination

Cristiano Akamine

Lattes

http://lattes.cnpq.br/0394598624993168

Summary

In this project, the team acted in the technical support for the development of the *hardware* and *software* of a Set-Top receiver
•Box based on DVB-S2 and DVB-S2X standards. The activities involved support for the implementation of the system's functionalities, as well as the performance of conformity tests and technical validation in accordance with the standards and specifications established by the ETSI and NorDig bodies, in addition to the guidelines defined by the GAISPI/EAF/GT SET Migration document. Experimental tests were also conducted to assess the performance of the receiver in receiving satellite television services, including verification of compatibility with advanced video codes and integration with digital content distribution platforms. The evaluation activities involved the analysis of the behavior of the system under different operating conditions, ensuring that the equipment was in compliance with the technical requirements established by the applicable standards and able to operate in environments for the distribution of audiovisual content via satellite.

SDGs

09–Industry, innovation and infrastructure

Course/Program

PPGCA

Academic unit

FCI

Funding

Mack Pesquisa

Type of funding

National

Project title

Intelligent monitoring system for predictive maintenance of the radio telescope of the Pierre Kaufmann observatory

Coordination

Rogério de Oliveira

Lattes

http://lattes.cnpq.br/3067732992972770

Summary

The present project proposes the development of an intelligent monitoring system for predictive maintenance (PdM) of the radio telescope of the Pierre Kaufmann Observatory. Using vibration sensors and signal spectrum analysis techniques, the system will enable the early detection of anomalies and the prediction of failures in real time. The implementation will include eight piezoelectric accelerometers for continuous monitoring of the eight radio telescope engines, and a data collection and analysis system. The project aims to reduce unscheduled observatory downtimes, increase component longevity, and reduce maintenance costs.

SDGs

09–Industry, innovation and infrastructure

Secondary SDGs

11, 08 e 17

Course/Program

PPGEEC

Academic unit

EE

Funding

Port of Santos

Type of funding

National

Project title

Ship berthing monitoring system based on artificial intelligence vision

Coordination

Bruno Luis Soares de Lima

Lattes

https://lattes.cnpq.br/8752251074252426

Summary

The project aims to develop a monitoring and image processing system for the identification of ships docked in ports, with the help of artificial intelligence (AI). com The work proposes the development of a Ship Docking Monitoring System (AVMS) with the help of artificial intelligence. In addition to being a more economical system, it surpasses other less accurate docking systems, as it can capture the image of ships regardless of size and does not suffer physical and climatic interference from the environment. In this project, an image processing algorithm will be developed to detect and identify the boat and, through sensing, the speed and distance at which the vessel performs the docking maneuver will be measured.

INSTITUTIONAL PROJECTS

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

07 and 13

Organ

Dean of Research and

Pos-graduation

Funding

CNPq

Type of funding

National

Project title

MAI/DAI Mackenzie Presbyterian University Program – CNPq call No. 012/2020

Coordination

Maria Cristina Triguero Veloz Teixeira

Lattes

http://lattes.cnpq.br/6002004614786497

Summary

This proposal involves different bodies of Mackenzie Presbyterian University, such as Engineering, Administration and MackGraphe Center. It is divided into 14 subprojects: 1) Re-coating based on iron aluminet in steel using *laser cladding*; 2) Maxime Ferrum: special steel of high mechanical strength with textured microstructure; 3) SKF do Brasil: process for simultaneous induction quenching of wind turbine bearing raceways; 4) Ford Project 1: polymeric composites based on EPDM and PVC/NBR with two-dimensional materials and loads of natural origin; 5) CBMM: performance improvement of brake discs with controlled additions of niobium; 6) Idea!: photonic and electro-optical devices and systems based on graphene and other 2D materials; 7) Thermomechanics: composites with copper matrix with graphene reinforcement by means of joining by accumulative lamination; 8) JASCO: construction of *point-of-care nano-biosensors* coupled to the *smartphone* using functional hybrid nanomaterials; 9) FORD Project 2: use of artificial intelligence to analyze vehicle driving patterns; 10) Rivera: research on the purposes of sustainable innovations and their nuances; 11) AXONDATA: development of test protocols and interface of a Big Data Analytics platform; 12) Zwick Roel: study of the mechanical behavior at high temperatures of the Ti-6Al-4V alloy coated with a thin film of metallic glass based on Zr-Cu; 13) DreamTech: Van der Waals heterostructures for new *ligth-emitting diodes* (LED); 14) NEC: research and development of IoT, 5G and artificial intelligence applications applied to telecommunications and smart cities.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

04, 11 e 13

Organ

Dean of Research and

Pos-graduation

Funding

CNPq

Type of funding

National

Project title

MAI/DAI Mackenzie Presbyterian University Program – CNPq call No. 068/2022

Coordination

Maria Cristina Triguero Veloz Teixeira

Lattes

http://lattes.cnpq.br/6002004614786497

Summary

The proposal involves three units: School of Engineering (EE), School of Architecture and Urbanism (FAU) and Center for Social and Applied Sciences (CCSA). At EE, two *stricto sensu graduate programs are participating*: Materials Engineering and Nanotechnology (PPGMN) and Electrical and Computer Engineering (PPGEEC). Within the programs there are several laboratories and a research center that work intensively in the development of applied research and innovation, including: Digital TV Laboratory (LBTVD) and Natural Computing and Machine Learning Laboratory (LCoN). It should be noted that, in recent years, EE has signed partnerships with more than 50 companies involving professors and students from both graduate and undergraduate programs, enabling strong interaction with society, thus in line with the guidelines established by Capes and the DCNs of Engineering. At FAU, the Graduate Program in Architecture and Urbanism (PP-GAU) participates, which holds a prominent position in the panorama of the teaching of Architecture and Urbanism in São Paulo and in Brazil, due to its characteristic of excellence in training in architectural and urbanism design. And, through the CCSA, the Graduate Program participates

-Bachelor of Business Administration, a program of excellence with academic master's and doctoral degrees and a member of AACSB. The proposal is divided into 16 subprojects in the areas of copper metallurgy, transmission equipment, industrial equipment, flat-rolled special steels, engineering services, plastic artifacts for industrial use, management consulting and development of computer programs for use in engineering and architecture.

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

07, 11 e 13

Organ

Dean of Research and

Pos-graduation

Funding

CNPq

Type of funding

National

Project title

MAI/DAI Program Mackenzie Presbyterian University – CNPq call No. 009/2024 – Line 1: institutions with consolidated graduate programs, especially those that already have partnerships established with companies with a strong component of interaction with the academic environment

Coordination

Maria Cristina Triguero Veloz Teixeira

Lattes

http://lattes.cnpq.br/6002004614786497

Summary

The proposal submitted for CNPq Public Notice No. 009/2024 MAI/DAI Mackenzie Presbyterian University involves four units: School of Engineering (EE), Faculty of Architecture and Urbanism (FAU), Center for Social and Applied Sciences (CCSA) and Center for Biological and Health Sciences (CCBS). By EE, two post-graduate programs are participating.

-stricto *sensu graduation*: Materials Engineering and Nanotechnology (PPGMN) and Electrical and Computer Engineering (PPGEEC). Within the scope of the programs, there are several laboratories and a research center that work intensively in the development of applied research and innovation, among which the following can be mentioned: Digital TV Laboratory (LBTVD) and Natural Computing and Machine Learning (LCoN) Laboratory. It is noteworthy that in recent years EE has signed partnerships with more than 60 companies involving professors and students from both graduate and undergraduate levels, enabling strong interaction with society. At FAU, he participates in the Graduate Program in Architecture and Urbanism (PPGAU), with a score of 6 in Capes. It is worth mentioning that FAU-Mackenzie holds a prominent position in the panorama of the teaching of Architecture and Urbanism in São Paulo and in Brazil, due to its characteristic of excellence in training in architectural and urbanism design. Through the CCSA, the Graduate Program in Business Administration participates, a program of excellence with academic master's and doctoral degrees and a member of AACSB. And, through the CCBS, the Human Development Sciences program (PPGCDH) participates, a PROEX program with a score of 7 in Capes. The proposal is divided into nine subprojects in the areas of financial impact of climate change, management consulting, development of computer programs for use in engineering and architecture, computational psychometrics, set-top development, and

-TV 3.0 box with the chipsets and sensor construction based on thin files for various segments.

SDGs

4-Quality Education

Secondary SDGs

03, 07, 09, 11 e 13

Organ

Dean of Research and

Pos-graduation

Funding

CNPq

Type of funding

National

Project title

Institutional research project focused on innovation at Mackenzie Presbyterian University – CNPq call No. 035/2023 – support for scientific, technological and innovation research: training scholarships – master's and doctorate

Coordination

Maria Cristina Triguero Veloz Teixeira

Lattes

http://lattes.cnpq.br/6002004614786497

Summary

This project will aim to develop research activities focused on innovation, strengthening, among the participating programs, multidisciplinary research actions with scientific and technological challenges of national impact. The primary objectives are part of the University's research roadmap. The general problems are: a) How to develop actions that increase the consolidation of student education with high quality and skills to face challenges and offer solutions with innovative impact in different areas? b) How to use products from dissertations and theses to leverage potential and accelerate regional and national economic and social development? The main hypothesis will be the verification of the impact of the proposed objectives in the development of scientific studies with innovative impact in different sectors associated with the research lines of the participating graduate programs. The hypothesis is plausible considering that the activities to be developed are part of the strategic planning of the participating programs and lines of research, highlighting that, among all the programs, four of them are PROEX in Capes. The main strategies for the validation of the hypotheses and the achievement of the objectives will be the use of a multidisciplinary approach with priorities and focuses on strategic technological sectors, skilled technologies, production technologies, technologies for the promotion, popularization and dissemination of science, technology and innovation, and technologies aimed at increasing the quality of life in the educational and health sectors, linguistics and literature and quality of life in human development. In addition, highly qualified human resources will be trained, both in basic science and in problem solving in applied areas with a focus on innovation and technology.

SDGs

4- Quality Education

Secondary SDGs

03, 07, 09, 11 e 13

Organ

Dean of Research and pos-graduation

Funding

CNPq

Type of funding

National

Project title

Mackenzie Institutional Project: research and innovation in a multi-disciplinary focus – CNPq public call No. 050/2024 – Institutional Graduate Scholarship Program (PIBPG) – 2025 cycle

Coordination

Maria Cristina Triguero Veloz Teixeira

Lattes

http://lattes.cnpq.br/6002004614786497

Summary

Scientific research and technological innovation play a fundamental role in socio-economic development, driving advances in the various areas of knowledge. To strengthen scientific production and the training of qualified human resources, it is essential to foster multidisciplinary research integrated with strategic sectors of society. This institutional project of Mackenzie proposes the articulation of eight graduate programs in areas such as nanotechnology, artificial intelligence, neurosciences, strategic management and innovation, architecture and urbanism, law and social transformation. The proposal seeks to consolidate high-impact interdisciplinary research, promoting collaboration between different fields of knowledge and productive sectors. The central challenge addressed is the need to intensify the interaction between academic research and the demands of the productive and social sector, ensuring that applied science generates innovative and impactful solutions. This integration is essential to accelerate technological development and strengthen national and international research networks. The hypothesis of the project is that the structuring of a collaborative research environment, with a focus on interdisciplinarity and internationalization, will enhance the generation of scientific and technological knowledge of excellence. Previous evidence of this approach includes the success of the PrInt Project (2019-2024), which expanded international collaborations and the global insertion of UPM researchers, in addition to the active participation of the programs in national networks such as the National Institutes of Science and Technology (INCT).

SDGs

09-Industry, innovation and infrastructure

Secondary SDGs

07, 11 e 13

Organ

Dean of Research and Pós-Graduação (PRPG)

Funding

CNPq

Type of funding

Nacional

Project title

Institutional project for scientific, technological and innovation research at Mackenzie Presbyterian University – CNPq call No. 069/2022 – master's and doctoral scholarships – PIBPG 2022

Coordination

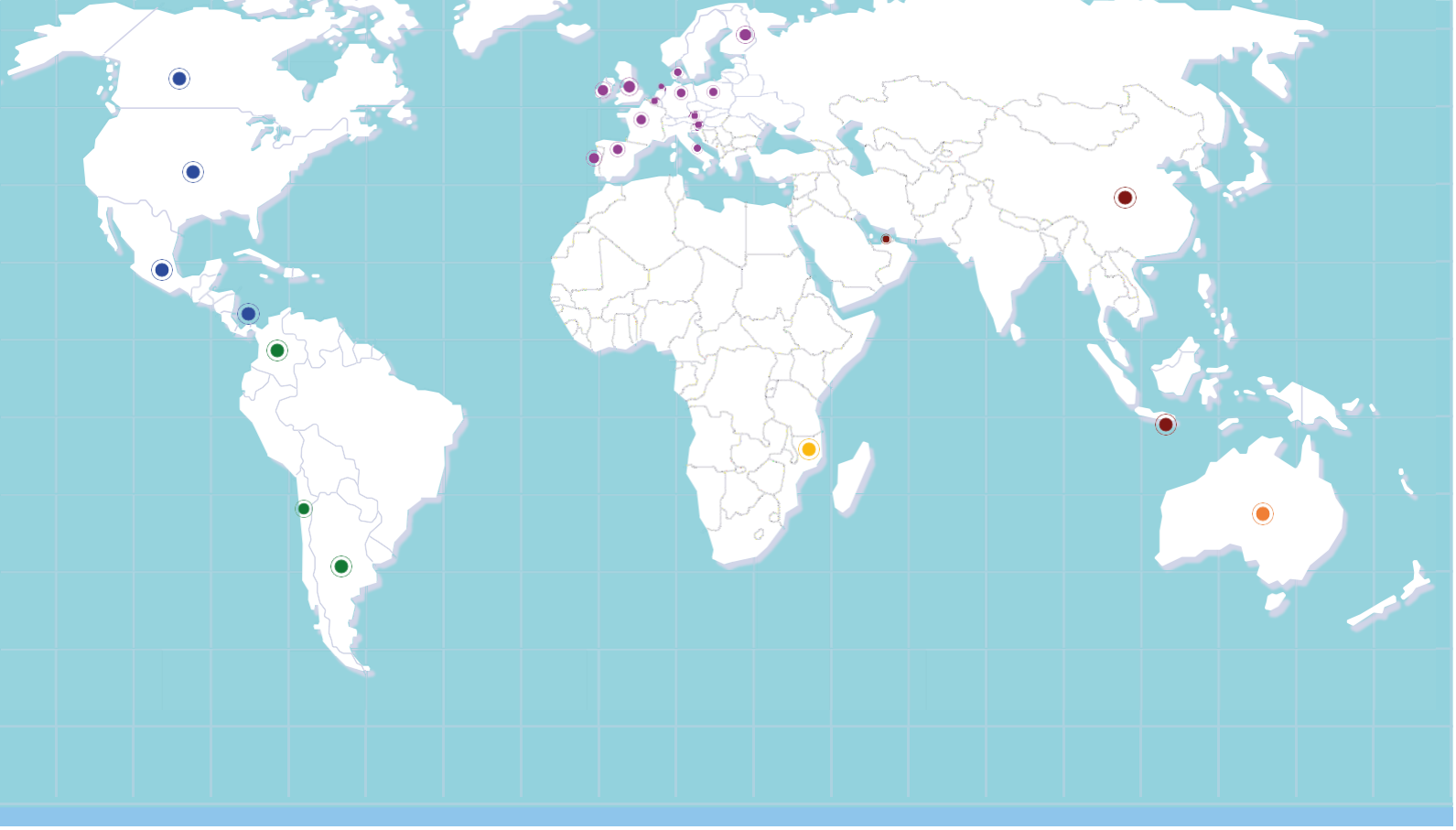
Maria Cristina Triguero Veloz Teixeira

Lattes

http://lattes.cnpq.br/6002004614786497

Summary

The institutional project aims to consolidate and strengthen research activities with real national impact, involving the productive and service sectors and aligned with the priority areas of the MCTI. In particular, the specific themes of the proposal are: nanotechnology and applied advanced materials; telecommunication service and technologies; space sciences; artificial intelligence; business administration; promotion of human development with quality of life; and multimodal languages for the learning of language and literature. In each of these areas, the problem to be addressed is the relative distance between the studies being developed in academia and the real needs for innovation in society. In order to achieve an approximation between university and society, it is intended to: increase the consolidation of the training of high-quality master's and doctoral students with skills to work in the national scenario, facing challenges that provide solutions with innovative technological impacts; develop research that contributes to leverage potential for the acceleration of the country's economic and social development; boost research with impact integrating the areas of concentration of the five graduate programs participating in the proposal. Previous experiences (for example, through the MAI/DAI program of CNPq and projects funded by other development agencies) and already well-consolidated dialogues between Mackenzie Presbyterian University and industries and services of society will make it plausible to achieve the established objectives. The methodological strategies for approaching the problems will be quantitative and qualitative. The study designs, research instruments, data collection and analysis procedures will be detailed in each thesis and dissertation developed.



Foreign partner universities

Germany
Alanus Hochschule
Constructor University Bremen gGmbH
Friedrich-Schiller-Universität Jena
Leibniz Universität Hannover
Ludwig-Maximilians-Universität München

Austria
Universität Wien

Belgium
Katholieke Universiteit Leuven
Universiteit Gent

Denmark
University of Copenhagen

Slovenia
Univerza v Ljubljani

Spain
Institut de Recerca en Energia de Catalunya
Universidad de Granada
Universidad de Huelva
Universidad de Salamanca
Universidad de Sevilla
Universitat Autònoma de Barcelona
Universitat Politècnica de Catalunya
Universitat de Barcelona

Finland
Turun Yliopisto (University of Turku)
University of Eastern Finland

France
Nantes Université
Université de Lille
Université de Montpellier
Université de Paris
École Nationale Supérieure d'Architecture — Paris-Val de Seine

Ireland
University of Dublin - Trinity College Dublin

Italy
Consiglio Nazionale delle Ricerche
Università degli Studi Gabriele d'Annunzio Chieti
Università degli Studi Roma Tre
Università degli Studi di Ferrara
Università degli Studi di Firenze
Università degli Studi di Siena

Netherlands
Leiden University
NHTV Internationaal Hoger Onderwijs Breda
Technische Universiteit Delft
Universiteit Utrecht

Poland
Uniwersytet Jagiellonski

Portugal
Polytechnic Institute of Bragança
International Iberian Nanotechnology Laboratory
Autonomous University of Lisbon
Lusófona University of Beira Interior University of Madeira
University of Aveiro University of Minho University of Porto

United Kingdom
Anglia Ruskin University
Durham University
Imperial College London
Loughborough University
University of Birmingham
University of Glasgow
University of Hertfordshire University of London University of Strathclyde University of Surrey University of York

Mozambique
Eduardo Mondlane University

Canada
University of Toronto
University of Victoria
Université Laval
Université de Montréal

Costa Rica
Universidad Nacional

United States
Case Western Reserve University
Columbia University
George Mason University
New York University
Northwestern University
Pennsylvania State University
Princeton University
Rice University
Texas Tech University
University of Central Oklahoma
University of Oklahoma
University of Texas
University of Vermont
Webster University
Yale University

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Universidad Autónoma de Guerrero
Universidad Nacional Autónoma de México

Argentina
Universidad Nacional de General Sar-miento
Universidad de Buenos Aires

Chile
Universidad de Chile

Colombia
Universidad de Medellí

China
Sichuan University
Southern University of Science and Technology
Macau University of Science and Technology

United Arab Emirates
Khalifa University

Timor-Leste
National University Timor Lorosa'e

Australia
University of New England

List of acronyms

CCBS – Center for Biological and Health Sciences
CCL – Center for Communication and Letters
CCSA – Centre for Social and Applied Sciences
CCT – Center for Science and Technology
CEFT – Center for Education, Philosophy and Theology
EE – School of Engineering
FAU– Faculty of Architecture and Urbanism
FCI – Faculty of Computing and Informatics
FDIR – Faculty of Law
PPGA – Graduate Program in Business Administration
PPGADN – Graduate Program in Business Development Administration
PPGAU – Graduate Program in Architecture and Urbanism
PPGCA – Graduate Program in Applied Computing
PPGCDH – Graduate Program in Human Development Sciences
PPGCFTG – Graduate Program in Controllership, Finance and Management Technologies
PPGCOM – Graduate Program in Intercultural Communication in Organizations
PPGDPE – Graduate Program in Political and Economic Law
PPGEAHC – Graduate Program in Education, Art and History of Culture
PPGEEC – Graduate Program in Electrical and Computer Engineering
PPGEM – Graduate Program in Economics and Markets
PPGEMN – Graduate Program in Materials Engineering and Nanotechnology
PPGEP–Graduate Programin Production Engineering
PPGL – Graduate Program in languages