Inria Hosting Offers: MSCA Postdoctoral Fellowships 2025 Call

What are the MSCA Postdoctoral Fellowships?

MSCA Postdoctoral fellowships support the career development of researchers for enhancing their individual competence diversification in terms of skills at multidisciplinary level and intersectoral experience. The MSCA-PF grant provides a competitive salary plus mobility and family allowances if applicable, as well as research, training and networking costs. This call to interest concerns the European Postdoctoral Fellowships (12 to 24 months of duration in Europe + optional placement in private sector in Europe of 6 months). More information: MSCA-PF

What are the eligibility criteria?

- Candidates must hold a PhD at the call deadline (10 Sept. 2025) and have 8 years maximum of full-time research experience after the PhD.
- "Mobility rule": candidates must NOT have resided or carried out their main activity (work, studies, etc.) in the country of the beneficiary for more than 12 months in the 36 months immediately before the call deadline (exceptions exist for European nationals).
- Candidates can be from any nationality.
- Although not an eligibility criterion, a good track record is recommended.
- An additional layer is at Inria institutional level regarding security procedures in recruitment, which must be approved by our Defence Security Officer.

What is needed to apply?

The MSCA PF programme requires candidates to write their own research project, in synergy with a supervisor at a European host institution. The proposal is a ten pages document describing the scientific idea, its expected impacts and implementation pathway, with an additional 5 pages for the candidate's CV. The nominal success rate is around 15%: this is a very competitive call. **At Inria, we provide a training programme** and extensive support to good quality candidates in the form of preliminary meetings, group training to better understand the programme and the grant proposal requirements, and one-to-one review sessions by specialised staff in the late stage, allowing us to significantly increase your chances of success.

I'm interested. What should I do?

1- Check our list of *hosting offers* (below), when a domain fits your profile or seems complimentary to your expertise, go to the research team webpage and look for more info.
2- Once you think you have an interesting research project idea that fits the domains described in one of our *hosting offers* (or research team), write it down in 4-5 lines and email the indicated contact persons (or directly to the researcher). Add your CV or a link to your profile for completeness.
3- Register here for the pre-training online info session (22 April 13:00 to 14:00 CET). This online event will present the offers and Inria's support schedule.
4- Finally, if you re interested in submitting a project with Inria as host institution, register here for the full training programme.

When should I do that? The earliest the better! If we had to give an indication, early Spring.

What's the Inria training programme like?

Selected candidates will have access to privileged grant writing training sessions and one-to-one proposal review sessions in the last phase with our experienced European Officers. The sessions will take place on the following dates (all times CET):

- First session: Introduction to MSCA-PF call -- Tue 29 April 10:00-12:30, online
- Second session: Grant proposal writing guide -- Tue 27 May 09:00-16:30, online
- Third session: Grant writing: fine-tune your proposal – 7-10 July: 4 full days, in-person (Paris, France)

Register here for the full training programme.

Contents

MSCA Postdoctoral Fellowships Offers for 2025 at Inria Rennes Centre

Inria MSCA-PF 2025 hosting offer Rennes #1: avatars, augmented reality, human-computer interaction

[KEYWORDS] avatars, augmented reality, human-computer interaction

[RESEARCH INTERESTS] How users could interact effectively in the context of augmented shared realities? We envision the avatar, i.e., the user's virtual representation, as a vehicle to enable such interactions. However, this question raises multi-disciplinary research challenges regarding human-computer interaction, multi-sensory rendering algorithms and perception, as the avatar should support interaction with real and virtual content.

[TEAM NAME] Hybrid

[DESCRIPTION] The research activity of Hybrid team belongs to the field of Extended Reality and 3D interaction with Virtual Environments. Our objective is to invent 3D interactive techniques with virtual environments exploiting both the body and brain of the user. We focus on novel user inputs in virtual reality such as coming from full-body tracking or brain-computer interfaces. Applications of our research program are for industry (virtual prototyping), medicine (surgical simulation, rehabilitation and re-education), design (architectural mock-up), art or videogames and entertainment. Hybrid was created in January 2013.

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Inria MSCA-PF 2025 hosting offer Rennes #2: Walk-Based Multimodal and Explainable Knowledge Graph Embeddings

[KEYWORDS] Knowledge Graph Embeddings; Random walks; Link prediction; Inductive Learning

[RESEARCH INTERESTS] Knowledge Graph Embeddings (KGEs) are a popular representation for large knowledge graphs because their latent nature makes them suitable for modern machine learning algorithms. Despite their popularity, KGEs are not free of limitations: they are usually black boxes, and they cannot be trivially extended to handle other data modalities such as text, videos, or images. These two observations limit their applicability to arbitrary knowledge graphs and use cases. In this project we aim to tackle these two limitations. We envision to exploit the semantic power of LLMs to make knowledge graphs more operable with arbitrary textual content and assistants. We expect to extrapolate the same techniques to other data modalities. To make the embeddings interpretable we envision to embed "reasoning schemes", e.g., paths or rules in the embeddings, which will guide training and serve as explanations. As an initial use case we plan to test our techniques on citation networks for the answer of complex queries on professional and scientific profiles. Further uses cases will be identified on the way. [TEAM NAME] LACODAM

[DESCRIPTION] The objective of the LACODAM team is to facilitate the process of making sense out of (large) amounts of data. This can serve the purpose of deriving knowledge and insights for better decision-making. Our approaches are mostly dedicated to provide novel tools to data scientists, that can either perform tasks not addressed by any other tools, or that improve the performance in some area for existing tasks (for instance reducing execution time, improving accuracy or better handling imbalanced data). Our main research areas are pattern mining, interpretable machine learning, and semantic web.)

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Inria MSCA-PF 2025 hosting offer Rennes #3: Explainable AI, Pattern mining, Neural Network debugging, Counterfactual explanations, Post-hoc explanations

[KEYWORDS] Explainable AI, Pattern mining, Neural Network debugging, Counterfactual explanations, Post-hoc explanations

[RESEARCH INTERESTS] We would like to explain (and potentially act on) the bad decisions (e.g. misclassifications) taken by neural networks. One axis could be to use/learn/construct global (counter-factual) explanations to identify particular problems in the data related to groups of examples (i.e. misclassified examples from the same class) that could, in turn, be used to improve the accuracy of the system. Another axis could be to use data mining tools to extract meaningful pattern in trained networks (i.e. activation maps per layer) and try to understand if parts of the network can be responsible for particular mistakes.

[TEAM NAME] LACODAM

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Inria MSCA-PF 2025 hosting offer Rennes #4: brain-computer interfaces and neuro-feedback for rehabilitation

[KEYWORDS] brain-computer interfaces and neuro-feedback for rehabilitation

[RESEARCH INTERESTS] Brain-computer interfaces rely on measuring directly the cerebral activity of the users for interacting with automated systems. Such "mental" interfaces can be used for brain rehabilitation, eg after stroke, by providing direct "neurofeedback". This is raising strong challenges in terms of real-time brain signal processing (EEG data), and novel human-computer interaction schemes exploiting for instance multi-sensory feedbacks.

[TEAM NAME] HYBRID

[DESCRIPTION] The research activity of Hybrid team belongs to the field of Virtual Reality and 3D interaction with Virtual Environments. Our objective is to invent novel 3D interactive techniques with virtual environments exploiting both the body and brain of the user. We focus on novel user inputs in virtual reality such as coming from full-body tracking or brain-computer interfaces. Applications of our research program are for industry (virtual prototyping), medicine (surgical simulation, rehabilitation and re-education), design (architectural mock-up), art or videogames and entertainment. Hybrid was created in January 2013.[LINK] https://team.inria.fr/hybrid/

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Inria MSCA-PF 2025 hosting offer Rennes #5: Network Neutrality, Search Neutrality, CDNs, Monitoring, statistical tests

[KEYWORDS] Network Neutrality, Search Neutrality, CDNs, Monitoring, statistical tests

[RESEARCH INTERESTS] According to network neutrality principles all data packets are supposed to be treated the same at each node of the network, without any distinction of their type, terminal, origin or destination. Our goal is to develop measurement tools allowing to detect if a non-neutral behaviour can be highlighted, this for the various actors of the Internet network: network access providers first, the main target of the network neutrality debate, but not only. Indeed, a packet-focused neutrality can be circumvented by applying a service differentiation at another level: it could for example be the case by choosing the data cached at the edge of the network to provide a better quality of service, or even at the search engine level. An implicit goal will then be to define a neutral (or fair) behaviour for each actor, to define the associated metrics, and to set up corresponding measurement techniques.

[TEAM NAME] ERMINE

[DESCRIPTION] The ERMINE team designs and analyses procedures and policies for efficiently managing network operations, but also works on the required measurement and monitoring of performance metrics. Our specific and original management activity will focus on network economics, regulation, and automated decision making. In terms of needed measurement, we make use of standard modelling and performance analysis techniques, but also carry out direct measurements to be analysed statistically. Our activity is a trade-off between methodological/mathematical developments and practical implementations.

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Inria MSCA-PF 2025 hosting offer Rennes #6: deep learning accelerators, hardware security, fault attacks, countermeasures, fault tolerance

[KEYWORDS] deep learning accelerators, hardware security, fault attacks, countermeasures, fault tolerance

[RESEARCH INTERESTS] Are Deep Learning Training Accelerators Secure? Recent studies show how to use side-channels to guess key parameters or inputs from DL models running on accelerators. For example, input images of a model were estimated from power traces. However, this project goes further than current practice by studying if private information can be retrieved during the training phase or if it is possible to disrupt the training quality by attacking the accelerators. Our objective is to study training-time hardware attacks and required countermeasures, focusing on fault injections in edge devices and remote side-channel attacks to cloud accelerators.

[TEAM NAME] TARAN

[DESCRIPTION] TARAN has recognized experience in computing architectures and design tools for domain-specific hardware architectures. TARAN explores efficient hardware accelerator architectures for DNN inference and training on resource-constrained embedded systems (e.g., on-board satellite, IoT devices) and in accelerated clouds using FPGA and ASIC technologies. TARAN has also expertise in analytical and simulation-based methods for evaluating the accuracy of reduced-precision computation and the reliability of hardware designs.

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Inria MSCA-PF 2025 hosting offer Rennes #7: Fine-grain recognition, Patrimonial archives, Computer vision, Deep learning, recent neural architectures

[KEYWORDS] Fine-grain recognition, Patrimonial archives, Computer vision, Deep learning, recent neural architectures

[RESEARCH INTERESTS]

Despite significant visual variations, the project explores the fine-grain recognition of similar images in patrimonial archives. It aims to structure large image collections to facilitate curatorial exploration. Computer vision based on deep learning is best for this task. Research involves challenging a few neural architectures (VGG, ResNet, ViT, …), a few recent image representations (AILIR, IRT, Selective Local Features, PWA, …), in order to establish strengths and weaknesses of existing solutions against in vitro and in vivo large scale image datasets, on task and domain changes in a continuous learning setting. New contributions are expected from the observed

weaknesses.

[TEAM NAME] Linkmedia

[DESCRIPTION] Linkmedia is concerned with the processing of extremely large collections of multimedia material. Getting rich, meaningful and deep insight from these collections, however, remains today hardly achievable because of the heterogeneity (and semantic) gap between modalities, because of the scale of the collections, because of the complex, hidden and implicit relationships between the items they contain, etc. To that end, Linkmedia contributes multimedia analytics algorithms to automatically process collections, eventually producing knowledge usable by humans. This involves a lot of deep learning, computer vision and NLP. Linkmedia is a joint team where Inria, CNRS, Univ. Rennes 1 and Insa researchers collaborate.

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Inria MSCA-PF 2025 hosting offer Rennes #8: robotics, microrobotics, haptics, shared control, medical robotics

[KEYWORDS] robotics, microrobotics, haptics, shared control, medical robotics

[RESEARCH INTERESTS] Research aims to enhance human control of small-scale untethered robot swarms for applications in drug delivery and embovascular medical procedures. Current systems lack intuitive human control, sensory feedback, and visualization. This study seeks to develop cognitive interfaces and AI-powered shared control for users to manage multi-robot systems effectively. Objectives include cognitive shared-control methods, AI-driven trajectory planning, haptic communication techniques, stability measures, and evaluating the system in diverse scenarios, from assembly tasks to endovascular medical procedures such aneurysm coiling.

[TEAM NAME] RAINBOW

[DESCRIPTION] The team is internationally recognized for its scientific activity in the field of shared control, multi-robots, haptics, sensor-based control, visual tracking, and visual servoing. The position is open in the framework of the collaborative European project RĚGO (rego-project.eu), which aims at developing an innovative set of AI-powered, microsized, untethered, stimuli-responsive swarms of robots. The project is composed of eight international partners from four EU countries. The work will be carried out in collaboration with one or more of the above laboratories and might include a visiting period in one of these labs.

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Inria MSCA-PF 2025 hosting offer Rennes #9: Distributed systems, Cloud-Edge Computing, Computing Continuum, Optimization, Urgent Science

[KEYWORDS] Distributed systems, Cloud-Edge Computing, Computing Continuum, Optimization, Urgent Science
[RESEARCH INTERESTS] Research Distributed systems are progressively moving towards a full IoT-Edge-Cloud Computing Continuum. At the same time, Urgent computing focuses on time-critical decisions that improve lives, monitor civil infrastructures, respond to extreme events, and accelerate science. Urgent services are typically sensitive to latency and response time, and are among the best candidates for the Computing Continuum. However, managing such services requires novel programming models and resource management approaches. This line of research seeks methods and optimizations that combine system states, decision variables, external events, and objective functions in order to realize the potential of the Computing Continuum for Urgent applications.

[TEAM NAME] Inria STACK
[DESCRIPTION] The STACK team addresses challenges related to the management and advanced usages of the Cloud to IoT continuum (infrastructures on the Cloud, Fog, Edge, and IoT). More specifically, the team is interested in delivering appropriate system abstractions to operate and use massively geo-distributed infrastructures, from the lowest to the highest levels of abstraction (i.e. system to application development, respectively), and addressing crosscutting dimensions such as energy or security. These infrastructures are critical for the emergence of new kinds of applications related to the digitalization of the industry and the public sector (a.k.a. the Industrial Internet, smart cities, e-medecine, etc.).

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Inria MSCA-PF 2025 hosting offer Rennes #10 : Aerial Robotics, Manipulation, AI for Physical Interaction, Multi-robot Collaborative Manipulation, Human-Aerial Robot Interaction Design, Control, Perception

[KEYWORDS] Aerial Robotics, Manipulation, AI for Physical Interaction, Multi-robot Collaborative Manipulation, Human-Aerial Robot Interaction Design, Control, Perception

[RESEARCH INTERESTS] Aerial physical interaction is attracting considerable attention because of the great application and scientific interest, as well as future impact. The goal is to enhance manipulation capabilities of highly dynamical aerial manipulators for complex tasks, involving dynamic and static objects, and in real environments characterized by uncertainties and disturbances. Investigations will focus on the design of new conception, modeling and control methods for precise, robust and safe physical interaction tasks for real applications. To overcome payload and manipulation limits, multi-robot cooperative manipulation and human-aerial robot collaboration is of interest as well.

[TEAM NAME] Rainbow

[DESCRIPTION] The long-term vision of the Rainbow team is to develop the next generation of sensor-based robots able to navigate and/or interact in complex unstructured environments together with human users.

We aim at tackling these general scientific challenges:

- high-level of autonomy for complex robots in complex (unstructured) environments;
- forward interfaces for letting an operator giving high-level commands to the robots in simple ways;
- backward interfaces for informing the operator about the robot ‘status’;
- user studies for assessing the best interfacing depending on the particular task/situation.

The applications targeted by research activities involve:

- remote manipulation with single/multiple arms under the guidance of a human operator
- coordination of single/multiple mobile robots for spatial navigation tasks (e.g., exploration, navigation, mapping)
- medical robotics for semi-autonomous probing and intervention
- assistive mobility devices for frail or impaired people

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MSCA Postdoctoral Fellowships Offers for 2025 at Inria Sophia Centre

Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #1: protein evolution, protein-protein interaction, knowledge graphs, phylogeny, evolutionary prediction

[KEYWORDS] protein evolution, protein-protein interaction, knowledge graphs, phylogeny, evolutionary prediction

[RESEARCH INTERESTS] Predicting protein evolution is one among the main current challenges in proteomics. The advent of transformer-based deep learning like AlphaMissense enhanced our ability to predict the fitness of future mutations based on information collected from homologous sequences. Yet, a protein's fitness is also determined by its interactions with other biomolecules, an aspect that escapes sequence-based evolutionary predictors. Protein-protein interaction (PPI) partners are important descriptors of a protein's function, and can be used to trace its evolution. Here, we propose to use knowledge graphs trained on deep PPI predictors in order to trace PPI-based evolutionary trajectories.

[NAME] ABS - Algorithms, Biology, Structure

[DESCRIPTION] Using novel ideas and concepts from computational geometry,

optimization, machine learning, probabilistic algorithms, and numerical probability applied to energy landscapes, the central goal of ABS is to introduce a new generation of algorithms to make accurate predictions on the dynamics of proteins. To this end, we also develop and maintain the Structural Bioinformatics Library, a templated C++, modular library of hundreds of algorithms for analyzing and characterizing the structure of the macromolecules of life. The group is also focused on foundational aspects of algorithmics, geometry, topology, and statistical mechanics.

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #2: sparse networks, Potts model, attention mechanism, sparse attention

[KEYWORDS] sparse networks, Potts model, attention mechanism, sparse attention

[RESEARCH INTERESTS] The transformer architecture is one of the core paradigms of AI due to its versatility and the possibility to fine-tune its parameters for specific tasks. Yet, training transformers remains extremely computationally demanding. For this reason, in the last years many attempts at simplifying its architecture appeared, each one with its advantages and disadvantages, and none so far conserving the transformers' most appealing characteristics.

Based on a recent analogy between Potts models and attention heads, we want to investigate whether common sparsification strategies used in Potts models can be mapped onto transformers for decreasing the number of their effective parameters. [NAME] ABS - Algorithms, Biology, Structure

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optimization, machine learning, probabilistic algorithms, and numerical probability applied to energy landscapes, the central goal of ABS is to introduce a new generation of algorithms to make accurate predictions on the dynamics of proteins. To this end, we also develop and maintain the Structural Bioinformatics Library, a templated C++, modular library of hundreds of algorithms for analyzing and characterizing the structure of the macromolecules of life. The group is also focused on foundational aspects of algorithmics, geometry, topology, and statistical mechanics.

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #3: Semantic Slam, Localisation, Machine Learning

[KEYWORDS] Semantic Slam, Localisation, Machine Learning

[RESEARCH INTERESTS] The objective is to build accurate and composite models of large-scale environments that mix metric, topological and semantic information. Ensuring the consistency of these various representations during the robot exploration and merging/sharing observations acquired from different viewpoints by several collaborative robots or sensors attached to the infrastructure, are very difficult problems. This is particularly true when different sensing modalities are involved and when the environments are time-varying. A recent trend in Simultaneous Localization And Mapping is to augment low-level maps with semantic interpretation of their content.

[TEAM NAME] ACENTAURI

[DESCRIPTION] ACENTAURI is a robotics team led by Ezio MALIS that studies and develop intelligent, autonomous and mobile robots that can help humans in their day-to-day lives at home, at work or during their displacements. The team focuses on perception, decision and control problems for multi-robot collaboration by proposing an original hybrid model-driven / data driven approach to artificial intelligence and by proposing efficient algorithms. The team focuses on robotic applications in smart territories, smart cities and smart factories. In these applications several collaborating robots will help humans by using multi-sensor information eventually coming from infrastructure

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #4: Autonomous Driving, Situation awareness, Decision-making, Planning, Machine Learning

[KEYWORDS] Autonomous Driving, Situation awareness, Decision-making, Planning, Machine Learning

[RESEARCH INTERESTS] The long-term objective of this research axis is to design and develop a decision-making module that is able to} (i) plan the mission of the robots (global planning) , (ii) generate the sub-tasks (local objectives) necessary to accomplish the mission based on artificial Situation Awareness (SA) and (iii) plan the robot paths and/or sets of actions to accomplish each subtask (local planning) . Since we have to face uncertainties, the decision module must be able to react efficiently in real-time based on the available sensor information in order to guarantee the safety of humans and things.

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #5: computational nanophotonics, metaphotonics, plasmonics

[KEYWORDS] computational nanophotonics, metaphotonics, plasmonics

[RESEARCH INTERESTS] Innovative Deep Learning modeling approches for nanophotonics leveraging physics-based neural networks

[NAME] Atlantis

[DESCRIPTION]: Atlantis is a joint project-team between Inria and the Jean-Alexandre Dieudonné Mathematics Laboratory at Université Côte d'Azur.

The team gathers applied mathematicians and computational scientists who are collaboratively undertaking research activities aiming at the design, analysis, development

and application of innovative numerical methods for systems of partial differential equations (PDEs) modelling nanoscale light-matter interaction problems.

[LINK] : http://www-sop.inria.fr/atlantis/

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #6: Neural engineering, Direct electrical stimulation, Electrophysiology, Evoked Potentials, Neurosurgery

[KEYWORDS] Neural engineering, Direct electrical stimulation, Electrophysiology, Evoked Potentials, Neurosurgery

[RESEARCH INTERESTS] Before the resection of brain tumours, the neurosurgeon has substantial imaging data allowing to plan his gesture upstream. However, during the surgery itself, imaging becomes ineffective due to brain shift. Direct electrical stimulation (DES) of the brain is used in awake patients cooperating with the neurosurgeon to determine functional areas. When patients are under anaesthesia this possibility no longer exists. We have planned to use the electrophysiology evoked by DES during brain surgery to determine the location the tumour and the anatomical connectivity on-line in order to guide the surgery in awake patients or under general anaesthesia.

[TEAM NAME] CAMIN

[DESCRIPTION] CAMIN research is dedicated to the design and development of realistic neuroprosthetic solutions in interaction with clinical partners. Our efforts are focused on the objective of having a clinical impact: improvement of patient functional evaluation or/and quality of life

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #7: Neuroprosthetics, Functional Electrical Stimulation (FES), Nerve Mapping, Inverse Modeling, EMG, Biosignals

[KEYWORDS] Neuroprosthetics, Functional Electrical Stimulation (FES), Nerve Mapping, Inverse Modeling, EMG, Biosignals

[RESEARCH INTERESTS] Development of advanced nerve mapping techniques for FES applications. The aim is to create an inverse model of nerve architecture, linking stimulation parameters to recorded biosignals (e.g., EMG,

movement). A critical aspect of this work is accurately determining the position of fascicles within the nerve. Understanding fascicle position enables focal stimulation through multi-contact electrodes, allowing for selective recruitment of specific muscle groups and precise movement control. Using existing data, the model will be trained to predict muscle activation patterns based on stimulation, refining fascicle properties to optimize predictions and improve neuroprosthetic control for restoring movement in individuals with sensory-motor impairments

[TEAM NAME] CAMIN

[DESCRIPTION] The CAMIN team specializes in neuroprosthetic solutions for sensory-motor impairments, combining theoretical and applied research. With a strong clinical orientation, CAMIN focuses on improving patient functional evaluation and quality of life. The team's research spans movement analysis, neural control mechanisms, and the development of neuroprosthetic interventions. Their work explores both central and peripheral nervous system contributions to motion control, enabling more precise and effective stimulation strategies. Based in Montpellier, France, CAMIN fosters interdisciplinary collaborations to advance movement restoration technologies

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #8: Brain Computer Interfaces, P300 Speller, Classification techniques, Symmetric Positive Definite Matrices, Electroencephalography

[KEYWORDS] Brain Computer Interfaces, P300 Speller, Classification techniques, Symmetric Positive Definite Matrices, Electroencephalography

[RESEARCH INTERESTS] Brain Computer Interfaces often need a calibration step specific to a subject or even to a session for a subject. This calibration procedure is tedious and classifiers are not always reliable enough given the limited amount of data that can be acquired due to time constraints. In particular, the Cronos research team has developed a P300 speller application that is tested on subjects suffering from the SLA disease. We are looking for improving this system by using a lower number of electrodes (and eventually dry ones). But reducing the number of electrodes or using dry electrodes has an impact on the accuracy/speed of the speller, so that we study more robust classifiers. In the context of keeping the current number of electrodes, such classifiers might also open the possibility of totally removing calibration in a multi-subject and/or multi-session context.

[TEAM NAME] CRONOS

[DESCRIPTION] Our objective is to provide tools for exploring the functioning of the brain, with an emphasis on signal and image recording from diffusion magnetic resonance imaging, magnetoencephalography and electroencephalography with application to brain computer interfaces

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #9: dynamical systems, biological models, oscillations, synchronization, control, hybrid systems

[KEYWORDS] dynamical systems, biological models, oscillations, synchronization, control, hybrid systems

[RESEARCH INTERESTS] Systems with periodic oscillations are present throughout living systems and play fundamental roles, for instance, in cell development (cell cycle), regulation (circadian clocks), or cell signalling (calcium oscillations). Several questions then arise related to the coupling, synchronization, and mutual control of two or more oscillators. For a network of several oscillators, it becomes important to characterize its dynamical behaviour, the robustness of the original periodic solution, or the emergence of new asymptotic behaviour and patterns, such as new steady states or new synchronization patterns in the network. We also apply techniques of control theory and hybrid systems.

[TEAM NAME] Macbes

[DESCRIPTION] The team apply and develop methodologies of control theory and computational biology to specific applications in biology and ecology.

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #10: Artificial Intelligence, Machine Learning, Statistical Learning

[KEYWORDS] Artificial Intelligence, Machine Learning, Statistical Learning

[RESEARCH INTERESTS] The purpose of this postdoc position will be focused on the development and the understanding of deep latent variables models for unsupervised learning with massive and evolving heterogenous data. Although deep learning methods and their statistical extensions, the deep latent variables models, allowed clear advances in Artificial Intelligence in the last 5 years, they clearly suffer from an overall weak knowledge of their theoretical foundations and behavior, in the context of unsupervised learning. The goal of this position will be to propose a generative DLVM model specifically designed for massive evolving heterogenous data. The proposed methodologies will be then applied to real-world situations in Medicine and Digital Humanities.

[TEAM NAME] Maasai (Models and Algorithms for Artificial Intelligence)

[DESCRIPTION] Maasai is a research project-team at Inria Sophia-Antipolis, working on the models and algorithms of Artificial Intelligence. This is a joint research team with the laboratories LJAD (Mathematics, UMR 7351) and I3S (Computer Science, UMR 7271) of Université Côte d'Azur. The team is made of both mathematicians and computer scientists in order to propose innovative learning methodologies, addressing real-world problems, that are both theoretically sound, scalable and affordable.

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #11: machine learning, statistics, missing data, anomaly detection, out-of-distribution detection

[KEYWORDS] Machine learning, statistics, missing data, anomaly detection, out-of-distribution detection

[RESEARCH INTERESTS] Machine learning with missing data (imputation, prediction), anomaly detection (what is an anomaly?)

[TEAM NAME] MAASAI

[DESCRIPTION] Despite the recent improvements due to deep learning, the nature of modern data have brought specific issues: learning with high-dimensional, atypical (networks, functions, …), dynamic, or heterogeneous data remains difficult for theoretical and algorithmic reasons. Deep Learning has also open new questions: How to learn in an unsupervised or weakly-supervised context with deep architectures? How to design a deep architecture for a given situation? How to learn with evolving and corrupted data? To address these questions, Maasai team focuses on topics such as unsupervised learning, theory of deep learning, adaptive and robust learning, and learning with high-dimensional or heterogeneous data

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #12: Deep Learning, Large Models (LLM, VLM, SLM), Concept, Explainable AI, Frugal AI, Human-in-the-loop

[KEYWORDS] Deep Learning, Large Models (LLM, VLM, SLM), Concept, Explainable AI, Frugal AI, Human-in-the-loop

[RESEARCH INTERESTS] A central challenge to make deep models more efficient in terms of both consumption and annotation, and more efficient to assist humans for important tasks, is to incorporate knowledge, understand the type of concepts the models leverage in complex pattern matching, and enable interaction on complex tasks with little examples but with detailed human analysis. Identifying concepts inside deep neural networks to explain decisions (see Concept Relevance Propagation, Attention-Aware Layer-Wise Relevance Propagation), to design new architecture (see Large Concept Models), or fine-tune LLM (see Task-specific skill localization in fine-tuned LLM) indeed attracts more and more attention. We want to identify internal concepts for continual and incremental learning settings, for explaining internal neural decisions, and for controlling and or driving both inference and training through human interactions and knowledge. We target specifically application domains where pattern matching can contribute to social justice, such as analysis in movies of subtle disparities in gender representation.

[TEAM NAME] MAASAI

[DESCRIPTION] Despite the recent improvements due to deep learning, the nature of modern data have brought specific issues: learning with high-dimensional, atypical (networks, functions, …), dynamic, or heterogeneous data remains difficult for theoretical and algorithmic reasons. Deep Learning has also open new questions: How to learn in an unsupervised or weakly-supervised context with deep architectures? How to design a deep architecture for a given situation? How to learn with evolving and corrupted data? To address these questions, Maasai team focuses on topics such as unsupervised learning, theory of deep learning, adaptive and robust learning, and learning with high-dimensional or heterogeneous data.

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #13: Ion channel dynamics, Computational neuroscience, Computational modeling, Epilepsy, Dravet Syndrome, Markov models, Piecewise deterministic Markov processes, Individual-based models, Monte Carlo methods, Pyhton

[KEYWORDS] Ion channel dynamics, Computational neuroscience, Computational modeling, Epilepsy, Dravet Syndrome, Markov models, Piecewise deterministic Markov processes, Individual-based models, Monte Carlo methods, Pyhton

[RESEARCH INTERESTS] Ion Channel Dynamics, Computational Modeling and Applications to Epilepsy and Dravet Syndrome: The aim is to the computational modeling of ion channel dynamics in neurons, with applications to understanding and simulating of pathologies like epilepsy and Dravet Syndrome. The study aims to develop mathematical models integrating microscopic descriptions of populations of ion channels, potentially incorporating individual channel behaviors. The models will be describes as Markov processes, piecewise deterministic Markov models, or individual-based approaches. Intermsofsimulation, wewanttocreatePython-basedsimulationtools. This research is linked to anongoing projecton Dravet Syndrome, providing a strong interdisciplinary and applied framework.

[TEAM NAME] MathNeuro

[DESCRIPTION] Our research focuses on the applications of multi-scale dynamics to neuroscience. This involves the modelling and analysis of systems with multiple time and space scales, as well as stochastic effects. We look both at single-cell models, microcircuits and large networks. In terms of neuroscience, we are mainly interested in questions related to synaptic plasticity, neuronal excitability and memory. In particular, we focus our modelling efforts towards questions related to pathological states such as migraine and epileptic seizures, and neurodegenerative diseases such as Alzheimer's Disease

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #14: Keywords: Markov process, Bayesian nonlinear filtering, particle filtering, Monte Carlo methods, information theory, computational neuroscience, free energy principle, Python.

[KEYWORDS] Keywords: Markov process, Bayesian nonlinear filtering, particle filtering, Monte Carlo methods, information theory, computational neuroscience, free energy principle, Python.

[RESEARCH INTERESTS] Exploring the role of bayesian nonlinear filtering and generative modeling in the context of the free energy principle: According to the Free Energy Principle (FEP), developed by Karl Friston, living organisms minimize "surprise", that is the discrepancy between predicting sensory input and updating internal models through Bayesian inference. This framework has gained prominence across neuroscience and beyond. We propose to focus on the nonlinear filtering, a key component of the FEP, to investigate how the brain encodes probabilities, updates models, and handles Bayesian normalization. We aim to explore multiscale modeling, develop Python-based simulation tools, and interpret pathologies like Dravet Syndrome and aging-related data within the FEP framework, bridging theory, computation, and experimental findings. [TEAM NAME] MathNeuro

[DESCRIPTION] Our research focuses on the applications of multi-scale dynamics to neuroscience. This involves the modelling and analysis of systems with multiple time and space scales, as well as stochastic effects. We look both at single-cell models, microcircuits and large networks. In terms of neuroscience, we are mainly interested in questions related to synaptic plasticity, neuronal excitability and memory. In particular, we focus our modelling efforts towards questions related to pathological states such as migraine and epileptic seizures, and neurodegenerative diseases such as Alzheimer's Disease

[TEAM NAME] MathNeuro

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #15: optimal control, astrodynamics, formation flying, orbit transfer, collision avoidance, KAM theory

[KEYWORDS] optimal control, astrodynamics, formation flying, orbit transfer, collision avoidance, KAM theory

[RESEARCH INTERESTS] Nonlinear control for space mechanics. This research will be devoted to theoretical and methodological progresses in control of artificial satellite trajectories with focus on low-thrust orbital transfer and formation flying. The first question that will be tackled concerns the possibility to leverage on resonances (between mean satellite motion and angles introduced by some orbital perturbations) to enhance the performance of the manoeuvres. In addition, the optimal deployment of large constellations (with several hundred or thousands of satellites) will be studied with special care on guaranteeing collision avoidance between agents.

[TEAM NAME] MCTAO

[DESCRIPTION] MCTAO is a joint team with INRIA and Université Côte d'Azur, specialized in control theory and applications. We are mostly concerned with nonlinear finite dimensional continuous time systems. There is a stress on optimal control; we are also interested in stabilisation, observers, path planning, controllability and structural questions. We are interested in solving important methodological problems, and conducting meaningful transfer on real life problems. Recent or current application domains are: space mechanics, navigation, quantum systems, biological models, models of neuronal activity; these are conducted with industrial partners or specialists of other fields.

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Inria MSCA-PF 2024 hosting offer Sophia-Antipolis #16: optimal control, dynamical systems, bacterial growth, cellular dynamics, resource allocation, turnpike

[KEYWORDS] optimal control, dynamical systems, bacterial growth, cellular dynamics, resource allocation, turnpike

[RESEARCH INTERESTS] Optimal control for bacterial growth modelling and control. Understanding the growth of microorganisms, such as bacteria, is an important challenge. It can for instance be the building block for industrial applications where a metabolite of interest needs to be produced. A recent and surprisingly effective approach relies on so-called self-replicator models based on resource allocation principles. In such low dimensional dynamical systems, the control is the allocation plus, in refined models, an external control aimed at changing the behaviour of the microorganism after some genomic engineering. The analysis uses both optimal control theory and numerical simulations, in relation with experimental results in collaboration with colleagues in Grenoble and the Maximic ANR project. Typical structures of optimised allocation processes mix bang and singular controls, and often exhibit turnpike phenomena.

[TEAM NAME] MCTAO

[DESCRIPTION] MCTAO is a joint team with INRIA and Université Côte d'Azur, specialized in control theory and applications. We are mostly concerned with nonlinear finite dimensional continuous time systems. There is a stress on optimal control; we are also interested in stabilisation, observers, path planning, controllability and structural questions. We are interested in solving important methodological problems, and conducting meaningful transfer on real life problems. Recent or current application domains are: space mechanics, navigation, quantum systems, biological models, models of neuronal activity; these are conducted with industrial partners or specialists of other fields.

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Inria MSCA-PF 2024 hosting offer Sophia-Antipolis #17: Nonlinear control, optimal control, controllability, flatness, observers

[KEYWORDS] Nonlinear control, optimal control, controllability, flatness, observers

[RESEARCH INTERESTS] Topics in geometric nonlinear control There is a possibility for a post-doc on general progress in geometric control theory, that will be made more precise with the right candidate. Here are examples of topics. 1. Open questions on observer construction or output feedback stabilization under weak observability conditions. 2. Geometric conditions for dynamic feedback linearizability, also known as flatness, in small dimension. 3. Averaging methods for optimal control.

[TEAM NAME] MCTAO

[DESCRIPTION] MCTAO is a joint team with INRIA and Université Côte d'Azur, specialized in control theory and applications. We are mostly concerned with nonlinear finite dimensional continuous time systems. There is a stress on optimal control; we are also interested in stabilisation, observers, path planning, controllability and structural questions. We are interested in solving important methodological problems, and conducting meaningful transfer on real life problems. Recent or current application domains are: space mechanics, navigation, quantum systems, biological models, models of neuronal activity; these are conducted with industrial partners or specialists of other fields.

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #18: Machine Learning, Information Theory, Game Theory, decision-making

[KEYWORDS] Machine Learning, Information Theory, Game Theory, decision-making

[RESEARCH INTERESTS] This project studies the fundamental limits on the influence that decision makers involved on common decision making can exert on each other via revealing, hiding or distorting information. The focus is on the case in which the benefit obtained by an individual decision maker depends upon the decisions of all involved individuals. This situation arises in most decision making processes involving humans, machines or humans and machines: (a) federated machine learning; (b) Marketing policies that propose goods to potential customers; and (c) Stock traders that follow different sources of information to buy, sell and trade shares.

[TEAM NAME] NEO

[DESCRIPTION] The team is positioned at the intersection of Operations Research, Network and Data Sciences. By using the tools of Stochastic Operations Research, we model situations arising in several application domains. The aim is to understand the underlying rules and their effects in order to influence and control the creation and the evolution of complex networks

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #19: Federated Learning, Distributed Machine Learning, Inference Serving Systems, Caching networks

[KEYWORDS] Federated Learning, Distributed Machine Learning, Inference Serving Systems, Caching networks.

[RESEARCH INTERESTS] Performance evaluation of distributed systems, in particular cache networks and large-scale learning systems. The research is characterized by the application of different mathematical tools (Markov processes, control theory, continuous optimization, fluid models, game theory)..

[TEAM NAME] NEO

[DESCRIPTION] The team is positioned at the intersection of Operations Research and Network Science. By using the tools of Stochastic Operations Research, we model situations arising in several application domains, involving networking in one way or the other.

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #20: Consent Management Platform, cookie, consent, GDPR, ePrivacy, legal compliance, Web tracking, JavaScript analysis

[KEYWORDS] Consent Management Platform, cookie, consent, GDPR, ePrivacy, legal compliance, Web tracking, JavaScript analysis

[RESEARCH INTERESTS] Dark patterns, legal compliance, manipulation and deception of users, EU Digital Services Act (DSA)

[TEAM NAME] PRIVATICS

[DESCRIPTION] We study "dark patterns," deceptive practices that exploit users' psychology to manipulate decisions for a digital service's benefit. Despite their sophistication and prevalence, few dark patterns have been detected at scale or across contexts. EU regulations like the DSA and DMA (enforced in 2024) aim to prohibit them, but detecting and proving deception remains a challenge. Our goal is to understand dark patterns' mechanisms and develop automated tools to identify them. By gathering evidence, we seek to support EU regulators in detecting violations and ensuring compliance with the law.

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #21: Dark patterns, legal compliance, manipulation and deception of users, EU Digital Services Act (DSA)

[KEYWORDS] Dark patterns, legal compliance, manipulation and deception of users, EU Digital Services Act (DSA)

[RESEARCH INTERESTS] Web tracking detection; Onilne Privacy; JavaScript applications; GDPR and ePrivacy directive; legal compliance; CMP; cookies; cookie banners

[TEAM NAME] PRIVATICS

[DESCRIPTION] Our research focuses on online privacy, developing computational tools to assess Web applications for privacy risks and legal violations. Using a transdisciplinary approach, we combine computer science with legal expertise to automate compliance audits. Our work includes detecting new Web tracking technologies, analyzing consent banners and Consent Management Platforms, and assessing adherence to EU GDPR and ePrivacy laws. By automating privacy evaluations, we help ensure digital services meet legal requirements and respect user rights

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #22: Machine Learning, AI, Causality, Federated Learning, Multi Modal data, Privacy, Uncertainty quantification, Healthcare, personalized medicine, data analysis

[KEYWORDS] Machine Learning, AI, Causality, Federated Learning, Multi Modal data, Privacy, Uncertainty quantification, Healthcare, personalized medicine, data analysis

[RESEARCH INTERESTS] Many topics of interest in causal inference include uncertainty quantification in policy learning, causal inference with temporal outcomes, meta-analyses, transportability, and more. In the context of handling missing data, key areas of focus include developing methods for treatment regime dynamics with missing data, addressing distributional shifts in the presence of missing data, coupling missing outcomes with missing covariates, and matching techniques that account for missing values.

[TEAM NAME] PREMEDICAL (precision medicine by data integration and causal learning).

[DESCRIPTION] The Premedical (Precision Medicine by Data Integration and Causal Learning) team\footnote{\url{https://team.inria.fr/premedical/}} is an Inria-Inserm research team based in Montpellier. This interdisciplinary team brings together experts in statistics, biostatistics, machine learning, and clinical practice. Premedical focuses on advancing precision medicine by leveraging causal learning and federated approaches that preserve the confidentiality of medical data. Its mission is to accelerate the development of targeted therapies and implement decision-support algorithms with quantified prediction uncertainty. The team hosts the Missing Data and Causality research and has curated a taskview on causal inference methods. Premedical's research is centered around three key axes: optimizing personalized treatment prescriptions, integrating diverse data sources, and ensuring privacy and fairness in its methodologies. By guiding clinical and policy-making decisions, Premedical fosters a unique environment for transdisciplinary research and collaboration, driving innovation at the intersection of data science and healthcare.

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #23: video understanding, deep learning

[KEYWORDS] video understanding, deep learning

[RESEARCH INTERESTS] computer vision, machine learning

[TEAM NAME] STARS

[DESCRIPTION] The Stars research team focuses on the design of vision systems for Activity Recognition. More precisely, we are interested in the real-time semantic interpretation of dynamic scenes observed by video cameras and other sensors. We study long-term spatio-temporal activities performed by agents such as human beings, animals or vehicles in the physical world. The major issue in scene interpretation of dynamic scenes is to bridge the gap between the subjective interpretation of data and the objective measures provided by sensors. To address this problem Stars develops new techniques in the field of computer vision and deep learning for physical object detection, activity understanding, activity learning, vision system design and evaluation. We focus on two principal application domains: visual surveillance and healthcare monitoring.

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #24: Unsupervised anomaly detection guided Mamba-based and text-enhanced multimodal approach for autism detection

[KEYWORDS] Unsupervised anomaly detection guided Mamba-based and text-enhanced multimodal approach for autism detection

[RESEARCH INTERESTS] Natural Language provides an additional modality which can boost the performance of an existing video classifier. In a video Swin transformer, pre-trained on Kinetics-400, is trained on autistic stimming videos of SSBD and ESBD datasets. The Video Swin Transformer classifier is contrastively learned again against the CLIP-embedding of the captions of the videos. Since Mamba has linear training complexity compared to transformers, we will be using a recently introduced Video-Mamba. Unlike Mamba for images, input video splits are accompanied by two embeddings namely positional and temporal embeddings. In our proposed method, we will segment the SSBD and ESBD videos for the children using SAM. The positional embedding will also be a function of the segmented foreground and background video chunks. The temporal embeddings will also be a function of the per frame anomaly score as calculated by. For uniformity across the entire model, the LSTM based encoders and decoders of will be replaced by Mamba-based ones. Prior to feeding as input to the Video-Mamba, the video chunks will be modulated with an AdaptIN layer according to the CLIP-embeddings of

the video captions. This work provides a robust and efficient framework for understanding stereotypical behaviors in autism diagnosis. By unifying state-of-the-art methods in video processing and natural language understanding, our approach bridges the gap between clinical needs and computational advancements. While challenges exist, particularly regarding data quality and integration complexity, the proposed method lays the groundwork for scalable and interpretable models in autism research, with potential applications in other domains requiring multimodal video analysis.

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Inria MSCA-PF 2025 hosting offer Sophia-Antipolis #25: Geometric modelling, geometry processing, AI for shape and scene analysis, remote sensing, urban modelling, computer vision, 3D object recognition

[KEYWORDS] Geometric modelling, geometry processing, AI for shape and scene analysis, remote sensing, urban modelling, computer vision, 3D object recognition

[RESEARCH INTERESTS] Geometric modelling, geometry processing, AI for shape and scene analysis, remote sensing, urban modelling, computer vision, 3D object recognition

[TEAM NAME] TITANE

[DESCRIPTION] Our overall objective is the computerized geometric modelling of complex scenes from physical measurements. On the geometric modelling and processing pipeline, this objective corresponds to steps required for conversion from physical to effective digital representations: analysis, reconstruction and approximation. The related scientific challenges include i) being resilient to defect-laden data due to the uncertainty in the measurement processes and imperfect algorithms along the pipeline, ii) being resilient to heterogeneous data, both in type and in scale, iii) dealing with massive data, and iv) recovering or preserving the structure of complex scenes. We define the quality of a computerized representation by its i) geometric accuracy, or faithfulness to the physical scene, ii) complexity, iii) structure accuracy and controllability, and iv) amenability to effective processing and high-level scene understanding.

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Inria MSCA-PF 2024 hosting offer Sophia-Antipolis #26: Nonlinear control, optimal control, controllability, flatness, observers

[KEYWORDS] Theoretical Machine Learning, Artificial Neural Networks, Discrete Probability

[RESEARCH INTERESTS] We are interested in understanding the role of topology in artificial neural networks at a fundamental level. To this end, we have investigated the Strong Lottery Ticket Hypothesis, which states that random neural networks can be pruned to approximate a large class of functions without changing the initial weights. We are also interested in Neural Combinatorial Optimization, where we are investigating the use of neural networks to solve graph and combinatorial problems.

[TEAM NAME] COATI

[DESCRIPTION] The COATI Team has an established expertise on algorithms, discrete mathematics (especially graph theory) and combinatorial optimization. More recently, it has been exploring fundamental theoretical questions in artificial neural networks, and exploring their applications to combinatorial problems

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MSCA Postdoctoral Fellowships Offers for 2025 at Inria Bordeaux Centre

Inria MSCA-PF 2025 hosting offer Bordeaux #1: Multiphase compressible flow; multiscale; diffuse-interface method; discontinuous Galerkin method

[KEYWORDS] computational fluid dynamics, compressible flows, high order methods, multigrid methods.

[RESEARCH INTERESTS] Multigrid methods for high order methods for compressible flows. Understanding complex flows via computational fluid dynamics requires a fine tuning of numerical methods. In different flow regimes (low Mach number flows, diffusive flows, incompressible flows), for reaching a reasonable computational cost, it is often required to design efficient implicit methods. Then, solving the resulting large nonlinear system of equations becomes a challenging task especially in a parallel environment. A natural manner of tackling this problem relies on the development of multigrid methods, because they may lead to a linear complexity in the number of unknowns, and so are naturally scalable. We are interested in the development of fast, scalable and accurate multigrid methods for compressible flows.

[TEAM NAME] CAGIRE

[DESCRIPTION] CAGIRE brings together researchers from different backgrounds (turbulence and multiphase compressible modelling, applied mathematics, experimentation) who have gradually developed a common vision of what should be the CFD tools of the future. This objective is based on the strong motivation to be useful to industrial actors from different fields. The considered flows are turbulent and most often bounded by walls. Consequently, they are characterized by the simultaneous presence of a multiplicity of spatial and temporal scales, which represents a challenge in terms of physical modelling and simulation.

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Inria MSCA-PF 2025 hosting offer Bordeaux #2: auditing language models (LLM) and generative AI

[KEYWORDS] Machine Learning, Trustworthy Artificial Intelligence, Generative AI, LLM, Bias, diffusion models

[RESEARCH INTERESTS]
Auditing an algorithm usually takes into account the purpose of the algorithm. Classification or regression models forecast an unknown label which may be qualitative or quantitative, recommenders system's output is a ranking. There is a clear correspondence between the algorithm and a target whose distribution can be studied in order to detect bias or disloyalty. Yet very recent algorithms escape this description since they do not follow a fixed objective rather can be used to either generate new data or to simply interact with users adapting to their solicitations.

The first task will consist in proposing new definitions and metrics for fairness. For example, large language models like GPT (and ChatGPT) produce sophisticated answers to open-ended questions, while text-to-image generators such as Stable Difusion convert free-form text into realistic images. The natural extension of the concepts of loyalty and fairness is to consider the context of a specific question or task and to use existing measures for this specific task. The selection of the task should be done with care and reflect the practical uses of the model and their framework of application.

The evaluation will thus depend on an external tool, such as another machine learning model, to assess the protected variable. Additionally, a strategy must be in place to generate data that balances the cost of generation with the statistical guarantees required for auditing, including the cost of energy, time, and/or financial resources. The different tasks or questions must be chosen properly and we should use an automated model to navigate between the different tasks. This approach involves treating the auditing process as a sequential learning problem, where the generative model is treated as a stochastic oracle. By treating the generative model as a stochastic oracle, it becomes possible to incorporate randomness into the auditing process, which can help to account for the uncertainty that is inherent in the data generation process. The methodology will require active learning to be able discover zones where the bias is present, either in the embeddings either in the way the information circulates in the network.

[TEAM NAME] Regalia

[DESCRIPTION]

Understanding the behavior of AI decisions, especially those driven by machine learning methods, presents significant challenges for both regulatory authorities and companies operating under legal constraints.While some algorithmic decisions may seem transparent, precise, and reliable at first glance, they can inadvertently perpetuate or even amplify biases present in the training data—potentially discrim- inating against specific sub-groups. Furthermore, unfairness can also arise from issues of opacity. This lack of transparency might stem from either deliberate human intent or a limited understanding of complex predictive models. With these classical sources of biases being recalled, our goals in this proposal could be summarized as detect and correct.

First, we will detect biases by developing new decision tools to investigate machine learning algorithms' compliance with given norms, of legal nature or described by algorithm providers. This is the audit dimension of the proposal.

Secondly, assuming the proofs of faulty behaviors are obtained, the project aims at correcting algorithms. This will be done under the double prism of machine learning and optimization. This includes the different methodologies that consist in pre-processing the data, controlling the learning phase of the algorithm or post-processing the outputs of the algorithms, depending on the availability of the data and algorithm.

The team is composed of two senior researchers (JM Loubes and B. Rottembourg) with 2 INRIA engineers working in collaboration with researchers from ANITI AI center in a research chair headed by JM Loubes on trustworthy AI.

The Post Doc will be based at ANITI premises in Toulouse.

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Inria MSCA-PF 2025 hosting offer Bordeaux #3: bridging the scales and explaining pathological oscillations emerging from single cell and synapse altered dynamics in Alzheimer's disease

[KEYWORDS] Computational Neuroscience. Hodgkin-Huxley model. Alzheimer's disease. Hippocampus. Neural Oscillations.

[RESEARCH INTERESTS] Mechanistically, Alzheimer's disease comes with cytotoxicity, channelopathies, and synaptic abnormalities. At the meso- and macroscopic levels, it has been observed that neuronal oscillations are perturbed within the hippocampus and in later stages in the prefrontal cortex and the whole memory circuit, leading to the cognitive deficits reported in patients. However, the way these single neuron and synaptic abnormalities give rise to pathological neuronal oscillations is not well understood.
In this context, the goal of this project will be to build a computational model capable of bridging the scales and explaining pathological oscillations emerging from single cell and synapse altered dynamics in Alzheimer's disease. This new model will be based on the hippocampus model developed previously in the team, which comprises about thirty thousand Hodgkin-Huxley neurons, and has already been used to study other neuronal dynamics, multiscale pathologies such as epilepsy, and neuromodulation.

[TEAM NAME] NeuroDTx

[DESCRIPTION] Over the past few years, our team has initiated a multifaceted research program that aims at developing new neuromodulation strategies and neuroprosthetic systems for improving motor and cognitive functions in neurological disorders. We believe that this field requires a synergistic approach between neuromodulation / neuroprosthetics and computational neuroscience, two aspects led collaboratively by Dr. Fabien Wagner (CNRS) and Dr. Amélie Aussel (Inria). We are currently conducting the following projects:

- Biophysical models of neural circuits, and how they are affected by neurostimulation.
- Personalized physical models of the head and brain based on neuroimaging.
- Invasive neurostimulation in non-human primates.
- Non-invasive brain and spinal cord stimulation.
- Multimodal digital therapeutics for improving cognition in neurovascular disorders using EEG biomarker identification, high-definition transcranial alternating current stimulation (tACS), and cognitive training.

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MSCA Postdoctoral Fellowships Offers for 2025 at Inria Grenoble Centre

Inria MSCA-PF 2025 hosting offer Grenoble #1: Numerical modelling and simulation, Natural risk mountain, HPC

[KEYWORDS] Numerical modelling and simulation, Natural risk mountain, HPC

[RESEARCH INTERESTS] Non-smooth numerical methods based on MPM (Material point method) and "data-driven mechanics" techniques for the modelling and simulation of gravity flows in mountains (debris flows, avalanches, rock slides). The objective of this post-doc is to develop in a non-smooth framework robust and reliable simulation methods for complex flows related to natural gravity hazards. For debris flows, coupling with implicit DEM ("Discrete Element Method") will be done. The issue of high performance scientific computing (HPC) will be addressed for these methods.

[TEAM NAME] TRIPOP

[DESCRIPTION] The team is mainly concerned with the modelling, the mathematical analysis, the simulation and the control of nonsmooth dynamical systems. Nonsmooth dynamics concerns the study of the time evolution of systems that are not smooth in the mathematical sense, i.e., systems that are characterized by a lack of differentiability, either of the mappings in their formulations, or of their solutions with respect to time. The team is one of the few in the world that has brought together researchers in applied maths, control theory, computational mechanics and scientific computing in the field of nonsmooth dynamics

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Inria MSCA-PF 2025 hosting offer Grenoble #2: Data-driven modelling, uncertainties, calibration, data assimilation, reduced order models, substitution models, mountainous natural risk

[KEYWORDS] Data-driven modelling, uncertainties, calibration, data assimilation, reduced order models, substitution models, mountainous natural risk

[RESEARCH INTERESTS] To develop simplified models that can be used extensively for the development of methods of calibration and quantification of uncertainties allowing the joint use of data from various origins for gravitational risk in mountains. The following points will be developed: A) Statistical models integrating data from various sources and the hazard models developed. The identification of the parameters of these hazard models, in particular using Bayesian approaches, will also make it possible to calibrate and quantify the uncertainties associated with the hazard models. B) Model reduction approaches (POD, PGD,...) or construction of substitution models (Sparse Polynomial Chaos, Gaussian Processes,...) will be implemented to build simplified models usable in this context. C) Application of different data assimilation techniques (particle filters or variational filters) on the models described in the first axis and on the reduced order models. The calibrated models will be integrated in a global approach aiming at building quantitative risk analysis methods.

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Inria MSCA-PF 2025 hosting offer Grenoble #3: Statistics, Extreme-value analysis, Dimension reduction

[KEYWORDS] Statistics, Extreme-value analysis, Dimension reduction

[RESEARCH INTERESTS] Design of new dimension reduction methods dedicated to extreme-value analysis in a risk assessment perspective.

[TEAM NAME] STATIFY

[DESCRIPTION] The STATIFY team specializes in the statistical modelling of systems involving data with a complex structure. The objective is to develop mathematically well-founded statistical methods to propose models that capture the variability of the systems under consideration, models that are scalable to process large dimensional data and with guaranteed good levels of accuracy and precision. STATIFY is a scientific project centred on statistics and wishing to have a strong methodological and application impact in data science.

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Inria MSCA-PF 2025 hosting offer Grenoble #4: Bayesian inference, machine learning

[KEYWORDS] Bayesian inference, machine learning

[RESEARCH INTERESTS] The candidate will develop new methods for approximating the posterior distribution of non-linear models used to describe complex physical phenomena. He will employ modern tools from Bayesian inference and deep generative modelling and tailor them to scientific applications with experimental data. The methods developed in this project have the potential of being applied by scientists from several domains and, as such, the candidate will be encouraged to cooperate with different laboratories in Grenoble's scientific ecosystem. The candidate is expected to publish their findings in top machine-learning conferences and statistics journals. The position is meant to further the careers of early-career researchers who wish to pursue a career in academia.

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Inria MSCA-PF 2025 hosting offer Grenoble #5: Bayesian inference, machine learning

[KEYWORDS] Bayesian inference, machine learning

[RESEARCH INTERESTS] The candidate will work on the project titled "A new Bayes-duality principle for adaptive, robust, and lifelong learning of AI". https://bayesduality.github.io/ The candidate will work on problems at the intersection of deep learning, Bayesian inference, optimization, and reinforcement learning. The candidate is expected to carry out research and publish their findings in top machine-learning conferences and statistics journals. The position is meant to further the careers of early-career researchers who wish to pursue a career in academia.

[TEAM NAME] STATIFY

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capture the variability of the systems under consideration, models that are scalable to process large dimensional data and with guaranteed good levels of accuracy and precision. STATIFY is a scientific project centred on statistics and wishing to have a strong methodological and application impact in data science.

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Inria MSCA-PF 2025 hosting offer Grenoble #6: sensitivity analysis, kernel embedding, model order reduction, hypoelliptic Fokker-Planck equations

[KEYWORDS] sensitivity analysis, kernel embedding, model order reduction, hypoelliptic Fokker-Planck equations

[RESEARCH INTERESTS] Many mathematical models involve input parameters, which are not precisely known. Global sensitivity analysis aims to identify the parameters whose uncertainty has the largest impact on the variability of a quantity of interest (QoI) - for instance by computing sensitivity measures. In this application, we are interested in QoIs defined as the solution of a hypoelliptic Fokker-Planck equation. The targeted application is the Fitzhugh-Nagumo model arising from neurosciences. We focus on Kernel-based sensitivity measures and propose model order reduction based on a stochastic Galerkin projection for a fast evaluation of these measures.

[TEAM NAME] AIRSEA

[DESCRIPTION] Big data (production, storage, transfer), Supervised and unsupervised learning, Bayesian methods, Kernel methods, Continuous Modeling (PDE, ODE), Stochastic Modeling, Multiscale modeling, Multiphysics modeling, Numerical analysis of PDE and ODE, Statistical methods, Optimization, High performance computing, Inverse problems, Data assimilation, Model reduction, Uncertainty Quantification, Fluid mechanics, Waves.

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Inria MSCA-PF 2025 hosting offer Grenoble #7: Systems reconfiguration for resilience and cyber-security

[KEYWORDS] Systems reconfiguration for resilience and cyber-security

[RESEARCH INTERESTS] Cybersecurity is a very critical issue in the growing importance of numerical and computing infrastructures. Much research is devoted to defense mechanisms that detect intrusions and attacks, but a less thoroughly studied topic is that of the automated reaction to attacks, in order to use detection information to take the appropriate defense and repair actions, so that the system can protect itself against the attacks, and remain operational, possibly in a degraded mode. We propose to approach this self-protection capacity, in terms of Autonomic Computing, in a feedback loop, e.g., using models & control for discrete event systems.

[TEAM NAME] CTRL-A

[DESCRIPTION] CTRL-A works on self-adaptive computing systems, large (data centers) or small (embedded), required to react to the dynamical fluctuations of their environments and workloads. We study their automated administration, in an Autonomic Computing approach, involving self-administration feedback control loops. Our objective is to develop a novel framework for model-based design of controllers in Autonomic Computing. We contribute generic Software Engineering methods and tools for developers to design and integrate controllers, and we improve concrete usability of techniques from Control Theory, e.g., Discrete Event Systems, by specialists of concrete systems, typically for resource management and cyber-security.

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Inria MSCA-PF 2025 hosting offer Grenoble #8: Self-adaptative resource management for data and computing centres, combining control and scheduling

[KEYWORDS] Self-adaptative resource management for data and computing centres, combining control and scheduling

[RESEARCH INTERESTS] Large-scale computing infrastructures are processing vaster amount of data or solving problems requiring vaster amount of computing power. Their behaviour has become more variable and difficult to model, e.g. wrt power consumption and application performance. Their management and configuration has to be automated, and performed at runtime in a feedback loop as in autonomic computing. We propose to analyse and design such autonomic managers in the context of High Performance Computing, and more particularly to consider, at the level of the RJMS (resources and jobs management system), to coordinate mechanisms from Control Theory and scheduling, applied to resource harvesting.

[TEAM NAME] CTRL-A

[DESCRIPTION] CTRL-A works on self-adaptive computing systems, large (data centers) or small (embedded), required to react to the dynamical fluctuations of their environments and workloads. We study their automated administration, in an Autonomic Computing approach, involving self-administration feedback control loops. Our objective is to develop a novel framework for model-based design of controllers in Autonomic Computing. We contribute generic Software Engineering methods and tools for developers to design and integrate controllers, and we improve concrete usability of techniques from Control Theory, e.g., Discrete Event Systems, by specialists of concrete systems, typically for resource management and cyber-security.

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Inria MSCA-PF 2025 hosting offer Grenoble #9: multi-agent, agent-based simulation, methodology, open data, science, reproducibility, semantic web

[KEYWORDS] multi-agent, agent-based simulation, methodology, open data, science, reproducibility, semantic web

[RESEARCH INTERESTS] Methodology of reproducible multi-agent social simulations -- Knowledge evolution may be studied using multi-agent simulations and publishing results in the top multi-agent conferences. To report reproducible experiments, we took steps to automate the experiment design, processing, analysis and publication. This involves describing explicitly the hypotheses, initial conditions, processes, measures, graphic output and statistical tests.

[TEAM NAME] MOEX

[DESCRIPTION] Cultural evolution is the application of evolution theory to culture. It is now widely acknowledged in social sciences and the humanities. mOeX adopts a computational approach to the study of the cultural evolution of knowledge, determining, in silico, properties of knowledge that artificial agents may obtain. Our ambition is to understand and develop general mechanisms by which a society evolves its knowledge. We consider societies of independent agents representing knowledge and adapting it through interacting with each other. We study the global properties of this local adaptation both experimentally, through multi-agent simulations, and theoretically, through logical models.

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Inria MSCA-PF 2025 hosting offer Grenoble #10: cultural evolution, knowledge, belief, evolutionary epistemology, behaviour, society, communication

[KEYWORDS] cultural evolution, knowledge, belief, evolutionary epistemology, behaviour, society, communication

[RESEARCH INTERESTS] A social science perspective on cultural knowledge evolution -- We are investigating the cultural evolution of knowledge and beliefs on a computational basis. We seek to cooperate with scientists trained in social sciences and the humanities offering their specific perspective on this work. Given the transverse position of cultural evolution in all SSH, this may be relevant to various fields. The research may concern social aspects of cultural evolution (sociology, epistemology) or focus on the motivation and individual knowledge and behaviour of agents (cognitive science, psychology) or taking an intermediary position linking knowledge and society (anthropology). Similarly we are open to experimental, observational or theoretical profiles. More details on https://moex.inria.fr/training/2021-PD-ssh-cke.html

[TEAM NAME] MOEX

[DESCRIPTION] Cultural evolution is the application of evolution theory to culture. It is now widely acknowledged in social sciences and the humanities. mOeX adopts a computational approach to the study of the cultural evolution of knowledge, determining, in silico, properties of knowledge that artificial agents may obtain. Our ambition is to understand and develop general mechanisms by which a society evolves its knowledge. We consider societies of independent agents representing knowledge and adapting it through interacting with each other. We study the global properties of this local adaptation both experimentally, through multi-agent simulations, and theoretically, through logical models.

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Inria MSCA-PF 2025 hosting offer Grenoble #11: Quantum information, causal structure, quantum computation, quantum control

[KEYWORDS] Quantum information, causal structure, quantum computation, quantum control

[RESEARCH INTERESTS] Both quantum computation and communication are generally considered within a fixed underlying causal framework. By exploiting quantum control systems, however, it is possible to consider more general situations, where the causal structure itself become quantum, leading to effects such as causal indefiniteness. This opens up new possibilities for quantum computation and communication that we are yet to fully understand. Research topics seeking to understand, model and exploit quantum causal structures for quantum information processing are welcome.

[TEAM NAME] QINFO

[DESCRIPTION] The new QINFO group at Inria, led by Omar Fawzi, is bi-localised between Grenoble and Lyon. Its research aims to use quantum information theory to understand the effects of noise on quantum information processing and design new and efficient methods to reduce its effect. This covers, e.g., the characterization of noisy quantum devices, quantum error correction and fault tolerance, and new models of computation in which the effects of noise can be more easily mitigated.

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Inria MSCA-PF 2025 hosting offer Grenoble #12: Expressive rendering, stylization, visualization, appearance edition, non photorealistic rendering

[KEYWORDS] Expressive rendering, stylization, visualization, appearance edition, non photorealistic rendering

[RESEARCH INTERESTS] As images result from the complex combination of light, material and object surface properties, coherently modifying their appearance in a plausible or stylized way is a very challenging task. We aim at providing intuitive and controllable tools that help users to create and edit images obtained from 3D inputs.

[TEAM NAME] MAVERICK

[DESCRIPTION] The Maverick project-team aims at producing representations and algorithms in the field of Computer Graphics, and more precisely of Photorealistic rendering (efficient accurate light transport & materials), Real-time rendering (high visual complexity in real time), Expressive rendering (automatic or authored stylization, scientific visualization), or transversely, Surface appearance (physical material models, procedural or authored textures, smart brushes), Natural phenomena (simulating light and generating/synthesizing/authoring/rendering elements in natural scenes).

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Inria MSCA-PF 2025 hosting offer Grenoble #13: Photorealistic rendering, materials, BRDF, phase function, light transport

[KEYWORDS] Photorealistic rendering, materials, BRDF, phase function, light transport

[RESEARCH INTERESTS] Efficient physically-accurate rendering is still a challenge: more work is needed to tackle complex light transport modalities (e.g. with transparent or diffusive materials; study of intrinsic properties of linear operators involved in the formalism of light transport; dimensionality reduction techniques; connections to Monte-Carlo approximations of very large matrices), as well as for quality material models (from acquisition and editing to formalization and representation).

[TEAM NAME] MAVERICK

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Inria MSCA-PF 2025 hosting offer Grenoble #14: realtime rendering, LOD, GPU, antialiasing, filtering, Proland, Gigavoxels

[KEYWORDS] realtime rendering, LOD, GPU, antialiasing, filtering, Proland, Gigavoxels

[RESEARCH INTERESTS] Outdoor scenes can be both ultra-large and ultra-detailed, overwhelming both the computation and memory budget. GPUs come with constraints, but also very efficient patterns to be better exploited. We seek to study more representations and algorithms able to manage high complexity at high quality in real-time.

[TEAM NAME] MAVERICK

[DESCRIPTION] The Maverick project-team aims at producing representations and algorithms in the field of Computer Graphics, and more precisely of Photorealistic rendering (efficient accurate light transport & materials), Real-time rendering (high visual complexity in real time), Expressive rendering (automatic or authored stylization, scientific visualization), or transversely, Surface appearance (physical material models, procedural or authored textures, smart brushes), Natural phenomena (simulating light and generating/synthesizing/authoring/rendering elements in natural scenes).

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Inria MSCA-PF 2025 hosting offer Grenoble #15: procedural texture, texture synthesis, vector texture, volumetric texture, animated texture

[KEYWORDS] procedural texture, texture synthesis, vector texture, volumetric texture, animated texture

[RESEARCH INTERESTS] Outdoor scenes can be both ultra-large and ultra-detailed, overwhelming both the computation and memory budget. GPUs come with constraints, but also very efficient patterns to be better exploited. We seek to study more representations and algorithms able to manage high complexity at high quality in real-time.

[TEAM NAME] MAVERICK

[DESCRIPTION] Textures are a key enrichment of surfaces and volumes in details, in both realistic and expressive rendering. A lot more work is required in efficient versatile procedural textures, reproduction of target property or aspects (realistic or artistic), easy editing, including paradoxical requirement when used in painterly rendering or to represent animated fluids, or inverse texture synthesis (to find the procedural process able to reproduce a target texture).

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Inria MSCA-PF 2025 hosting offer Grenoble #16: privacy, data security, information law, user consent

[KEYWORDS] privacy, data security, information law, user consent

[RESEARCH INTERESTS] The PRIVATICS team focusses on privacy and personal data protection, from many different angles: privacy leaks on the web, in smartphones, in IoT connected devices, in wireless networks (Wifi, BLE, UWB, LoraWan), pseudonymisation techniques, privacy preserving ML, end-user information and consent management, automated decision systems understandability, privacy regulation. This list is of course non exhaustive.

[TEAM NAME] PRIVATICS

[DESCRIPTION] Since its creation in 2014, the PRIVATICS project-team of Inria is working on privacy protection in the digital world: on one side, it aims at understanding the privacy research domain and its evolution, both from theoretical and practical aspects, and on the other side with a strong interest in designing and developing privacy-enhancing technologies, tools and systems. The approach taken in PRIVATICS is fundamentally inter-disciplinary and covers theoretical, legal, economical, sociological and ethical aspects by the means of enriched collaborations with the members of these disciplines.

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Inria MSCA-PF 2025 hosting offer Grenoble #17: Sketch-based modelling, AI and Animation, Virtual Cinematography, Virtual Actors, Virtual Storytelling, Computer Theater, Computational Aesthetics

[KEYWORDS] Sketch-based modelling, AI and Animation, Virtual Cinematography, Virtual Actors, Virtual Storytelling, Computer Theater, Computational Aesthetics

[RESEARCH INTERESTS] Authoring and Directing Story Worlds. In August 2017, the motto for the ACM Siggraph conference became “Enabling Everyone to Tell Their Stories”. Indeed, narrative contents such as interactive games and animated movies are a major application domain for computer graphics, with implications in entertainment, education, cultural heritage, scientific communication and professional training. In those applications, the creation of 3-D content cannot be limited to the production of shapes and motions; it should also include the necessary steps to organize shapes and motions into compelling stories, using adequate staging, directing and editing. As a result, it becomes essential to conduct research in authoring and directing animated story worlds.

[TEAM NAME] ANIMA

[DESCRIPTION] An important goal in Computer Graphics is to enable artists to “tell their stories”. Towards this goal, the ANIMA team focuses on developing computer tools for authoring and directing animated movies, interactive games and mixed-reality applications, using virtual sets, actors, cameras and lights. This includes

dedicated user interfaces for communicating the story; high-level geometric, physical and semantic models that can be manipulated in real-time under the user's artistic control; and new interaction models for controlling the virtual actors and cameras to communicate the desired story while maintaining the coherence of the story world.

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Inria MSCA-PF 2025 hosting offer Grenoble #18: embedded system, CPS, causality, accountability, explanation, certification

[KEYWORDS] embedded system, CPS, causality, accountability, explanation, certification

[RESEARCH INTERESTS] The objective of this position is to develop techniques to build accountable cyber-physical systems in the sense that a causal explanation of their behaviours can be constructed automatically. We are looking for candidates with a strong background informal methods and at least one of the following domains: - causality, program analysis, static analysis, hybrid systems, runtime verification, or - certification, Coq.

[TEAM NAME] SPADES

[DESCRIPTION] SPADES develops formal methods for embedded systems design by focusing on three key questions: - How to build networked embedded systems as adaptive modular structures? - How to program systems with resource and behavioral constraints on multicore architectures? - How to program reliable and fault-tolerant embedded systems with different levels of criticality?

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MSCA Postdoctoral Fellowships Offers for 2025 at Inria Lyon Centre

Inria MSCA-PF 2025 hosting offer Lyon #1: Simulation, Optimization, and Machine Learning for Direct-to-Satellite Internet of Things

[KEYWORDS] Direct-to-Satellite IoT, Satellite Networks, Satellite Constellations, Low Power Wide Area Networks (LPWAN)

[RESEARCH INTERESTS] The primary focus is enabling Direct-to-Satellite IoT (DtS-IoT) for efficient data transfer services to IoT devices in remote areas where establishing terrestrial infrastructure is impractical. This research explores using low-Earth orbit satellites, like CubeSats, as mobile IoT gateways for data offloading. Key challenges include the complexities of long-distance transmissions, dynamic satellite channels, and constraints on device capabilities. Addressing these challenges necessitates revising and extending Low Power Wide Area Networks (LPWAN) protocols, integrating them with orbital mechanics principles to facilitate a globally integrated space-terrestrial IoT network. This research will leverage computational simulations, innovative optimization techniques, and machine learning methods to overcome these obstacles and advance the field of satellite-based IoT networking.

[TEAM NAME] AGORA

[DESCRIPTION] The postdoctoral position at Inria's AGORA research group, located at the La Doua Campus in Lyon, offers a unique opportunity to collaborate with esteemed experts such as Dr. Juan Fraire, Dr. Oana Iova, and Prof. Hervé Rivano. The appointee will use advanced software tools like FloRaSat, an Omnet++-based DtS-IoT simulator, enhancing their expertise in interplanetary communication systems, wireless sensor networks, and urban network planning. This role is enriched by AGORA's strong international and academic-industrial collaborations, including ties with IRIT/ENSEEIHT, i2CAT, Kineis, and Semtech. It offers the chance to delve into the Smart City domain, exploring technologies pivotal to wireless sensor networks and massive machine-to-machine communications. This position is a gateway to cutting-edge research and professional growth in IoT and smart city technologies.

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Inria MSCA-PF 2025 hosting offer Lyon #2: Models, Protocols, and Algorithms for the Interplanetary Connected Things Paradigm

[KEYWORDS] Interplanetary Networks, Direct-to-Satellite IoT, Delay-Tolerant Networks, Deep Space Links, High Latency Transport Protocols.

[RESEARCH INTERESTS] This interplanetary communication research seeks to address the critical challenges of IoT networking across deep space. The core objectives include optimizing mission design, enhancing remote asset

autonomy through machine learning, and refining network protocol architectures. This endeavor seeks to integrate Direct-to-Satellite IoT (DtS-IoT) access with deep-space Delay Tolerant Networking (DTN) backhaul, aiming to create dynamic, distributed networks of smaller, interconnected devices. The project aims to vastly improve data collection, expand coverage, and enhance the resilience of communication systems in deep space exploration. The research will leverage advanced informatics and innovative networking models and technologies, integrating cross-layer adaptation of LoRa/LoRaWAN, NB-IoT, and Bundle Protocol. This research is set to transform traditional paradigms of interplanetary missions, fostering a new domain of space informatics.

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Inria MSCA-PF 2025 hosting offer Lyon #3: Multi-robot systems, online path planning, aerial robotics, autonomous exploration and mapping

[KEYWORDS] Multi-robot systems, online path planning, aerial robotics, autonomous exploration and mapping

[RESEARCH INTERESTS] The main research objective will be focused on the design of new multi-robot planning solutions for the autonomous exploration and mapping of complex 3D structures. The challenge will be to overcome the limitations and simplified assumptions present in the current literature to propose efficient and applicable solutions to generate online feasible and safe trajectories for a team of cooperating aerial vehicles. Ideally, the obtained solutions will be initially tested in a realistic simulator and in a second phase on experimental platforms in real outdoor environments in collaboration with other team members working on related subjects.

[TEAM NAME] CHROMA

[DESCRIPTION] The overall objective of Chroma is to address fundamental and open challenges that lie at the intersection of the research fields “Mobile Robotics” and “Artificial Intelligence". Our goal is to design algorithms and develop models allowing mobile robots to navigate in dynamic and human-populated environments. Chroma is involved in all aspects pertaining to (multi)robot navigation tasks, including perception and motion-planning. Our approach for addressing this challenge is to bring together probabilistic methods, planning and learning

techniques and multi-agent decision models. Our main application domains concern autonomous vehicle driving, aerial robots and services robotics.

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Inria MSCA-PF 2025 hosting offer Lyon #4: fast and accurate numerical algorithms, floating-point arithmetic, symbolic error analysis

[KEYWORDS] fast and accurate numerical algorithms, floating-point arithmetic, symbolic error analysis

[RESEARCH INTERESTS] Computer arithmetic is currently undergoing a major evolution, with traditional IEEE floating-point being complemented with new formats and instructions, but also alternative number systems. Of particular importance is the advent of low-precision formats, mostly driven by efficiency needs in AI and HPC. By being increasingly supported by modern hardware, low-precision arithmetic brings obvious performance benefits, but it also makes accuracy much more difficult to guarantee. Our goal is to address this challenge by exploring new ways to perform accuracy analysis, with a focus on the systematic and, ideally, automatic exploitation of the structure of floating-point errors.

[TEAM NAME] ARIC

[DESCRIPTION] A key challenge in modelling and scientific computing is the simultaneous mastery of hardware capabilities, software design, and mathematical algorithms for enhancing the performances of computations. Thus, the objective of AriC is to improve computing at large, in terms of efficiency and reliability. We investigate the fine structure of floating-point arithmetic, controlled approximation schemes, fast algebraic algorithms, and new cryptographic applications, most of these themes being pursued in their interactions.

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Inria MSCA-PF 2025 hosting offer Lyon #5: symbolic and algebraic computation, computer algebra, algebraic complexity

[KEYWORDS] symbolic and algebraic computation, computer algebra, algebraic complexity

[RESEARCH INTERESTS] The research in computer algebra in AriC develops three main interconnected themes: the use of linear differential or difference equations as a data-structure and its application to combinatorics and special functions (D-finiteness); the design of fast algorithms for matrices of polynomials; the exploitation of structure in linear algebra in order to develop efficient algorithms for fundamental operations such as the computation of resultants or the composition of power series.

[TEAM NAME] ARIC

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Inria MSCA-PF 2025 hosting offer Lyon #6: Image bioinformatics; Deep learning; Light-sheet microscopy; Mouse brain development

[KEYWORDS] Image bioinformatics; Deep learning; Light-sheet microscopy; Mouse brain development

[RESEARCH INTERESTS] In collaboration with team Morpheme (Inria Sophia-Antipolis) and the Fleischmann lab (Brown University), we are developing a scalable pipeline for analysis of three-dimensional images of the developing mouse brain. Current best-practice involves various manual steps, which limits us to 2-3 brain regions. Our goal is to scale to tens of brain regions. Thus we need to automatically map brains to reference shapes; use state-of-the-art nuclei detection methods (ObjMPP, StarDist); and accommodate for developmental changes. It requires evaluating computational costs and alleviating bottlenecks whilst maintaining accuracy and robustness. This project is part of work on gene regulation inference in brain development.

[TEAM NAME] BEAGLE

[DESCRIPTION] The expanded name for Beagle is “Artificial Evolution and Computational Biology”. Our research is at the interface between biology and computer science and aims at contributing new results in biology by modelling biological systems. In other words we are making artifacts – from the Latin artis factum: an entity made by human art rather than by Nature – and we explore them in order to understand Nature. Using computational

approaches, we study abstractions of cellular systems and processes in order to unravel their organizational principles.

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Inria MSCA-PF 2025 hosting offer Lyon #7: Computational evolution, genome architecture, robustness, evolvability, artificial life

[KEYWORDS] Computational evolution, genome architecture, robustness, evolvability, artificial life

[RESEARCH INTERESTS] The Beagle team develops and uses the aevol model (www.aevol.fr). Aevol is a digital genetics platform specifically designed to study the evolutionary dynamics of genomes and genome architecture. The objective of this project is to use – and if needed expand – aevol to unravel the links between selection for robustness (due eg to changes in mutation rates or population size) and genome architecture. We are particularly interested into linking the results of the models with population genetics approach on the one side and large-scale bioinformatics analyses.

[TEAM NAME] BEAGLE

[DESCRIPTION] The expanded name for Beagle is “Artificial Evolution and Computational Biology”. Our research is at the interface between biology and computer science and aims at contributing new results in biology by modelling biological systems. In other words we are making artifacts – from the Latin artis factum: an entity made by human art rather than by Nature – and we explore them in order to understand Nature. Using computational approaches, we study abstractions of cellular systems and processes in order to unravel their organizational principles.

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Inria MSCA-PF 2025 hosting offer Lyon #8: prion dynamics, Alzheimer's disease, synchronicity, strains, ODE, PDE

[KEYWORDS] prion dynamics, Alzheimer's disease, synchronicity, strains, ODE, PDE

[RESEARCH INTERESTS] The neurodegenerative fatal diseases like prion or Alzheimer are still misunderstood. From the protein dynamics point of views, the object of the project here is to explore how the strain interact with each other and the cell itself and how it spreads in the brain.

[TEAM NAME] MUSICS

[DESCRIPTION] Our project is devoted to multi-scale modeling in life sciences, and more specifically to the development of tools and methods to study multi-scale processes in biology with potential applications in medicine. Our team mainly focuses on the cellular level, taking into account interactions at a smaller spatial (and possibly faster) scale (e.g. cellular content, gene expression), or at a larger spatial scale (e.g. tissue, organism).

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Inria MSCA-PF 2025 hosting offer Lyon #9: Hemoglobin production, modelling

[KEYWORDS] Hemoglobin production, modelling

[RESEARCH INTERESTS] Hemoglobin production in the bone marrow is regulated through kidneys and their release of EPO. When damaged or removed, patients under dialysis are required to receive synthetic EPO injections to keep the red blood cell level high enough (low level induces anemia, high level induces strokes). Controlling the doses amplitude and frequency becomes then of major challenge for clinicians for the patient's comfort. Modelling the process and its control is then the centre of this project.

[TEAM NAME] MUSICS

[DESCRIPTION] Our project is devoted to multi-scale modeling in life sciences, and more specifically to the development of tools and methods to study multi-scale processes in biology with potential applications in medicine. Our team mainly focuses on the cellular level, taking into account interactions at a smaller spatial (and possibly faster) scale (e.g. cellular content, gene expression), or at a larger spatial scale (e.g. tissue, organism).

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Inria MSCA-PF 2025 hosting offer Lyon #10: population dynamics, multi-scale models, PDE, ODE, gene regulatory network

[KEYWORDS] population dynamics, multi-scale models, PDE, ODE, gene regulatory network

[RESEARCH INTERESTS] The recent development of single cell analysis is giving very rich albeit noisy information. The understanding of the molecular heterogeneity of cell populations and their time-dependent evolution leads to the need for the development of new analysis and models. We are particularly interested in the domain of stochastic gene regulatory network inference, and their coupling with trajectory inference.

[TEAM NAME] MUSICS

[DESCRIPTION] Our project is devoted to multi-scale modeling in life sciences, and more specifically to the development of tools and methods to study multi-scale processes in biology with potential applications in medicine. Our team mainly focuses on the cellular level, taking into account interactions at a smaller spatial (and possibly faster) scale (e.g. cellular content, gene expression), or at a larger spatial scale (e.g. tissue, organism).

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Inria MSCA-PF 2025 hosting offer Lyon #11: HPC, programming models, task and dataflow, component models

[KEYWORDS] HPC, programming models, task and dataflow, component models

[RESEARCH INTERESTS] Extending existing HPC Programming models to offer a better code composability.

[TEAM NAME] AVALON

[DESCRIPTION] The long term goal of the Avalon team is to contribute to the design of programming models supporting a lot of architecture kinds, to implement it by mastering the various algorithmic issues involved, and by studying the impact on application-level algorithms.

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Inria MSCA-PF 2025 hosting offer Lyon #12: Sparse matrix computations, sparse tensor computations, algorithms, graphs, hypergraphs

[KEYWORDS] Sparse matrix computations, sparse tensor computations, algorithms, graphs, hypergraphs

[RESEARCH INTERESTS] We design, analyse and implement algorithms on sparse matrices, tensors, graphs and hypergraphs. Computations on sparse matrices and tensors form one side of our research. On the other side, we develop algorithms on graphs and hypergraphs to make these computations more efficient. We strive to achieve high performance on both sides of the spectrum. There are currently a few projects ongoing and new ones are being developed. A successful candidate will have opportunities to collaborate with experts in topics such as deep learning, low rank matrix and tensor factorizations, and algorithmic graph and hypergraph theory and experiments.

[TEAM NAME] ROMA

[DESCRIPTION] The ROMA team aims at designing models, algorithms, and scheduling strategies to optimize the execution of scientific applications on High-Performance Computing platforms. One of the research axes of ROMA covers sparse tensor and matrix computations, and associated graph and hypergraph models, and interacts with other axes.

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Inria MSCA-PF 2025 hosting offer Lyon #13: Multi-criteria scheduling algorithms, resilience, edge-cloud platforms

[KEYWORDS] Multi-criteria scheduling algorithms, resilience, edge-cloud platforms

[RESEARCH INTERESTS] We aim at designing multi-criteria scheduling for modern computing platforms. For instance, in edge-cloud platforms, jobs can either be executed locally at the edge of the network, or sent to a centralized cloud platform that can execute them at greater speed. Such jobs may come from e-health or flying

drones applications. The problem is to decide where and when to schedule each job. While we have already studied how to minimize the maximum stretch incurred by any job, we plan to investigate other objective functions, such as the energy consumption or the reliability of the execution.

[TEAM NAME] ROMA

[DESCRIPTION] One of the research themes of ROMA is to focus on the design of scheduling strategies that finely take into account some platform characteristics beyond the most classical ones, namely the computing speed of processors and accelerators, and the communication bandwidth of network links. In the scope of this theme, when designing scheduling strategies, we focus either on the energy consumption of applications or on their memory behaviour. All optimization problems under study are multi-criteria. The work of ROMA also strongly focuses on resilience on failure-prone platforms.

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Inria MSCA-PF 2025 hosting offer Lyon #14: Goal-Oriented Communications, Molecular communications

[KEYWORDS] Goal-Oriented Communications, Molecular communications

[RESEARCH INTERESTS] I am interested in communication systems that are codesigned with other decision making processes, often known as goal-oriented communications. For example, sensor networks that communicate data for control or biological systems that exchange information via chemical signals (also known as molecular communications) to function. The main tools are drawn from information theory and statistical signal processing. Current models of interest arise in wireless random access systems, decentralized estimation, molecular communication systems, feedback control systems.

[TEAM NAME] MARACAS

[DESCRIPTION] Communication is fundamental to control of Cyber Physical Systems, distributed computation, the organization of large numbers of machines, as well as human-to-human interactions. In MARACAS, we develop theory, algorithms, and experimentation for reliable communication systems to support these aims. We contribute to the development of 5G and beyond, as well as emerging applications including vehicular communications, Cyber Physical systems, and molecular communications. We draw on tools from information theory, statistical signal processing and machine learning. We also host the FIT/CorteXlab testbed.

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Inria MSCA-PF 2025 hosting offer Lyon #15: Machine Learning, Physics-Informed Models, Generalization Guarantees, Mutual Information, Diffusion models

[KEYWORDS] Machine Learning, Physics-Informed Models, Generalization Guarantees, Mutual Information, Diffusion models

[RESEARCH INTERESTS] Physics-informed Machine Learning (PiML) designs machine learning approaches that combine both the information of available knowledge in physics and data. It allows to develop efficient and consistent solutions for modelling of complex and partially known tasks in physics. The area is very active, but theoretical foundations still require further research. We propose to investigate the interest of information theory and mutual information frameworks to develop new theoretical foundations and principled algorithms. One objective is to study the derivation of generalization bounds that can embed the physical knowledge available. Another is to investigate complexity measures or particular quantities for assessing generalization (Rademacher complexity, Lyapunov coefficients, topological information, ...). The last one is to design new algorithms, notably diffusion models based on mutual information for the modelling of self-organization processes studied in the team.

[TEAM NAME] MALICE

[DESCRIPTION] MALICE aims to combine interdisciplinary skills in statistical learning and laser-matter interaction to foster the development of new methodological contributions at the interface between Machine Learning and Surface Engineering. Its members have complementary backgrounds in computer science, applied mathematics and optimization while benefitting from the expertise of physicists of the Hubert Curien lab in modelling ultrashort laser-matter interaction. Surface engineering raises numerous machine learning challenges: (i) a limited access to training data and the availability of only partial knowledge (typically in the form of PDEs), (ii) the need of deriving theoretical guarantees for Physics-informed learning models trained from both data and physical knowledge and (iii) a strong necessity to transfer knowledge from one learned dynamical system to another. On the other hand, the advances carried out in machine learning allow to better understand the physics underlying the mechanisms of laser/radiation-matter interaction, enabling to address numerous societal challenges in the fields of space, nuclear, defense, energy or health.

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Inria MSCA-PF 2025 hosting offer Lyon #16: Anthropocene ; Science studies ; Genome Sequencing ; planetary boundaries ; Risk-assessment ; Ecological economics

[KEYWORDS] Anthropocene ; Science studies ; Genome Sequencing ; planetary boundaries ; Risk-assessment ; Ecological economics

[RESEARCH INTERESTS] In our research team we examine in particular how the dynamics of transgressing planetary boundaries influence how science is conducted in the Anthropocene, and reciprocally how the expected results of scientific projects delineate possible futures for the planet. Our primary interest is on genomic sciences, a field of biology which is seen as pivotal for solving environmental, agroeconomical and health issues, but where innovations can also constitute a risk. We study the narratives put forward by biologists to rationalize their endeavor, the identified stakeholders and their interest, and how their future is envisaged. We are located in a Biology and Ecology lab, within a team hosted by the complex system institute in Lyon, and with connections to social science labs in Lyon.

[TEAM NAME] SEMIS

[DESCRIPTION] Within Inria Lyon research center we are studying the role of science and technology, particularly information technology, in global, geopolitical and climatic dynamics. On the one hand, science and technology are tools for mediating between human societies and their environments, which gives them particular importance in any policy designed to manage the needs of individuals while respecting the resources of both local and global environments. On the other hand, digital technologies are major transformative forces in contemporary societies, likely to upset lifestyles, the law, balances of power and might, as well as the preservation or destruction of ecosystems. We study the multidimensional transformative effects of science and technology in the Anthropocene, drawing on knowledge of computer science, physics and biology, as well as methods from the social sciences (history, sociology, law, philosophy).

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MSCA Postdoctoral Fellowships Offers for 2025 at Inria Lille Centre

Inria MSCA-PF 2025 hosting offer Lille #1: health, agriculture and ecology, sustainable development

[KEYWORDS] health, agriculture and ecology, sustainable development

[RESEARCH INTERESTS] the research topic of Scool is the study of the sequential decision-making problem under uncertainty. Most of our activities are related to either bandit problems, or reinforcement learning problems. Through collaborations, we are working on their application in various fields, mainly: health, agriculture and ecology, sustainable development.

[TEAM NAME] SCOOL

[DESCRIPTION] Scool is doing research on the general problem of sequential decision making under uncertainty. Research activities span the whole spectrum from fundamental research to applications. Favoured domains of application are health and sustainable development.

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Inria MSCA-PF 2025 hosting offer Lille #2: distributed systems, multi-party interaction, structured interaction, formal methods, BIP, choreography

[KEYWORDS] distributed systems, multi-party interaction, structured interaction, formal methods, BIP, choreography

[RESEARCH INTERESTS] Coordination frameworks, such as BIP and JavaBIP, implement the coordination semantics using centralised engines orchestrating the execution of system components—a significant bottleneck for large systems. Previous attempts at the distributed implementation of BIP systems only partially address this problem. Most importantly, they disregard the inherent structure of BIP connectors considering only sets of flat interactions, defined by a list of components that must all participate in the synchronisation. Eliminating structure from BIP connectors may lead to exponential explosion of the number of such flat interactions. New protocols are needed that would take into account the connector structure, if necessary, relaxing the atomicity of interactions. Beyond BIP, the results could be applied to horeography composition.

[TEAM NAME] SPIRALS

[DESCRIPTION] Spirals is conducting research activities in the domains of distributed systems and software engineering. Spirals aims at introducing more automation in the adaptation mechanisms of software systems, in particular, transitioning from adaptive systems to self-adaptive systems. In this context, Spirals targets three properties: self-healing, self-optimization, and self-protection. With self-healing, Spirals aims at studying and tailoring data mining solutions for the design and implementation of software systems. With self-optimization, Spirals aims at sharing, collecting, and analysing distributed behaviours and data to continuously tailor, optimize,

and keep under working conditions software systems. With self-protection, Spirals aims at automating as much as possible the security of software systems with respect to moving threats.

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Inria MSCA-PF 2025 hosting offer Lille #3: Human-Computer Interaction, Interaction Techniques, Engineering of Interactive Systems

[KEYWORDS] Human-Computer Interaction, Interaction Techniques, Engineering of Interactive Systems

[RESEARCH INTERESTS] We are open to applicants interested in various domains of HCI that could contribute to our team project: e.g., study and design of new interaction techniques and modalities in various applicative and technological contexts (creativity support, mediated collaboration, virtual and augmented reality, etc.), study of the discoverability of the functionalities of an interactive system and acquisition of digital expertise, new software technologies (programming languages, software architectures, toolkits) to design and support advanced interaction.

[TEAM NAME] LOKI

[DESCRIPTION] Our research aims at producing original ideas, fundamental knowledge and practical tools to inspire, inform and support the design of human-computer interactions. We favour the vision of computers as tools to empower people. We are focusing on how such tools can be designed and engineered by investigating how interactive systems has to be revisited along three levels of dynamics of interaction: micro-dynamics (low-level problems such as transfer functions, latency compensation, tactile feedback), meso-dynamics (augmenting the interaction bandwidth and vocabulary) and macro-dynamics (real-time activity monitors and better system adaptability for skills acquisition).

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Inria MSCA-PF 2025 hosting offer Lille #4: Dissipative PDE systems, high-order time-integration scheme, entropy dissipation, Numerical analysis, Simulation

[KEYWORDS] Dissipative PDE systems, high-order time-integration scheme, entropy dissipation, Numerical analysis, Simulation

[RESEARCH INTERESTS] Design, analysis and implementation of high-order time-discretization methods preserving the entry structure of dissipative PDE systems

[TEAM NAME] RAPSODI

[DESCRIPTION] The activity of the team is devoted to the design, the analysis, and the efficient implementation of numerical schemes for dissipative models arising in physics or biology. We particularly focus our attention on the preservation of some physical characteristics at the discrete level: positivity, mass conservation, growth of physical entropies, asymptotic behaviours… We also aim at optimizing the computational cost at a fixed accuracy, by developing high-order schemes, or by means of a posteriori error control. Finally, we adapt the algorithms to the potential industrial constraints, so that they can be incorporated in existing codes.

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Inria MSCA-PF 2025 hosting offer Lille #5: Partial differential equations, Corrosion, Free boundary problem, Numerical analysis, Simulation

[KEYWORDS] Partial differential equations, Corrosion, Free boundary problem, Numerical analysis, Simulation

[RESEARCH INTERESTS] Numerical modelling of corrosion at oxide scale: Corrosion is an irreversible process describing the alteration of a metal by oxidation. We aim to develop numerical methods describing the motion evolution of the oxide layer (geometry, density of charge carriers) that are consistent with thermodynamics. We are interested in the mathematical analysis of the model (PDEs), in its numerical analysis and in its efficient simulation.

[TEAM NAME] RAPSODI

[DESCRIPTION] The activity of the team is devoted to the design, the analysis, and the efficient implementation of numerical schemes for dissipative models arising in physics or biology. We particularly focus our attention on the preservation of some physical characteristics at the discrete level: positivity, mass conservation, growth of

physical entropies, asymptotic behaviours… We also aim at optimizing the computational cost at a fixed accuracy, by developing high-order schemes, or by means of a posteriori error control. Finally, we adapt the algorithms to the potential industrial constraints, so that they can be incorporated in existing codes.

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MSCA Postdoctoral Fellowships Offers for 2025 at Inria Nancy Centre

Inria MSCA-PF 2025 hosting offer Nancy #1: formal verification, model checking, theorem proving, distributed algorithms, TLA

[KEYWORDS] formal verification, model checking, theorem proving, distributed algorithms, TLA

[RESEARCH INTERESTS] We are interested in the formal verification of distributed algorithms expressed at a high level of abstraction in the TLA+ formalism. In particular, our research group contributes to the development of TLAPS, the TLA+ Proof System, an interactive proof assistant that uses different automatic theorem provers, including SMT solvers and superposition-based systems, as back-end provers. Topics of particular interest include (1) efficient encodings of set theory for automatic theorem provers, (2) the integration of symbolic model checking and theorem proving, and (3) the certification of results obtained by an automatic back-end prover through a skeptical proof assistant.

[TEAM NAME] VeriDis

[DESCRIPTION] The VeriDis project aims to exploit and further develop the advances and integration of interactive and automated theorem proving applied to the area of concurrent and distributed systems. The goal of our project is to assist algorithm and system designers to carry out formally proved developments, where proofs of relevant properties as well as bugs can be found fully automatically. We believe that a substantially higher degree of automation can be achieved in system verification over what is available in today's verification tools.

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Inria MSCA-PF 2025 hosting offer Nancy #2: Formal methods, Model checking, Automata theory, security, opacity

[KEYWORDS] Formal methods, Model checking, Automata theory, security, opacity

[RESEARCH INTERESTS] The pervasiveness of cyber-physical systems is highly increasing, raising many safety and security concerns. Formal methods aim at tackling those problems through the verification of formal properties on a model abstracting the real system.A well-known formal model to reason about timed systems is timed automata, an extension of finite-state automata with continuous clocks measuring time. Our main objective is to study security properties such as opacity for timed automata while including features such as control, parameters and probabilities.This research has theoretical aspects, as well as applications to cybersecurity.

[TEAM NAME] MOSEL-VeriDis

[DESCRIPTION] The VeriDis project aims to exploit and further develop the advances and integration of techniques to formally verify systems. On the one hand, the team is concerned with developing efficient model checking techniques, notably for quantitative systems (probabilistic automata, timed automata…). On the other hand, the team develops interactive and automated theorem proving applied to the area of concurrent and distributed systems. VeriDis is a team of LORIA (Université de Lorraine, Inria, CNRS), a large laboratory (> 500 members) recognized internationally.

[LINK] https://www.loria.fr/en/research/teams/mosel-veridis/

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Inria MSCA-PF 2025 hosting offer Nancy #3: Multimodal speech, gesture generation, human-machine interaction, machine learning

[KEYWORDS] Multimodal speech, gesture generation, human-machine interaction, machine learning

[RESEARCH INTERESTS] We are interested in studying multimodal speech communication in an Interactional context. Our group is interested in studying the multimodal components (prosody, facial expressions, gestures) used during interaction, both by the speaker and by the interlocutor (the listener). We consider the simultaneous generation of speech and gestures by the speaker. We also consider generating regulatory gestures by the listener, such as signs of understanding, follow-up or approval (mainly head nods, hand and arm gestures, and facial expressions). Modeling and integrating these gestures in a virtual assistant or in a robot and synchronizing them with speech will make the spoken communication more realistic in the context of human-machine interaction.

[TEAM NAME] MULTISPEECH

[DESCRIPTION] The Multispeech project-team considers speech as a multimodal signal with different modalities: acoustic, facial, articulatory, gestural, etc. We focus on the analysis and synthesis of these modalities and on their multimodal dependencies in the context of human-human or human-computer interaction. In particular, we are interested in designing machine learning models and techniques to extract information about the linguistic content, the speaker identity and states, and the speech environment, and to synthesize multimodal speech using limited amounts of labeled data.
The team has three main research axes:
(1) Data-efficient and privacy-preserving learning,
(2) Extracting information from speech signals,
(3) Multimodal speech: generation and interaction.

[LINK] https://team.inria.fr/multispeech/

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Inria MSCA-PF 2025 hosting offer Nancy #4: Multimodal speech, spoken language understanding, dialog manager, NLP, human-machine interaction

[KEYWORDS] Multimodal speech, spoken language understanding, dialog manager, NLP, human-machine interaction

[RESEARCH INTERESTS] Our mid-term goal is to develop an embodied voice assistant that displays realistic spoken communication skills and is easy to use by developers. This calls for research on the following topics:
1) low-resource spoken language understanding (SLU)
We aim to enable developers to quickly set up an SLU system for a new language and domain, with as little data and human input as possible. To do so, we seek to reuse SLU datasets and models for other languages and domains by means of interactive data augmentation and transfer learning.
2) multimodal SLU and dialog management (DM)
In addition to the linguistic facet of human-machine dialog, we aim to analyze speech, facial movements, and gestures to characterize the speaker's intention (e.g., irony), the listener's reaction, and the way the speaker adapts his/her speech according to the listener's reaction. This implies that we break the classical DM scheme to dynamically account for the listener's reaction while the speaker is talking.

[TEAM NAME] MULTISPEECH

[DESCRIPTION] The Multispeech project-team considers speech as a multimodal signal with different modalities: acoustic, facial, articulatory, gestural, etc. We focus on the analysis and synthesis of these modalities and on their multimodal dependencies in the context of human-human or human-computer interaction. In particular, we are interested in designing machine learning models and techniques to extract information about the linguistic content, the speaker identity and states, and the speech environment, and to synthesize multimodal speech using limited amounts of labeled data.
The team has three main research axes:
(1) Data-efficient and privacy-preserving learning,
(2) Extracting information from speech signals,
(3) Multimodal speech: generation and interaction.

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Inria MSCA-PF 2025 hosting offer Nancy #5: DNN-based hate speech detection using speech signal and text data

[KEYWORDS] DNN-based hate speech detection using speech signal and text data.

[RESEARCH INTERESTS] Hate speech expresses an antisocial behavior. In many countries, online hate speech is punishable by the law. Manual analysis of such content and its moderation are impossible. An effective solution to this problem would be the automatic detection of hate comments. Until now, for hate speech detection, only the text documents have been used. We would like to advance the knowledge about hate speech detection by exploring a new type of document: audio documents.
We would like to develop a new methodology to automatically detect hate speech, based on Machine Learning and Deep Neural Networks using text and audio.

[TEAM NAME] MULTISPEECH

[DESCRIPTION] The Multispeech project-team considers speech as a multimodal signal with different modalities: acoustic, facial, articulatory, gestural, etc. We focus on the analysis and synthesis of these modalities and on their multimodal dependencies in the context of human-human or human-computer interaction. In particular, we are interested in designing machine learning models and techniques to extract information about the linguistic content, the speaker identity and states, and the speech environment, and to synthesize multimodal speech using limited amounts of labeled data.
The team has three main research axes:
(1) Data-efficient and privacy-preserving learning,
(2) Extracting information from speech signals,
(3) Multimodal speech: generation and interaction.

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Inria MSCA-PF 2025 hosting offer Nancy #6: Weak Social Signals, gesture generation, human-machine interaction, deep learning

[RESEARCH INTERESTS] We aim to enhance the naturalness of virtual avatars (IVA) and social robots by generating weak social signals—subtle, non-communicative behaviors such as micro-movements of the eyes,

spontaneous blinking, and idle head shifts—that are crucial for making interactions appear lifelike. While significant progress has been made in gesture generation for speech animation, current systems often fail to escape the uncanny valley. This project focuses on modeling and synthesizing these weak signals using deep learning techniques to improve the realism of IVAs. We will analyze the role of weak signals in human communication, develop generative models, and evaluate their impact through objective and perceptual studies. The long-term goal is to enhance the naturalness of multimodal speech communication in human-machine interaction.

[DESCRIPTION] The Multispeech project-team considers speech as a multimodal signal with different modalities: acoustic, facial, articulatory, gestural, etc. We focus on the analysis and synthesis of these modalities and on their multimodal dependencies in the context of human-human or human-computer interaction. In particular, we are interested in designing machine learning models and techniques to extract information about the linguistic content, the speaker identity and states, and the speech environment, and to synthesize multimodal speech using limited amounts of labeled data.
The team has three main research axes:
(1) Data-efficient and privacy-preserving learning,
(2) Extracting information from speech signals,
(3) Multimodal speech: generation and interaction.

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Inria MSCA-PF 2025 hosting offer Nancy #7: Machine learning, robotics, teleoperation, environmental awareness, adaptive behavior

[KEYWORDS] Machine learning, robotics, teleoperation, environmental awareness, adaptive behavior

[RESEARCH INTERESTS] We are interested in developing intuitive teleoperation for humanoid robots, so that an operator can remotely command the robot to realize a huge variety of complex loco-manipulation tasks (open doors, use appliance, sort objects, repair items, etc).
To do so, we are interested in advancing in the following skills:
1) anticipating the human operator to predict their goals and desired trajectories;
2) learning to transition optimally between teleoperation and autonomy, beyond the classic shared control mechanisms;
3) learning to execute tasks from teleoperated demonstrations;
4) execute complex dynamic tasks without haptic feedback;
5) teleoperating the robot with multimodal interfaces/channels;
6) increasing the operator awareness with more robots, more sensors, or digital twins.
We are seeking motivated and creative collaborators that are motivated to realize experiments with our humanoid robots Talos and Tiago.

[TEAM NAME] LARSEN

[DESCRIPTION] The team Larsen was created in INRIA Nancy on January 1st, 2015.
The team Larsen's vision is to have robots outside of the research labs and manufacturing industries. To reach this goal, the team Larsen is developing methods to endow robots with long-term autonomy and interaction skills, grounded on physical and social interaction, machine learning, and planning under uncertainty. Experiments, especially in service and assistive robotics, are at the core of our methodology.
The team is involved in the European project euROBIN, leading a team participating to a personal robotics competition, where bimanual robots and humanoid robots (Tiago, Talos) must solve every year more and more challenging interaction and manipulation tasks in a house environment.

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Inria MSCA-PF 2025 hosting offer Nancy #8: Machine learning, robotics, exoskeletons, adaptive behavior

[KEYWORDS] Machine learning, robotics, exoskeletons, adaptive behavior

[RESEARCH INTERESTS] We are interested in anticipatory adaptive control for active exoskeletons. We seek to model the user's behaviors and movements, considering the context in which the motions are executed, and to use these contextual models to improve the control of the exoskeleton. The objective is to increase user acceptance, reduce the metabolic cost, improve transparency and performance in the assistance.
One the one side, we look for collaborators interested into developing contextual prediction models from wearable and vision sensors, using machine learning techniques. The objective is to have models that run in real-time on wearable computers embedded in the exoskeleton.
On the other side, we look for collaborators that are interested into developing ethically aligned shared control techniques that rely on AI models that are intuitive for the user to tune and understand, making the algorithms usable in realistic settings. The goal is to validate these control techniques with experiments with human participants.

[TEAM NAME] LARSEN

[DESCRIPTION] The team Larsen was created in INRIA Nancy on January 1st, 2015.
The team Larsen's vision is to have robots outside of the research labs and manufacturing industries. To reach this goal, the team Larsen is developing methods to endow robots with long-term autonomy and interaction skills, grounded on physical and social interaction, machine learning, and planning under uncertainty. Experiments, especially in service and assistive robotics, are at the core of our methodology.
The team is involved in the European project euROBIN, leading a team participating to a personal robotics competition, where bimanual robots and humanoid robots (Tiago, Talos) must solve every year more and more challenging interaction and manipulation tasks in a house environment.

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Inria MSCA-PF 2025 hosting offer Nancy #9: mathematical modelling, data assimilation, data analysis, brain activity

[KEYWORDS] mathematical modelling, data assimilation, data analysis, brain activity

[RESEARCH INTERESTS] We are interested in developing neurostimulation techniques in order to improve the cure of patients suffering from mental disorders. To this end, our aim is to develop dynamic neural models and merging these data to experimentally observed data, such as EEG or BOLD responses. This merge may utilize diverse optimization techniques, such as data assimilation. The latter permits to estimate model parameters adaptively in non-stationary signals, i.e. online in time. A prominent example for a data assimilation technique is Kalman filtering.
More detailed, we are looking for collaborators, who are interested in neural population models describing macroscopic brain activity in pathological brain states under neurostimulation. The mathematical analysis of such models typically yields important insights into the origin of the brain activity. Moreover, the merge with experimental data demands a certain understanding of data analysis techniques to prepare the experimental data and identify correctly good biomarkers. It would be advantageous if the future colleague has some fundamental expertise in this respect. Finally, the perfect future collaborator has already some expertise in parameter estimation techniques, especially in data assimilation.

[TEAM NAME] MIMESIS

[DESCRIPTION] The MIMESIS research team works on a set of scientific challenges in the field of scientific computing, data assimilation, machine learning, and control with the objective of creating real-time digital twins in the medical context. Our main application domains are surgical training, surgical guidance during complex interventions and pre-clinical research in neurostimulation.

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Inria MSCA-PF 2025 hosting offer Nancy #10: distributed systems, collaborative systems, replication, trust, security, user studies

[KEYWORDS] distributed systems, collaborative systems, replication, trust, security, user studies

[RESEARCH INTERESTS] Our vision is to move away from centralized authority-based collaboration towards large scale trustworthy peer-to-peer collaboration where control over the data is given to users who can decide with whom to share their data. Collaboration involves humans and agents that complete joint activities.

Particular topics include:

1. Replication algorithms that maintain consistency of the shared data in the face of concurrent modifications such as CRDTs (Conflict-Free Replicated Data Type – types of data replicated without conflict)
2. Trust assessment of users/agents according to their past behavior in the collaboration.
3. Security mechanisms for distributed collaborative systems without a central authority including an access control to the shared documents, an end-to-end encryption of data and a key management suitable for user dynamic groups
4. Study of long term collaboration in application domains such as software engineering based on collaboration traces and user interviews.

[TEAM NAME] COAST

[DESCRIPTION] Team COAST works on distributed collaborative systems that enable distributed group work using computer technologies. Designing such systems require an expertise in distributed systems and computer-supported cooperative work. Besides theoretical and technical aspects of distributed systems, design of distributed collaborative systems must take into account the human factor to offer suitable solutions for users. Currently the team coordinates one project with HIVE company (https://www.hivenet.com/) that aims to propose an alternative peer-to-peer cloud which provides both computing and data storage via a peer-to-peer network rather than from a centralised set of data centers. It also coordinates one of the axes of the PEPR project

eNSEMBLE (https://www.lri.fr/~mbl/eNSEMBLE/home.html). In order to support French and European sovereignty over digital services infrastructure, eNSEMBLE will redesign the entire stack of digital services from the underlying infrastructure to user interface by integrating open and interoperable collaborative functionalities.

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Inria MSCA-PF 2025 hosting offer Nancy #11: Quantum computing, lambda-calculus, proof-theory, linear logic, category theory

[KEYWORDS] Quantum computing, lambda-calculus, proof-theory, linear logic, category theory.

[RESEARCH INTERESTS] The long-term project is to extend the Curry-Howard-Lambek isomorphism to quantum computing. For that, we work with quantum extensions of the lambda-calculus, mainly in the quantum control paradigm, and its categorical models, and aim at relating it with mainstream languages such as the ZX-calculus or the classical-control Quantum Lambda Calculus. The following are possible short-term projects that can be developed in the context of the long-term project: 1. Extend one of the quantum control lambda-calculi, such as the Lambda-S1 calculus, with more features, such as higher-order functions or polymorphism. 2. Studying the duality between quantum calculi and linear logic, from a categorical perspective. 3. Use Lambda-S as a quantum logic to prove properties of quantum algorithms.

[TEAM NAME] Mocqua

[DESCRIPTION] The Mocqua team investigates new computational models, including quantum computing, higher-order computing, and computing with infinite precision, to address challenges arising from the increasing complexity of digital systems. They aim to develop solutions through computational and algorithmic methods, bridging the gap between computer science and interdisciplinary fields like physics, biology, and mathematics.

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Inria MSCA-PF 2025 hosting offer Nancy #12: Bayesian statistical inference, complete and incomplete data, EM algorithms

[KEYWORDS] random patterns and structures in spatial data, Gibbs Markov processes, marked point processes with interactions, Markov random fields, spatio-temporal stochastic processes, MCMC simulation, adapted MCMC dynamics, exact simulation, stochastic algorithms, Bayesian statistical inference, complete and incomplete data, EM algorithms

[RESEARCH INTERESTS] We call spatial data a set in which each element has two components: position and characteristics. Catalogues of galaxies in astronomy, geological faults, digital images, the distribution over the territory of measurements concerning the spread of a disease, collaborative networks created by researchers in an institute or records of leaks in a water distribution network are examples of spatial data. In many situations, analysing spatial data means answering the following question: what pattern is “hidden” in the data? The aim of this research project is to propose probabilistic and statistical tools to answer this question.More specifically, the aim is to develop the following research directions:

- stochastic modelling: build the pattern of interest
- MCMC simulation: understanding the behaviour of the pattern
- statistical inference and evaluation: detect and characterise the pattern present in the data, does the detected pattern really exist?

The main areas of application are: astronomy, environmental sciences, image analysis, geosciences and industry.

[TEAM NAME] PASTA

[DESCRIPTION] PASTA is a joint research team between Inria - Nancy Grand Est, CNRS and the University of Lorraine, based at the Institut Elie Cartan de Lorraine. The aim of the PASTA team is to build and develop new methods and techniques by exploiting and interweaving stochastic modelling and statistical tools to integrate and analyse real data.

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Inria MSCA-PF 2025 hosting offer Nancy #13: Computer Vision, Visual Localization, Geometric Deep Learning, Invariance, Equivariance, Foundation models, Vision-Language Models, Self-supervised Learning

[KEYWORDS] Computer Vision, Visual Localization, Geometric Deep Learning, Invariance, Equivariance, Foundation models, Vision-Language Models, Self-supervised Learning.

[RESEARCH INTERESTS] Object-based visual localization consists in relying on a few high-level landmarks for estimating the current camera pose with respect to a known map of the environment. Such an approach allows

for relying only on a few distinctive features recognizable under a large variety of seen and unseen viewpoints. However, existing approaches are limited to controlled environments and previously learned object categories. To extend the scope of applications of these methods, we are interested in leveraging zero-shot capabilities of novel foundation models, and especially vision-language models such as CLIP. As a basis, we therefore intend to study the geometric properties (e.g., invariance, equivariance) of such representations with respect to geometric image transformations (e.g., originating from viewpoint variations). Can we imagine a systematic framework for assessing geometric properties of neural representations of images? What is the effect of neural architecture on such properties? What is the effect of learning strategy? What is the effect of multi-modality? These are some of the research questions we propose the excellent applicant to address. Any input is of course very welcome.

[TEAM NAME] TANGRAM

[DESCRIPTION] The main focus of TANGRAM is on physically coherent modeling, accurate visual registration and robust estimation techniques. Visual registration and modeling are two research topics with a rich history in computer vision. The TANGRAM team aims at addressing some specific aspects of these fields which are still largely unsolved. Difficulties originating in the nature of the scene (poorly textured or specular environments), in the motion undergone by the object (tiny motions which hardly emerge from the noise floor, or in contrast, highly deformable objects) and in temporal variations, are under the scope of the team. In the recent years, TANGRAM has especially developed a recognized expertise in object-based localization, which is in line with this proposal.

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MSCA Postdoctoral Fellowships Offers for 2025 at Inria Saclay Centre

Inria MSCA-PF 2025 hosting offer Saclay #1: Personalized GenAI for individual mobility dataset synthetic generation

[KEYWORDS] Synthetic mobility generation, privacy-compliant datasets, Generative AI, out-of-domain

generation, disentangled representations, mobility time-series

[RESEARCH INTERESTS] The focus and the evolving directions of TRiBE research contribute, among others, to the priority themes “Digital Security” and “Responsible AI and Algorithms”. Building on a combination of protocol design, data learning, modeling, and experimental research, TRiBE’s contributions aim to shape thoughtful, unified, and perceptive Internet Edge networks designed to effectively meet the purposes of the demand and adapt to the specificities and usability of devices. In this context, human dynamics directly influence how resources, services, and infrastructures are utilized at the Internet Edge. Consequently, studying end-users’ behavioral patterns (e.g., mobility) and incorporating the inherent heterogeneity and unpredictability into networking solutions is critical. Our research aims thus to establish a tactful networking design practice – enabling networks to observe, interpret, and adapt dynamically to the daily life features of high-end IoT devices’ end-users. Individual mobility datasets are a primary but rare resource in this research goal.

[TEAM NAME] : TRiBE (“inTeRnet BEyond the Usual”)

[DESCRIPTION] Accessing mobility traces has become increasingly challenging due to three key factors: the high complexity and cost of data collection, strict privacy regulations limiting data availability, and the commercial sensitivity of mobility data, which discourages organizations from sharing it. Even when mobility datasets are shared, they are often aggregated or anonymized using privacy-preserving techniques such as k-anonymity or differential privacy. While these methods help protect individual identities, they also obscure fine-grained mobility patterns, reducing the datasets' utility for research and network optimization.
Although various data augmentation and generation techniques exist to model mobility patterns, they often fail to capture the complexity of real-world human movement accurately. Recent advances in Generative AI (GenAI) offer a promising alternative that directly addresses these challenges. Specifically, we will leverage state-of-the-art GenAI models, such as Variational Autoencoders (VAEs) and Generative Adversarial Networks (GANs), which enable disentangled representations—the ability to separate different factors of variation within the latent space. Although commonly explored in domains such as image generation, translation, and spatiotemporal data analysis, recent studies on human mobility have investigated disentanglement techniques only for mobility forecasting tasks. Thus, the application of disentangled representations specifically for generating synthetic mobility datasets remains relatively unexplored. By leveraging disentangled representations, we can generate synthetic mobility traces that allow specific characteristics to be modified independently while keeping others unchanged.
To our knowledge, leveraging Disentangled-featured GenAI models for capturing and generating heterogeneous per-individual synthetic mobility datasets realistically, represents a significant and novel advancement in the field. The resulting synthetic datasets will effectively obscure real individuals’ spatiotemporal habits—such as daily routines, work- home transitions, and leisure activities—while preserving realistic mobility patterns enhancingusability and privacy protection.

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Inria MSCA-PF 2025 hosting offer Saclay #2: *Quantified Logics in Deep Inference*

[KEYWORDS] proof theory, deep inference, first-order logic, epsilon calculus, cut elimination, logic programming

[RESEARCH INTERESTS] The PARTOUT project is interested in the principles of deductive and computational formalisms. In the broadest sense, we are interested in the question of trustworthy and verifiable meta-theory. PARTOUT works on the question of the essential nature of deductive or computational formalisms. For instance, we are interested in the question of proof identity that attempts to answer the following question: when are two proofs of the same theorem the same? Surprisingly, this very basic question is left unanswered in proof theory, the branch of mathematics that supposedly treats proofs as algebraic objects of interest. We also pay particular attention to the combinatorial and complexity-theoretic properties of the formalisms.

[TEAM NAME] PARTOUT

[DESCRIPTION] PARTOUT investigates the well-studied foundational questions of the meta-theory of logical systems and type systems: cut-elimination and focusing in proof theory, type soundness and normalization theorems in type theory, etc. The focus of our research here is on the fundamental relationships behind the notions of computation and deduction. We are particularly interested in relationships that go beyond the well-known Curry-Howard correspondences between proofs and programs. Indeed, interpreting computation in terms of deduction (as in logic programming) or deduction in terms of computation (as in rewrite systems or in model checking) can often lead to fruitful and enlightening research questions, both theoretical and practical.

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Inria MSCA-PF 2025 hosting offer Saclay # 3: Quantum Computation

[KEYWORDS] : *Quantum Computation, Quantum Algorithms, Quantum Programming Languages, Graphical Languages, Quantum Cellular Automata, Quantum Simulation Algorithms, Categorical Models of Quantum Computation.*

[RESEARCH INTERESTS] The QuaCS team is interested in quantum computational structures from a wide angle : categorical and mathematical models, compilation and programming of algorithms, dedicated quantum graphical languages, and foundational approaches to quantum computation and its connection to physics.

[TEAM NAME] : *QuACS*

[DESCRIPTION] Encoding information within quantum systems and manipulating them promises to lead to great advantages, with three main application domains: quantum cryptography, quantum simulation, and quantum algorithmics. To understand its strengths and limits, we take a transversal stance and seek to capture which resources are granted to us by nature, at the fundamental level, for the sake of computing (e.g. quantum & spatial parallelism). We do so by abstracting away physics' ability to compute, into formal models of quantum computation (e.g. quantum automata and graph rewriting models). We then verbalize its main structures as quantum programming languages (e.g. quantum lambda-calculus, process algebra). Actually, the process goes both ways, when developments in quantum programming languages lead to the discovery of new structures which may or may not be compilable into formal models of quantum computation, raising the sometimes fascinating question of the physicality of these resources.

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Inria MSCA-PF 2025 hosting offer Saclay #4: *Quantum Information Theory*

[KEYWORDS] : *Quantum Information Theory*, Machine Learning for Quantum Sciences, Categorical and Graphical Frameworks for Quantum Computing

[RESEARCH INTERESTS + DESCRIPTION]

Our research explores the potential of quantum information processing, focusing on quantum networks and distributed computing. We examine fundamental distinctions between classical and quantum information theory, identifying key tasks that showcase these differences and developing protocols in collaboration with experimental groups. Our work spans quantum correlations in networks, quantum theory foundations, quantum device certification, quantum optics, and many-body physics. By integrating methods from quantum information theory, theoretical computer science, and advanced mathematical frameworks such as C*-algebras and non-commutative polynomial optimization, we address these challenges from multiple perspectives.

Beyond these foundational and network-related aspects, we also investigate the computational challenges posed by quantum systems. The complexity of quantum materials and devices is often constrained by the limitations of current analytical and numerical methods. Machine learning and data science, with their ability to manage high-dimensional problems, provide a promising avenue for advancing computational quantum physics. Our goal is to develop innovative algorithms that address fundamental quantum physics questions with practical technological and societal implications. By framing physical problems as optimization challenges, we leverage deep neural networks and Monte Carlo techniques to enhance computational feasibility.

Additionally, we explore deep theoretical topics such as the relationships between tensor networks and symbolic dynamics, promonads in programming, and combinatorial interpretations of ZW-calculus. We study graphical languages for infinite-dimensional quantum mechanics and investigate their foundational role within the prop formalism. Moreover, we apply categorical approaches to relational quantum mechanics to advance our understanding of these frameworks, contributing to the broader intersection of quantum computing, mathematical structures, and computational methods.

[TEAM NAME] : PhiQus

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Inria MSCA-PF 2025 hosting offer Saclay #5: Bioinformed Monitoring and Optimization

[KEYWORDS] : Control Theory, signal processing, artificial intelligence, machine learning, Mathematical modeling, Health, sports. Movement assistance, physiology, heart-brain interplay.

[RESEARCH INTERESTS]

Signal processing and learning-based methods for neurophysiological signals processing and monitoring, Modeling and estimation of complex coupled dynamics, Develop optimal control methods and algorithms to improve human-exoskeleton in interaction

[TEAM NAME] : BOOST

[DESCRIPTION] BOOST (Bio-informed Monitoring & Optimization for Enhanced Sport & Health) is an Inria project, in collaboration with the CIAMS (Complexité, innovation, activités motrices et sportives) laboratory at Université Paris-Saclay. BOOST focuses on advancing research and innovation by developing cutting-edge mathematical models, control systems, estimation techniques, and signal analysis methods and algorithms to enhance bio-informed systems. Applications of this project span critical areas such as human health, movement assistance, sports performance, and overall well-being. Through multidisciplinary collaboration, BOOST aims to address pressing challenges and open new horizons in personalized health monitoring, rehabilitation, and performance optimization.

[LINK] *Insérer le lien de l'équipe :* https://team.inria.fr/boost/presentation/

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