Level of qualifications required : PhD or equivalent
Function : Post-Doctoral Research Visit

About the research centre or Inria department
Grenoble Rhône-Alpes Research Center groups together a few less than 800 people in 35 research teams and 9 research support departments.

Staff is located on 5 campuses in Grenoble and Lyon, in close collaboration with labs, research and higher education institutions in Grenoble and Lyon, but also with the economic players in these areas.

Present in the fields of software, high-performance computing, Internet of things, image and data, but also simulation in oceanography and biology, it participates at the best level of international scientific achievements and collaborations in both Europe and the rest of the world.

Context
The goal of this postdoctoral position is to study nanoscale communication systems from an information theoretic perspective. The position is funded for 18 months by an Exploratory Research Project grant by the French research agency Inria. The successful candidate will work within the CITI Laboratory, a joint laboratory between Inria, the University of Lyon and INSA (National Institute of Applied Sciences). The CITI Laboratory is based in the attractive French city of Lyon.

Assignment
The successful candidate will work within an active research collaboration of scientists primarily from Inria and CNRS, hosted by Dr Malcolm Egan within the CITI Laboratory.

The focus of the project is on information theoretic limits of nanoscale communication networks exploiting molecular communication, where information is encoded in the quantity, type or timing of molecules emitted by a nanoscale device. A key aspect of the study will be to investigate interactions between the molecular communication system and external biological systems. In particular, transmissions by the molecular communication system will be constrained in order to ensure that the function of the external biological system is not disrupted.

References on molecular communication and information theoretic approaches to its study can be found: https://malcolmalexegan.wordpress.com/notes-and-references/molecular-communication-references/

The project will consider three questions and the focus of the successful candidate will largely depend on their background and interests. Recent work has exploited chemical reaction networks and their steady state behaviour. The first question is therefore how to improve the models for the interactions between the communication system and external biological systems. The second question concerns information theoretic limits of communication systems that provide guarantees such as limited perturbations of the steady states of the chemical reaction network models. The third question is how the molecular communication system might obtain side information on models for the behaviour of the external biological system by exploiting statistical statistical detection and estimation theory.

The successful candidate will be responsible for carrying out research into these questions. This will involve formalisation of models, analysis of communication strategies and their impact on the models of biological systems, preparing reports and research articles on findings, and disseminating the results through attendance of conferences and seminars.

Main activities
Main activities:
- Mathematical modeling
- Information theoretic analysis
- Writing of reports and research articles
- Dissemination of results in conferences

Skills
Technical skills and level required : PhD in electrical engineering, applied mathematics, computer science or systems biology or related fields.
Languages : English
Other valued appreciated : Interest in multidisciplinary collaboration.

Benefits package

About Inria
Inria, the French National Institute for computer science and applied mathematics, promotes "scientific excellence for technology transformation and society". Graduates from the world’s top universities, Inria’s 2,700 employees come to the challenges of digital sciences. With its open, agile model, Inria is able to explore original approaches with its partners in industry and academia and provide an efficient response to the multidisciplinary and application challenges of the digital transformation. Inria is the source of many innovations that add value and create jobs.

The keys to success
The successful candidate should have a high level of written and spoken English, evidenced in the form of published research articles. Proficiency in French is not required.

Candidates should hold a PhD in a field such as electrical engineering, applied mathematics, computer science or systems biology. A strong background in mathematical modelling and analysis is required for this project and experience with information theoretic techniques is highly desirable. Due to the multidisciplinary nature of the work, an interest in discussing with researchers in biology, engineering and applied mathematics is also a positive feature.

Conditions for application
Defence Security :
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorization to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy :
As part of its diversity policy, all Inria positions are accessible to people with disabilities.

Warning : you must enter your e-mail address in order to save your application to Inria.
- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Flexible working hours
- Sports facilities

**Remuneration**
2653 euros brut

Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.