About the research centre or Inria department

The Inria Rennes - Bretagne Atlantique Centre is one of Inria’s eight centres and has more than thirty research teams. The Inria Rennes Center is a major and recognized player in the field of digital sciences. It is at the heart of a rich R&D and innovation ecosystem: highly innovative PMEs, large industrial groups, competitiveness clusters, research and higher education players, laboratories of excellence, technological research institute, etc.

Context

Within the framework of a partnership (you can choose between)

- collaboration with GRANIT IRISA team in Rennes

A prototype is expected, more specifically dedicated to the monitoring of professional cyclists using specialized body sensor network. The Immernome platform will offer experimental facilities required for this Postdoc.

Mimetic Inria team is associated with M2S laboratory (Movement, Sport, Health) of the University of Rennes 2 is part of the top 200 in the global ranking of the best universities in the social sciences. The M2S laboratory is interested in the effects of sports and physical activity on performance and health. The M2S lab pursues this goal using multidisciplinary approaches, specifically coupling movement analysis and synthesis based on both experimental data and digital human models. To do so, the laboratory can rely on an exceptional ImmenMove technical platform that includes a virtual reality room (12x4x4 m) and a sports hall (30x20x10 m) dedicated exclusively to the analysis of the movement. This platform includes various motion analysis equipment such as optical and inertial motion capture systems, external force evaluation and electromyographic systems.

Is regular travel foreseen for this post? No. Mainly communication in conferences: "travel expenses are covered within the limits of the scale in force".

Annual Gross Salary: 31,000 euros.

This Fellowship is funded by Université Bretagne Loire and Labex CominLabs.

The CominLabs laboratory of excellence (for "ComMunication and INformation Sciences Laboratories") brings together 1100 researchers, more than 500 of whom are permanent between Brittany and Nantes, who come from a dozen institutions (universities, research organisations, grandes écoles). This project must contribute to the improvement of digital uses, particularly in the health field by relying on mobile platforms with enhanced functionalities (e.g. monitoring of physiological and physical parameters). This project of excellence brings together the following partners: CNRS, INSERM, INRIA Rennes Bretagne Atlantique, University of Rennes 1, University of Rennes 2, University of Western Brittany, University of South Brittany, University of Nantes, Nantes Mining Schools, INS A Rennes, ENS Cachan - Bretagne, Telecom Bretagne, Supélec.

Assignment

Assignments:

With the help of Guillaume Nicolas and Nicolas Bideau, the recruited person will be taken to propose innovative solutions and methods to transpose the tools and methodologies used in motion capture from optoelectronic equipment to inertial unit devices, in the specific cycling application domain. It is carried out within a collaborative framework between the Granit team at IRISA (http://www-granit.ira.inria.fr/) and the M2S laboratory (http://m2s2lab.com). The Granit team is recognized in the field of algorithm design and transmission systems architectures able to adapt to their environment.

In this context, the M2S laboratory provides skills in analyzing the determinants of physical activity. The biomechanics team is affiliated to the INRIA Mimetic project team, specialized in providing digital solutions for the analysis-synthesis loop of human movement.

The overall objective of the Moonlight project is therefore to combine these research skills and interests to design and implement a new generation of embedded systems capable of analyzing sporting movement in actual practice situations. The main application of this project concerns the analysis of pedaling movement in real cycling conditions (road, velodrome etc.). The implementation of a solution to this problem requires to bridge several knowledge gaps. Firstly regarding sensors, it is necessary to design a hardware and software architecture capable of precisely measuring movement parameters over long periods of time and over a large area of capture. Secondly regarding movement pattern recognition, it is necessary to reconstruct the movement of athletes from a reduced set of data from elementary sensors (inertial, magnetic, radiofrequency, etc.). One of the main challenges is to accurately estimate the joint angles from the sensors to calculate segmental physiological and physical parameters. The accuracy of these calculations is paramount to be able to analyze and optimize performance while preserving the physical integrity of athletes.

Keys to success

- Recent doctorate (PhD) in signal processing or in sports sciences (biomechanics), with a maximum 3 years of experience after thesis defense.
- An international experience in research is required (during or after Doctorate).
- Candidates must not have supported their thesis in the hiring institution and not previously worked in the host research unit.

Conditions for application

- Please submit online: your resume, cover letter and letters of recommendation eventually.
- 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). Authorisation 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. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.
Collaboration:
It is carried out within a collaborative framework between the Granit team at IRISA (http://www-granit.irisa.fr/) and the M2S laboratory (http://m2slab.com). The Granit team is recognized in the field of algorithm design and transmission systems architectures able to adapt to their environment.

Responsibilities:
The person recruited is responsible for proposing new methods and algorithms, develop prototype and test it in laboratory and real conditions.

Steering/Management:
The person recruited will be in charge of co-managing the Moonlight collaborative project, co-organizing meetings and reports.

Main activities
Main activities (5 maximum):
- Propose software solutions for computing relevant information based on inertial sensors, with signal processing to enhance the quality of the collected data.
- Develop programs and interfaces to design a prototype
- carry-out experiments and tests, to evaluate and calibrate the prototype

Additional activities (3 maximum):
- Write documentation
- Write reports
- Write and present papers in international conferences and journals

Skills
Technical skills and level required:
- Biomechanics and motion capture (optoelectronics and/or inertial units)
- Mechanics of solids
- Signal processing
- Scientific computing (ex: MATLAB, Java, C/C++)

Languages: English is expected with good practice

Relational skills: work in a group of scientist, dynamic, curious, interested in both signal processing software development and experimental set-ups

Other valued appreciated: interest in sports

Benefits package
- Subsidised catering service
- Partially-reimbursed public transport

Remuneration
Monthly gross salary amounting to 2653 euros