
Level of qualifications required: PhD or equivalent
Fonction: Post-Doctoral Research Visit
Level of experience: From 3 to 5 years

About the research centre or Inria department
The Inria Sophia Antipolis - Méditerranée center counts 37 research teams and 9 support departments. The center's staff (about 600 people including 400 Inria employees) is composed of scientists of different nationalities (250 foreigners of 50 nationalities), engineers, technicians and administrators. 1/3 of the staff are civil servants, the others are contractual. The majority of the research teams at the center are located in Sophia Antipolis and Nice in the Alpes-Maritimes. Six teams are based in Montpellier and a team is hosted by the computer science department of the University of Bologna in Italy. The Center is a member of the University and Institution Community (ComUE) "Université Côte d'Azur (UCA)."

Context
As part of a long-term collaboration between the HEPHAISTOS project, the University Hospital of Nice and the Rehabilitation center of Vallauris we are working on the application of virtual reality in rehabilitation

The objectives are:

- improve the realism of the exercises performed in virtual reality by actuating the exercise equipments and / or the body of the subjects in order to increase the motivation of the subjects and to allow to propose a greater variety of exercises
- take advantage of these actuations to be able to offer exercises even to people with very limited mobility, to be able to modulate the difficulty of the exercises, to place the body of the subject in the most favorable pose for the rehabilitation and to be able to repeat finely a given exercise
- monitor the rehabilitation process using external or wearable sensors (motion capture, accelerometers, forces, distance, ..) providing the necessary measures for the calculation of synthetic and medically relevant indicators. These elements will be integrated in a coherent, modular and flexible framework that can be adapted to to the available hardware, that can be reconfigured very quickly and will require a minimal setup time for the subjects.

This collaboration requires to travel in Sophia's immediate environment for consultations with the medical community.

Assignment

Missions: the current platform allows the potential use of 3 types of actuation:
lifting columns, motion base with 6 degrees of freedom and cable-driven parallel robot, these three systems being able to lift a person. The mission is to integrate these systems into a coherent framework allowing to create a large variety of exercise, perform experimentation and then analyze the measures.

General Information

- Theme/Domain: Robotics and Smart environments
- Town/city: Sophia Antipolis
- Inria Center: CRI Sophia Antipolis - Méditerranée
- Starting date: 2018-11-01
- Duration of contract: 1 year, 4 months
- Deadline to apply: 2018-04-13

Contacts

- Inria Team: HEPHAISTOS
- Recruiter: Merlet Jean-pierre / jean-pierre.merlet@inria.fr

The keys to success

Programming skill, a strong appetite for experimentation, no priori on methods and means, being able to listen and discuss with doctors and an open mind towards other scientific domains are the essential ingredients for the success of this post-doctorate

Conditions for application

Before to apply, and preferably before march 20, it is strongly recommended to contact the scientific in charge of this offer.

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. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.
Exercise, perform experimentation and then analyze the measurement for defining appropriate synthetic indicators that reflect the progress of the exercise. This mission will be carried out with the help of a support engineer and the support of the project's permanent staff.

For a better knowledge of the proposed research subject, the candidate will be able to refer to the HEPHAISTOS project web page, in particular the assistance part and the "Gallery" part where some of the hardware available in the project is presented.

**Required skills**: Familiarity with C / C++ is needed as well as a strong taste for experimentation and a basic knowledge of the fundamentals in robotics. Skills in acquisition of measurements, rapid prototyping using Arduino, Phidgets and knowledge on parallel robots will be considered as bonus.

**Collaboration**: Experiments and measurement analysis will be done in close collaboration with the project's medical partners.

**Responsibilities**: In this position it will be asked to demonstrate initiatives regarding the adaptation of the measurement system surrounding a rehabilitation exercise so that it will be adaptable to the subjects, their pathologies and will allow to extract the maximum of medical information regarding the exercise, being given that there are very strong legal limits for human monitoring, in particular regarding the use of computer vision.
Main activities

Main activities:
- participate in the finalization of the actuated systems
- participate in the development of the measurement instrumentation
- prepare the environment for the realization of various rehabilitation exercises
- analyze the measurements to identify relevant indicators and their calculation method. The whole process and procedures will be detailed in a lab notebook while the results will be stored in a protected area

Additional activities:
- interact with physicians about possible exercises extension and the relevance of the indicators
- participate in writing a journal article

Skills

Technical skills and level required: Familiarity with C / C++ is required as well as a strong taste for experimentation and a basic knowledge of the fundamentals in robotics. Measurement acquisition skills, rapid prototyping on Arduino, Phidgets and knowledge on parallel robots will be of great value.

Languages: fluency in scientific English

Relational skills: open-minded and able to work in a team and for the team

Benefits package

- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Flexible working hours
- Sports facilities

Remuneration

Gross Salary: 2650 brutto per month