Offer #2025-08704

Post-Doctoral Research Visit F/M Acceptability, usability and acceptance of a gamified motor rehabilitation for children with cerebral palsy

Contract type : Fixed-term contract

Level of qualifications required : PhD or equivalent

Fonction : Post-Doctoral Research Visit

About the research centre or Inria department

The Inria Centre at Rennes University is one of Inria's eight centres and has more than thirty research teams. The Inria Centre 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

The REACH project brings together clinicians and researchers from two interdisciplinary teams: the physical medicine and rehabilitation (MPR) department of Rennes University Hospital and the Seamless team of IRISA.

Pr. Isabelle Bonan, Head of the MPR department at Rennes University Hospital, is the scientific coordinator of the REACH project which will benefit from her expertise in working on postural control with persons with brain-damages and her

numerous experience leading pioneering clinical studies with promising new technologies. Scientific research conducted on patients with cerebral palsy by Pr. Bonan has resulted in many publications (Cacioppo et al., 2020; Gaillard, Cretual, et al., 2018; Gaillard et al., 2020). The Dr. Viallard will also be actively involved in conducting the clinical trials. She holds a Master's degree (M2) in Adapted Physical Activity, with a module specifically dedicated to gait analysis, and is currently working on a PhD on the topic of this project. Finally, Mr. Cordillet, a research engineer with a PhD in movement analysis affiliated with the clinical and research unit will be involved. He has published work on movement analysis in adult neurological populations, such as stroke patients (Jamal, Cordillet et al., 2023). With a dedicated team and established processes, the department ensures rigorous compliance with research standards, contributing to advancements in medical knowledge and therapeutic innovation. The pediatric rehabilitation service at the University Hospital of Rennes benefits from a gait analysis laboratory, which operates routinely in a clinical setting and serves a large population of children with cerebral palsy.

The Seamless team, through the involvement of Léa Pillette (a newly hired CNRS researcher in the team), brings their multidisciplinary experience in computer science, particularly in modelisation and electroencephalographic signal processing, as well as their expertise in cognitive science and user-centered studies (Savalle et al., 2024; Le Jeune et al., 2024). The team has published many papers reporting results for many medical applications (Redjem et al., 2024; Hummel et al., 2023), many of them also involving electrophysiological analyses (Giulia et al., 2021; Le Franc et al., 2021).

Assignment

Cerebral palsy is the leading cause of motor disability in children and results from a brain injury that occurs before the age of 2. Children with cerebral palsy experience abnormal maturation of neuromuscular control, leading to pathological co-contractions between agonist and antagonist muscles, particularly during walking. Electroencephalography (EEG) analysis reveals changes in brain oscillations during movement, notably in the alpha, beta, and gamma frequencies. These oscillations are more pronounced in children with cerebral palsy, affecting their spatio-temporal gait parameters, such as speed and cadence. Although some current rehabilitation methods have led to reductions in pathological cortical activity, they often lack intensity and tend not to be motivating.

A rehabilitation and serious game called MYOHERO was developed by the team. It offers intensive and engaging rehabilitation, using surface electromyography (EMG) as a controller for a game to improve muscle selectivity and reduce co-contractions by targeting the tibialis anterior and triceps surae muscles in the leg.

The goal of the project is to assess the acceptability, usability and acceptance of this rehabilitation game. Amongst the originality of the project, the goal is to evaluate both the influence on gait and neurophysiological markers. Specifically, we expect that the amount of abnormal co-contractions during walking will be reduced and that the tibialis anterior (TA) and lateral gastrocnemius (Tcs) muscles will be strengthened. We also expect that these highly positive changes for children with cerebral palsy will also reflect some plastic reorganisation of the motor cortex and we will assess if such modification can still be observed in the long-term, 3 months after the end of the MYOHERO rehabilitation program.

Main activities

The tasks of the postdoc will, amongst others consist in:

- Literature review and contribute to the design of the different studies
- Data collection and signal processing and analysis
- Co-supervision of PhD student and graduate students
- Writing grant proposal with the help of the supervising team

Skills

Technical skills and level required : Knowledge in programmation

Languages : English

Other valued appreciated : A first experience with clinical research, knowledge in cognitive sciences and neurosciences would be a bonus.

Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking (after 6 months of employment) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities

- Access to vocational training

Remuneration

Monthly gross salary from 2 788 euros.

General Information

- **Theme/Domain :** Interaction and visualization
  Data production, processing, analysis (BAP D)
- **Town/city :** Rennes
- **Inria Center :** Centre Inria de l'Université de Rennes
- **Starting date :** 2025-06-01
- **Duration of contract :** 7 months
- **Deadline to apply :** 2025-05-06

Contacts

- **Inria Team :** SEAMLESS
- **Recruiter :**
  Pillette Lea / lea.pillette@inria.fr

About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

The keys to success

We are looking for a motivated candidate with knowledge in computer science and human-machine interfaces and a good level of English.

A first experience with clinical research, knowledge in cognitive sciences and neurosciences would be a bonus.

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.

Instruction to apply

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.