2020-02499 - Post-Doctoral Research Visit F/M (BN 20)
Curiosity in Virtual Reality devices as a lever for fostering spatial learning in large scale environments

Type of contract : CDD  
Level of diploma exigé : Thèse ou équivalent 
Function : Post-Doctorant

A propos du centre ou de la direction fonctionnelle

The Flowers project-team, at Inria and Ensta ParisTech, studies mechanisms that can allow robots and humans to acquire autonomously and cumulatively repertoires of novel skills over extended periods of time.

This includes mechanisms for learning by self-exploration, as well as learning through interaction with peers, for the acquisition of both sensorimotor and social skills. Sensorimotor skills include locomotion, affordance learning, active manipulation. Interactive skills include grounded language use and understanding, adaptive interaction protocols, and human-robot collaboration.

Contexte et atouts du poste

The post-doctoral project covers the challenge to build a “human-centered digital world” with innovative interactive systems providing “adaptive and personalized interactions with humans” for supporting “their wellbeing and health”.

It will constitute a significant part to the Flowers program managed by Pierre-Yves Oudeyer on “Curiosity-driven learning and route memory: (re)discovering specifically the curiosity-related [elements]” (Ed in Game Institute, Myra Fernandes, Cognitive neuroscience Lab), funded by the IDeX program between UB and University of Waterloo on the topic of “AI and health sciences”.

Mission confiée

How can we design (re)educational programs where individuals learn in a way that is intrinsically motivating, personalized, and at the same time achieves (re)educational objectives needed to socially participate as citizens of our world?

Flowers is an interdisciplinary research group, studying mechanisms that can allow robots and humans to acquire autonomously and cumulatively repertoires of novel skills over extended periods of time. The originality of the team’s work is to focus on intrinsic motivation as an essential ingredient of learning. One of main team’s purpose is studying how curiosity state can foster to learning mechanisms.

Curiosity in all ages is a core aspect of self-goal achievement and perseverance, well-being, and quality of life. Theoretical advances on curiosity have been made in the last decade such as its formalization in the learning progress model [2,3], in which activities that are most intrinsically motivating for individuals are self-chosen activities where empirical learning progress is maximal. Personalization is an essential challenge of (re)education, as each individual is unique and often requires different learning setup. VR based (re)educational apps have a huge potential to address this challenge worldwide, i.e., for helping children to acquire fundamental skills like the ability to orient in space, or even for helping older adults to manage their cognitive decline for nominal independent living. It is an open-question to understand how to design VR apps that personalize both for learning efficiency and intrinsic motivation, based on cognitive science principles [3,4].

This project is part of a team’s goal to provide children as well as older adults an efficient and unique tool for the development of space skills on a large scale (and their training in the elderly), the originality of which is to combine the assets of immersive technologies with recent scientific progress on curiosity and space exploration and learning behaviors.

Principales activités

Leveraging from our recent results on curiosity benefits for learning in both children [3,4] and older adults [5,6], this new post-doctoral proposal aims at the development of an original approach joining together two perspectives: 1) the fundamental study of curiosity-driven learning across life-span [children, young adults and older adults], 2) the study of how new (re)educational technologies, using both curiosity-related models and VR techniques, can maximize curiosity and learning efficiency in real world context.

We target to design a new VR application based on curiosity-related models to elicit human-computer interactions that are intrinsically motivating to enhance exploration behaviors and, then to foster spatial learning performance. This means this new VR application will propose a set of various environments (natural, urban spaces and shopping centers) that the user explores in different conditions of exploration (guided tour, free and/or arousing states of curiosity using motivational objects) and of spatial complexity (Environment size, changes of direction), and then to study visual exploration behaviors and robustness to curiosity-related configurations specifically the curiosity-related configuration of the property of VR application, it will lever from a preexisting prototype in which motivational objects can be introduced in environment to produce different intensity levels of curiosity states.

Our participant targets are children (from 8 years old), young and old adults. The expected results is showing the added value of a curiosity-centered (re)educational systems on spatial learning irrespective of age conditions, and demonstrate the greatest resistance to time-related forgetting (long term memorization by the study of near-far effects).

Overall, the activities of post-doctoral project will be twofold:

1) To design and enrich a preexisting prototype of curiosity-based VR application that stimulates learner engagement and intrinsic motivation by eliciting states of curiosity in order to promote the development (in children) and re-training (in older adults) of the large-scale spatial skills necessary for autonomous behaviors. To this end, the tools should be configurable in terms of the proposed

Informations générales

• Thème/Domaine : Robotique et environnements intelligents 
• Biologie et santé, Sciences de la vie et de la terre (BAP A) 
• Ville : Talence 
• Centre Inria : CRI Bordeaux - Sud-Ouest 
• Date de prise de fonction souhaitée : 2020-11-01 
• Durée de contrat : 4 mois 
• Date limite pour postuler : 2020-05-22

Contacts

• Equipe Inria : FLOWERS  
• Recruteur :  
  Helene.Sauzeon@inria.fr

À propos d’Inria

Inria est l’institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 200 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 9500 scientifiques pour relever les défis du numérique, souvent à l’interface d’autres disciplines. L’institut fait appel à de nombreux talents dans plus d’une quarantaine de métiers différents. 900 personnels d’appui à la recherche et à l’innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde.

Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 180 start-up. L’institut s’efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l’économie.

L’essentiel pour réussir

Required Knowledge and background:

• PhD degree or its equivalent in cognitive science or in its related-domains (e.g., Computer and human interaction, developmental psychology)
• Advanced knowledge in Unity software for designing VR based experiments
• Medium knowledge for statistics applied to human performance
• Strong interests for experimental studies with humans
• Proficiency in English for an autonomous writing of research papers

Consignes pour postuler

Thank you to send :
- CV
- Cover letter
- Support letters (mandatory)
- List of publication

Sécurité défense : 
Ce poste est susceptible d’être affecté dans une zone à régime restrictif (ZZR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L’autorisation d’accès à une zone est délivrée par le chef d’établissement, après avis ministériel favorable, tel que défini dans l’arrêté du 03 juillet 2013, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZZR aurait pour conséquence l’annulation du recrutement.

Politique de recrutement :
Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en
exploration tasks, the motivational objects included, or the complexity of the spatial learning task.

2) To study the role of states of curiosity on both user experience (with standardized questionnaires) and motivation (regarding the distinction between extrinsic, intrinsic motivation and amotivation) elicited by the VR application, but also its benefits on spatial learning according to the learner's profile (age and his/her initial skills in terms of large-scale spatial cognition) in order to ultimately establish personalized programs for the acquisition/training of large-scale spatial skills. To this end, a set of VR experiments (manipulating motivational objects, the delay between the exploration phase and the route memory test and age of participants) will be performed.

References


Avantages

- Subsidized meals
- Partial reimbursement of public transport costs
- 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
- Social security coverage

Rémunération

2653€ / month (before taxes)