Offre n°2023-06908

PhD Position F/M PhD Position F/M Interacting with Avatars in Virtual and Augmented Reality

Le descriptif de l’offre ci-dessous est en Anglais

Type de contrat : CDD
Niveau de diplôme exigé : Bac + 5 ou équivalent
Fonction : Doctorant
Niveau d'expérience souhaité : Jeune diplômé

A propos du centre ou de la direction fonctionnelle

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.

Contexte et atouts du poste

This PhD position is framed in the context of the ANR project ASTRAL (Augmented Self: TowaRds effective Avatars in augmented reaLity). The general context of this project is the design and study of avatars in augmented reality. Avatars, i.e. digital representations of users in a Virtual Environment (VE) [1], are more and more present in our lives due to the recent democratization of Virtual Reality (VR) headsets and supported by the colossal investments of major economic actors such as Meta or Microsoft. Avatars today are the most broadly used means for representing users in an immersive VE and can be found in a wide range of applications in areas such as entertainment, tele-communication, medicine, education, etc. Such avatars have been shown to improve users' presence [2] and performance [3] in immersive VEs, and even alter their perceptions [4]. Our general objective is therefore to enable and evaluate AR avatarization (i.e. providing users with their own AR avatar). Reaching this objective will help us pave the way to new innovative AR avatars by proposing new rendering and interaction methods along with perceptual understanding of their use. Considering this general objective, we will focus our efforts on three scientific objectives. This PhD will focus on the interaction dimension, and in particular on the “Interacting through AR avatars”. We envision the AR avatar as an interaction tool that will augment the user's interaction capabilities, enabling the interaction with real and augmented content.

Supervision

The supervision will be shared between Inria and IMT Atlantique, but the PhD candidate will be physically located at Inria Rennes and will integrate the Hybrid Research team. The Hybrid research team strongly focuses of Virtual and Augmented Reality research, and it is located at Inria Rennes/IRISA (https://team.inria.fr/hybrid). The team is composed by ~30 members including (4 permanent staff, 11 PhD students, 3 Postdocs, 4 VR/AR engineers). The official supervisors of the PhD will be:

- Ferran Argelaguet (CRCN Inria, Rennes, PhD director) ferran.argelaguet@inria.fr
- Étienne Peillard (MCF IMT Atlantique, Brest, PhD co-advisor) etienne.peillard@imt-atlantique.fr
- Anatole Lécuyer (DR Inria, PhD Director, Rennes, PhD co-advisor) anatole.lecuyer@inria.fr
- Guillaume Moreau (PR IMT Atlantique, Brest, PhD co-advisor) guillaume.moreau@imt-atlantique.fr

Mission confiée

In the context of the project ASTRAL, this PhD will focus on the human-computer interaction dimension, and in particular on how users can interact with their AR avatarized version of their self. We envision the AR avatar as an interaction tool that will augment the user's interaction capabilities, enabling the interaction with real and augmented content.

When interacting with virtual and augmented reality, three main strategies can be considered: (1) Reality-based interactions, in which the interaction closely resembles interactions in the real world, such as isomorphic grasping [10], (2) Illusory interactions, in which the actions of the user can be altered in order to create illusions, such as redirected touching [5] and pseudo-haptics [6] and (3) Beyond-real interactions, in which the interaction capabilities of users surpass those of in real life, such as interacting with remote objects [13]. Although a large number of different interaction methods have been proposed in the literature, a key aspect of all the different interaction strategies is the available feedback to the user while interacting. In the context of VR, this feedback can be provided either by the user's avatar [1]...
or by additional visual elements (e.g., 3D cursor), which play a major role in ensuring efficient and precise interactions. In the context of AR, a key aspect of the feedback relies on the actual user's body representation, which is at the same time one of the main input modalities (e.g., gesture-based interfaces). Typical AR-based interactions rely on grasping and pinching gestures, coupled with other interaction modalities such as gaze and vocal commands. However, while the role of the user's representation has been largely studied in the context of Virtual Reality [2], few studies have systematically explored the impact of the user's representation in an AR context. A few notable works have started to address the impact on the avatar in the interaction process in AR [7], it remains scarcely explored the actual role of the avatar within the interaction process in AR.

**Principales activités**

The main research question that will aim to address is “which user representation is the most adequate when interacting with objects that span through the mixed reality continuum?” To answer this question, the PhD candidate will study the role of the AR avatar during commonplace 3D interactions, and determine the adequate user's representations to achieve them.

While in VR, the visual aspects of the user's avatar are potentially unlimited [1], in AR such representations are limited by a wide range of conflicts, in particular visual, proprioceptive and haptic [2], [3], potentially hindering the interaction process. Moreover, interacting through AR avatars poses several challenges in terms of how users will leverage their augmented representation to efficiently interact with real and augmented content. This raises questions regarding the integration not only of virtual and real content, but also on the alterations of the user's body scheme by the AR avatar and the potential impact of the avatar to the sense of agency [4].

The main outcome of the PhD is to provide guidelines and tools to improve the impact of the avatar in the interaction process and design and evaluate novel interaction methods to AR to support efficient interaction with AR avatars.

**References**


**Compétences**

The candidate must have a master degree (or equivalent), with a preference in mixed reality or human computer interaction. In addition, the candidate should be comfortable with as much following items as possible:

- Experience in 3D/VR/AR applications (e.g. Unity3D).
- Experience in evaluation methods and controlled users studies.
- Good knowledge in programming languages (e.g. C#, C++)
- Good spoken and written English.
- Good communication skills.

**Avantages**

- Subsidized meals
- Partial reimbursement of public transport costs
- Possibility of teleworking (90 days per year) and flexible organization of working hours
- Partial payment of insurance costs

**Rémunération**

Monthly gross salary amounting to 2082 euros for the first and second years and 2190 euros for the third year

**Informations générales**
• Thème/Domaine : Interaction et visualisation
  Ingénierie logicielle (BAP E)
• Ville : Rennes
• Centre Inria : Centre Inria de l'Université de Rennes
• Date de prise de fonction souhaitée : 2024-10-01
• Durée de contrat : 3 ans
• Date limite pour postuler : 2024-03-31

Contacts
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• Directeur de thèse :
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A propos d'Inria
Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 215 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3900 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 200 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.

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Sécurité défense :
Ce poste est susceptible d'être affecté dans une zone à régime restrictif (ZRR), 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 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR 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 situation de handicap.