Offre n°2019-01713

Doctorant F/H Doctorat -- Realistic, Reactive and Interactive Virtual Humans for Virtual Reality

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

Inria, the French national research institute for the digital sciences, promotes scientific excellence and technology transfer to maximise its impact.
It employs 2,400 people. Its 200 agile project teams, generally with academic partners, involve more than 3,000 scientists in meeting the challenges of computer science and mathematics, often at the interface of other disciplines.
Inria works with many companies and has assisted in the creation of over 160 startups.
It strives to meet the challenges of the digital transformation of science, society and the economy.

Contexte et atouts du poste

This PhD position is framed under the**EU H2020 ICT 25 PRESENT** project. PRESENT aims at creating **virtual digital companions -- embodied agents -- that look entirely naturalistic, demonstrate emotional sensitivity, can establish meaningful dialogue, add sense to the experience, and act as trustworthy guardians and guides** in the interfaces for AR, VR and more traditional forms of media. There is no higher quality interaction than the human experience when we use all our senses together with language and cognition to understand our surroundings and, above all, to interact with other people. We interact with today's "Intelligent Personal Assistants" primarily by voice. However, communication is episodic, based on a request-response model; the user does not see the assistant, which cannot take advantage of visual and emotional clues or evolve over time. Nonetheless, advances in the real-time creation of photorealistic computer-generated characters, coupled with emotion recognition and behaviour, and natural language technologies, allow us to **envisage virtual agents that are realistic in both looks and behaviour**; that can interact with users through vision, sound, touch and movement as they navigate rich and complex environments; converse in a natural manner; respond to moods and emotional states; and evolve in response to user behaviour.

This international partnership includes the Oscar-winning VFX company Framestore; technology developers Brainstorm, Cubic Motion and IKinema; Europe's largest certification authority InfoCert; research groups from Universitat Pompeu Fabra, Universität Augsburg, Inria, and the pioneers of immersive virtual reality performance CREW.

The PhD candidate will join the Inria's Rainbow team (https://team.inria.fr/rainbow), internationally recognized in the robotics, virtual reality, and haptics research fields. Currently, the team is composed by more than 30 members working in topics related to human-computer interaction, physical simulation, virtual reality, haptics, and visual servoing.

The PhD candidate will also have access to unique experimental platformsImmersia and Immermove which offer a high-tech set-up to perform user experiments in real and virtual environments and measure motion (motion capture, EMG, force plate, eye trackers).

Mission confiée

The general objective of the PhD is to create interactive characters endowed with levels of behavioural sensitivity and responsiveness for Virtual Reality applications. By populating virtual environments with such characters, our goal is to achieve new levels of immersive experiences, by **reinforcing the feeling of presence through non-verbal communication between a user and one or more agents.**

Principales activités

We will investigate situations involving**1-to-n interactions between a user and multiple (virtual) characters**. In such scenarios, the first step will be to define the full list of events or user actions that agents should be reacting to. This will be done by also detailing the virtual sensory channels by which

agents perceive actions or events, e.g., if we want agents to react to a loud sound, a flashlight, or after being touched by the user.

We will also **establish a list of expressive motions and emotions agents will be able to perform**, defining their vocabulary for non-verbal communication (NVC) capabilities, such as expressing: annoyance, impatience, anger, fear, etc. These motions and emotions will be formulated on a set of variables to modulate their level, and make them dependent on the triggering source, such as the position of the user, the location of an event in the environment, or the state of the neighbouring agents to simulate emotion propagation phenomena.

We will explore **motion capture data edition techniques that offer a good trade-off between the naturalness of motion and performance**. However, pre-recorded motions are not sufficient since the reactive motions are depending on the features (location in the environment, level, etc.) of the user actions or events that triggered it.

In addition to motion, which will be conveyed through visual sensory channels to the user, we will also explore **the tactile sensory channel to render the environment** (and, more importantly, the contacts made between the user and the characters) to the user with two objectives in mind: make the user aware of physical contacts (that will affect user behaviours, e.g., to avoid collisions) and convey voluntary NVC messages to the user (e.g., shoulder tapping). In this respect, this raises several issues, which the task will study such as: the type of haptic rendering devices we will use, their number and location on user bodies (in the case of **wearable haptic devices**) and the contact rendering technique.

Compétences

The candidate should also be comfortable with as much following items as possible: Experience in computer graphics, physical simulation, haptics, and animation; Experience in 3D/VR applications (e.g., Unity3D); Experience in carrying out principled user studies; Good knowledge of programming languages and tools (e.g., C#, git); Good spoken and written English; Good communication skills. This PhD is framed under a larger project, thus the candidate will have to interact with other members of the project and assist to the project meetings.

Avantages

- Subsidised catering service
- Partially-reimbursed public transport

Rémunération

Monthly gross salary amounting to 1982 euros for the first and second years and 2085 euros for the third year.

Informations générales

- **Thème/Domaine :** Robotique et environnements intelligents
- **Ville :** Rennes
- **Centre Inria :** Centre Inria de l'Université de Rennes
- **Date de prise de fonction souhaitée :** 2019-09-02
- **Durée de contrat :** 3 ans
- **Date limite pour postuler :** 2019-07-18

Contacts

- **Équipe Inria :** RAINBOW
- **Directeur de thèse :**
  Pettre Julien / julien.pettre@inria.fr

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.

L'essentiel pour réussir

The candidate must have a master degree (or equivalent), with a preference for computer science, virtual reality, or computer graphics.

Attention: Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d'autres canaux n'est pas garanti.

Consignes pour postuler

Please submit online : your resume, cover letter and letters of recommendation eventually

For more information, please contact julien.pettre@inria.fr

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.