2018-00935 - PhD - HETEROGENEOUS DATA FUSION FOR SAFEGUARDING OF CULTURAL HERITAGE OF DANCE

Level of qualifications required: Graduate degree or equivalent
Function: PhD Position

About the research centre or Inria department
The Inria Rennes - Bretagne Atlantique Centre is one of Inria's eight centres and has more than thirty research teams. The Inria Center 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 PhD is part of a European project under the call JPICH. The "SCHEDAR" project is a collaborative project between several European partners, including University of Cyprus (leader), Algorythm Ltd in Cyprus, Warwick University in UK, University Rennes 2 (Inria MIMETIC team), and University of Reims Champagne Ardennes (URCA - CRAStIC lab. in the RIVIM team). SCHEDAR aims at capturing, preserving and subsequently re-creating intangible Cultural Heritage in dance using new technologies.

Assignment
In this PhD, we will explore the capability of creating robust reconstruction of dynamic capture of dancers. Difficulties are manifold. Unlike many other types of input, it will be difficult to automatically map a skeleton because of large moving garments. Moreover, contact and accessories might infer additional difficulties. One main challenge is to capture the motion of dancers in uncontrolled ecological situaiton, with occlusions, complex motions, garments, etc. In this thesis, we will explore the adequate approaches for building an animated 3D mesh of the dancer from fusion of several heterogeneous data, including depth images, RGB images, and prior knowledge. Several methods could be used to build reliable human poses based on this data, including machine learning, uncertainty, 3D vision, and mathematical models. The main idea of this PhD is to take advantage of these methods to propose a new approach.

The PhD will take place at URCA in Reims, with some stays in Rennes. It will be co-supervised by Prof. Céline Loscos at URCA, Prof. Franck Multon in Rennes, and Dr. Eric Desjardin at URCA. Both teams have expertise in human motion estimation, 3D vision and 4D modeling. They benefit from exceptional equipment that will be available in the project, with a preferential access to a motion capture studio set in Inria/Rennes 2 and to ROMEO HPC facilities at URCA.

Main activities
The PhD will have to perform a state of the art of motion capture techniques based on cameras and the fusion of heterogeneous data. Then the PhD will have to propose an original data fusion algorithm (video, depth images, sound, data priors) of unique or multiple depth cameras, and to evaluate it in the specific context of the SCHEDAR project. We aim at publishing the work in the best computer graphics journals and conferences.

The results will be exploited in the SCHEDAR project to fill-in a database of cultural dancing motions. The PhD will consequently have to participate in european meetings and collaborate with other partners of the project.

Benefits package
- Subsidised catering service
- Partially-reimbursed public transport

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

General Information
- Theme/Domain: Interaction and visualization
- Multimedia Production (BAP F)
- Town/city: Reims et Rennes
- Inria Center: CR Rennes - Bretagne Atlantique
- Starting date: 2018-09-01
- Duration of contract: 3 years
- Deadline to apply: 2018-09-31

Contacts
- Inria Team: MIMETIC
- Recruiter: Multon.Franck / franck.multon@inria.fr

About Inria
Inria is the French National Institute for computer science and applied mathematics, promoting "scientific excellence for technology transfer and society". Graduates from the world's top universities, Inria's 2,700 employees rise to the challenges of digital sciences. With its open, agile model, Inria is able to explore original approaches with its partners in industry and academia and provide an efficient response to the multidisciplinary and application challenges of the digital transformation. Inria is the source of many innovations that add value and create jobs.

The keys to success
The PhD candidate should hold a master's degree in computer science. Very good background in computer graphics, 3D vision, and/or machine learning are expected. A good English level is preferable in order to facilitate collaborative work with partners abroad. The candidate will be co-supervised by Céline Loscos at URCA and Franck Multon at UR2-Inria.

Conditions for application
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. 2011-1525 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.

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.