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

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), Algoslys Ltd in Cyprus, Warwick University in UK, University Rennes 2 (Inria MimetIC team), and University of Reims Champagne Ardennes (URCA - CRISTIC lab. in the RVM 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 situation, 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 extensive expertise in motion capture, animation, 3D vision and 4D modelling. 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 motion capture techniques based on cameras and the fusion of heterogeneous data. 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.

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