Synchronisation of a real cyclist with an autonomous virtual cyclist in augmented reality

Location: Inria Rennes (www.inria.fr/centre/rennes), Campus Universitaire de Beaulieu, in the MimeTIC team (www.irisa.fr/mimetic/)
Duration: 6 months
Date: mid-January to mid-July 2023

The European project SHARESPACE is interested in simulating virtual agents that facilitate group dynamics, such as managing a race in a pack of cyclists. Our contribution consists in designing an autonomous virtual human who analyses the dynamics of groups of several cyclists (some real, gathered together on ergocycles, others at a distance, and finally the last ones simulated), and decides on actions to be carried out to encourage actions in this pack, such as preventing an adversary from escaping, or on the contrary encouraging the start of a teammate. With the help of augmented reality (AR) glasses, the cyclist who is actually cycling alone will be able to see his or her partners and opponents around him or her, including the autonomous virtual human facilitator. It is a real technological and scientific challenge to be able to use AR glasses in these conditions, at high speed, in an unknown and variable environment, while ensuring the coherent positioning of one or more other cyclists.
The objective of the internship is therefore 1) to explore the literature in order to find the most appropriate methods for using our Microsoft Hololens glasses in these extreme conditions (high speed, large displacements) in terms of collocation and visual restitution; 2) to develop this application and 3) to evaluate the performances and limitations of this type of device.

This internship will be carried out within the MimeTIC team of Inria Rennes and in collaboration with researchers from the M2S laboratory of the University of Rennes 2, specialised in the biomechanical and perceptual analysis of sports gestures, from the EuroMov laboratory of the University of Montpellier, specialised in human synchronisation and biological systems, and from the DFKI laboratory of the University of Kaiserslautern, specialised in cognitive augmented reality.

Required skills: development in C# and Unity3D, knowledge in AR.
Appreciated skills: animation of virtual humans.

Co-supervision: Inria Rennes (Franck Multon), University Rennes 2 (Richard Kulpa), University of Montpellier (Benoît Bardy), University of Kaiserslautern (David Stricker).

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