Virtual Reality and Multi-Sensory Interaction - VRI - Master SIF – 2022/2023

Written Exam

Time: 2h
Available documents: Any

Provide an original design for **two of the three** following VR interfaces:

1. **Solar system navigation interface:** The proposed interface should allow for the exploration of the solar system. From an overview perspective, to a close up view of a given planet (e.g. exploring a building or a geological structure). The main challenge is to provide an accurate control for the different degrees of scale.
2. **LEGO construction interface:** The proposed interface should allow for the construction of complex LEGO-like structures. In particular, it has to enable the precise selection and manipulation of the building blocks, allowing for the construction of complex/huge structures. The main challenge is to increase the precision while selecting and docking blocks.
3. **Molecular docking interface:** The proposed interface has to enable the user to select and manipulate complex molecular structures. In particular, it has to enable the creation of new molecules by docking simpler molecules. The main challenge is to provide suggestions and/or guides to drive the docking process. You can assume that given two molecules only a few valid configurations are enabled, some being more optimal.

Design constraint: The designed interfaces have to take advantage of haptic feedback at least for one interaction task. The haptic feedback can be either active, passive or pseudo-haptic.

For each chosen interface, you have to provide as many details as possible (e.g. hardware, control algorithms) and justify your choices when possible. We recommend you to structure your answer according to the different processes involved in the action-perception loop: what are the actions that the user has to perform, how these actions are translated into commands, what feedback provided by the system and how the user perceives it. Do not forget to draw schemas of the different components of the interfaces to increase clarity. You can assume that the rendering of the 3D scenes and the physical simulation is already solved.

In addition, for each interface, you have to discuss the required equipment (feel free to use whatever VR equipment you want) and provide some metrics to evaluate their performance.

Each interface can use different VR equipment, as there is no need to couple both interfaces.

Be imaginative and provide out-of-the-box solutions!