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IMMERSION

Multi-modal Immersion
 into
 Interactive
 Virtual Environments



IMMERSENCE overall objective is to enable people to freely act and interact in highly realistic virtual environments with their eyes, ears and hands. The keyword is *multi-modal*: Human senses shall be integrated into a single experience allowing comprehensive immersion.

Most of today's systems receive the user merely as a passive observer. Whenever interaction with the virtual world is inevitable, like in the case of computer games, human action is restricted by basic devices compromising significantly the feeling of 'being there'.

IMMERSENCE is to fundamentally change this very restrictive situation. Users of Virtual Environments (VE) shall be able to manipulate items of various shapes, sizes and textures as well as to interact with other users including physical contact and joint operations on virtual objects.

In order to achieve this new level of immersion, IMMERSENCE main focus lies on the investigation of the tactile dimension in order to catch up with the remarkable progress made in the fields of visual and auditive devices. The development of new techniques of signal processing shall finally lead to the synthesis of all sensory modalities in a single perception allowing full multi-modal feedback in the planned virtual scenarios.

3 driving scenarios have been designed which address the specific characteristics of manual operations:



P2O: The Person-to-Object Interaction is concerned with the most basic form of interaction, the handling of an object by a human. It relies on the passivity of the "interaction partner" (object), which only reacts in a physically predictable manner to the actions of the user.

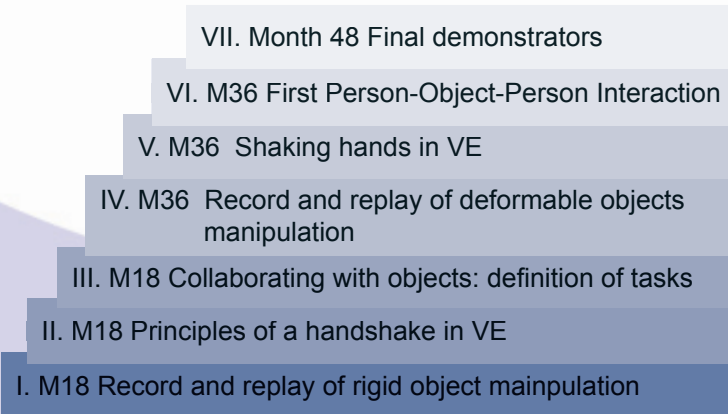


P2P: In the Person-to-Person scenario this constraint will be relaxed. It engages two people in multimodal interaction involving physical contacts, like handshaking or social dancing.



POP: Person-Object-Person scenario investigates collaborative, multimodal interaction between two persons mediated by an object, for example jointly inserting a heavy component during an assembly process.

7 Milestones for the implementation process:



IMMERSENCE objectives are to be reached by a **large-scale interdisciplinary action** incorporating competences in 4 major areas:

Hardware and Software Engineering: Innovative components for the simulation and transmission of sensory stimuli have to be created.

Rendering & Display Technologies: For superior fidelity, real stimuli have to be recorded and replayed in situations which have never been observed. Interpolation methods are to be developed which allow to predict the behaviour of the interaction partner or environment.

Neurosciences: The investigation of the brain functional, neurophysiological, behavioural and cognitive mechanisms behind the process of multi-modal interaction are fundamental for the optimisation of the technological devices.

Presence measures: The created prototypes have to be validated by quantifying and measuring the presence perceived by the user.



Potential impact of project results for basic research, technologies and application systems:

- Applications of high socio-economic relevance in medical training and diagnosis related to palpation, tele-cooperation in industrial or architectural construction and entertainment
- New insight into the perceptual and neural mechanisms involved in multi-modal interaction
- Numerous novel haptic interfaces and demonstrative multimodal integrated systems
- New methods for the acquisition of geometric components of haptic interaction in 3D
- Theoretical and algorithmic basis for the enrichment of pure visual mixed reality systems by haptic feedback

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▶ Further information on WWW.IMMERSENCE.INFO