

HAPTIC COMMUNICATION TO INCREASE COLLABORATION IN VIRTUAL ENVIRONMENTS

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ABSTRACT

Collaborative Virtual Environments (CVEs) are shared 3D spaces in which users work together towards a common goal. To reach an effective collaboration, an operator must be aware of his partner's presence in the Virtual Environment (VE), and must be able to build and maintain with him an efficient Common Frame of Reference (CFR). CFR contains common representations for actions to perform together in the VE, and also spatial organization of environment objects [1]. Thus, both sides exchange information through several sensory modalities (vision, audition and haptic) to construct their CFR. However, in a VE, means of communication are limited, particularly when operators are away from each other. This constrains the CFR construction and leads to a lack of understanding and antagonistic actions. Hence, to avoid these problems, the VE must offer users ways to enlarge their CFR.

A first exploratory study [2] has allowed us to see how the participants build a CFR according to the content of the VE in a 3D reconstruction task. The use of visual cues included in the EVC has allowed male users to have a better understanding of their partner's activities and teamwork collaboration profiles. This study has shown also that some users try to avoid mutual understanding problems by compensation strategies (visual and / or verbal).

In our current experimental study, we are introducing haptic devices as an additional mean of communication between peers in the VE. Thus, users can see and feel their partner's actions on virtual objects, and also discuss about these actions. Participants will perform a technical gesture learning task. To ensure skills transfer between a novice and an expert, they must collaborate through a shared VE and using haptic devices. The purpose will be to know whether it is possible to enlarge CFR between operators by giving them more resources to inform their partners about their current activities. Indeed, haptic communication, combined with verbal exchanges and visual space sharing may facilitate coordination between operators, increase their awareness of their partner's presence and thus allow them to have a better collaboration through the VE. The results of these studies may give us information on how operators work together through a VE and can be used to design CVE facilitating collaboration.

REFERENCES:

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