



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title: Design and Evaluation of User-Centric Gestures for Locomotion in HMD-VR Interfaces for a Seated Position

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Thesis Submitted to the Department/ Center : Department of Design

Date of completion of Thesis Viva-Voce Exam : 29-12-2023

Key words for description of Thesis Work : HCI, Virtual Reality, gesture based interaction techniques

SHORT ABSTRACT

Virtual Reality (VR) systems offer a means of immersing users within 3D computer-generated virtual environments (VEs) with the aim of creating a natural experience. This thesis explores and investigates body gestures as a medium of interaction in a seated position for locomotion in multitasking VEs. The present research aims to identify and evaluate natural and intuitive gestures for locomotion in a seated position for three different multitasking scenarios. This research presents the results of five user studies aimed at developing and evaluating three new controller-less, gesture-based locomotion techniques for multitasking VEs that can be performed while seated. The first study utilized the gesture elicitation method to generate three sets of user-centric gestures for locomotion suitable for different multitasking VEs. The second study evaluated these gestures based on appropriateness, ease of use, effort, and user preference and further classified them based on hand usage and geometric taxonomy. Three new gesture-based techniques, called the Calling gesture, Deictic Pointing gesture, and Mirror- Leaning gesture, was designed and developed for virtual locomotion. Three different comparative studies were conducted to compare these gestures with techniques from the literature, such as tapping and teleportation, and evaluated based on parameters such as task completion time, accuracy, intuitiveness, performance, comfort, ease of use, perceived workload, spatial knowledge, presence, simulation sickness, and user preference.

The contributions of this research include proposing new locomotion gestures for three different VEs, evaluation of the new gestures with the existing techniques to scientifically establish the results for the various objective and subjective measures, developing a characteristic framework to help future designers select appropriate gestures for locomotion based on the application's needs, and providing a set of design guidelines for gesture-based locomotion techniques that application designers can use to build effective and efficient controller-less natural locomotion techniques for future VR applications.