Real-Time Sensable Simulation Systems

Shinji Tomita

Kyoto University, Graduate School of Informatics, Professor

Outline of survey

This project aims to research Real-Time Sensable Simulation Systems that allow the users to interact with simulated objects through their senses of hearing, sight, and touch. For example, in the medical field, virtual surgery requires this type of simulation system. However, neither a real-time response nor an interaction with a simulation target currently exists for large-scale simulation systems. Therefore, this project will focus on large-scale interactive simulation architecture and simulation interfaces using the human's senses.

To achieve a Real-Time Sensable Simulation System as the next generation simulation platform, the following fundamental research issues will be addressed :

1) sensable simulation server architecture with interactive simulation steering mechanisms,

2) real-time force feedback and visual display systems for sensable simulation, and

3) latency hiding techniques based on multi-scale simulation technique.

Expected results

This project should result in the following: 1) real-time simulation steering techniques that accept both interactive deformations of the simulated objects and dynamic changes in the boundary conditions during the simulation, 2)real-time force feedback and visual display systems that are integrated into the sensable simulation system, and 3) latency hiding techniques, for remote simulation, that exploit approximation and optimization techniques based on the characteristics of the human senses.

References by the principal researcher

1. Shinji Tomita, Computer Architecture (Rev.2), Maruzen CO., LTD., April 1996.
2. Shinji Tomita, Shin-ichiro Mori, et al.: ReVolver/C40: A Scalable Parallel Computer for Volume Rendering --Design and Implementation--, IEICE Trans. Inf. & Syst., Vol.E86-D, No.10, pp.2006-2015, 2003

Term of project	FY 2004 2008	Budget allocation	84,900,000 yen

Homepage address   http://www.lab3.kuis.kyoto-u.ac.jp/