
PROJECT SUMMARY

Firm: Orbital Technologies Corporation
Contract No.: NNJ08JA54C
Project Title: Just in Time Simulation Platform, Phase 2

Purpose of the research

The purpose of ORBITEC's "Just in Time Simulation Platform" Phase II project was to seamlessly integrate decision-support software into a simulation software package and design a user interface for faster authoring of 3D interactive training systems. With a small amount of training on the system, non-3D programmers, subject matter experts, or graphic designers can assign potential actions to standard 3D models in a flowchart structure, and have those actions triggered by users in the simulation (such as by a mouse click or by selecting an object). The authoring interface also allows the content developer to include procedural text or tutoring feedback for each action path taken by the user. When these elements are complete, the system can export the content into a web-based or standalone training simulation. In parallel to this software development, ORBITEC also wished to demonstrate the use of 3D graphics instruction in space through a high fidelity training system on a complex NASA assembly or maintenance procedure. This demonstration would show that it would be possible reduce some of the need for large scale training facilities on Earth through enhanced visual materials available during long-term missions.

Description of the research carried out

Integration of the Discovery Machine "logic engine" module into ORBITEC's 3D Hypercosm simulation software to provide a text-based method of entering responses to users' actions in a training simulation was the most significant portion of the Phase II work plan. It included building new application programming interfaces and a custom authoring and communications system, and testing the integrated system by creating procedural demonstrations. Working together with Wyle Laboratories, ORBITEC also completed 3D procedures for the most complex steps of the new treadmill assembly installation for use on the International Space Station (ISS) in 2009. The underlying software was tested and certified for use on the ISS laptops, but due to time constraints, the text accompanying the simulation was unable to link to NASA's International Procedure Viewer (iPV) software prior to launch. Therefore videos of each simulation step, and not the interactive 3D procedures, were uploaded to the ISS to assist the Astronauts in the 20 hour treadmill assembly procedure.

Research findings or results

The new software developed during this Phase II met our goals specified at the beginning of the project. In side-by-side development of training simulations with and without the software, we found it reduced development time substantially, and made it possible for graphic designers (and without programmers) to build procedural 3D simulations. Both ORBITEC and Discovery Machine feel it has great potential commercially for training development. We also learned that until a standard is set by NASA for incorporating 3D simulations or graphics into on-board training materials, it is a time consuming process to expand beyond the iPV text-based procedures used in flight. There are different certification processes for "procedure text" and "software." Since a training simulation contains both procedure text and software for displaying 3D models and animations, even minor changes to the text require re-validation of the software, which adds a great deal of time and expense to the certification process.

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