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RIVET: Rapid Interactive Visualization for Extensible Training

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Abstract
The new NASA mandate calls for missions of unprecedented remoteness and duration while human capabilities remain relatively fixed. The RIVET team (Penn, Orbitec, and NASA JSC) is to develop computer based integrated training and instruction tools that are visually intuitive, easily authorable, and adaptable to user skill level and context. The goal is to improve reliability in executing instructions by a crew with limited training, especially for critical tasks in nominal and emergency situations.

Comments
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RIVET: Rapid Interactive Visualization for Extensible Training

Norman I. Badler (University of Pennsylvania), Jan Allbeck (University of Pennsylvania), Abe Megahed (Orbitec, Inc.), Mihriban Whitmore (NASA JSC)

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The RIVET prototype is an extensible (scalable) embedded training system using graphical and speech interfaces. RIVET is designed for multiple application environments (e.g., operations, maintenance, medical) and provides user interaction tools appropriate to both training and operational environments (e.g., portable systems or hands-free voice actuation). Currently RIVET implements a flexible instruction delivery interface for Advanced Cardiac Life Support (ACLS).

A Java enabled web browser is used as the base platform for laptop or PDA instruction delivery. The RIVET interface contains a display area including the current and previous instructions, as well as the next steps dependent on the current instruction outcome. There are controls for switching between operational and training modes, turning on and off speech recognition and output, and managing embedded instruction timers. A user can restart the algorithm or undo procedure steps. Patient state is clearly displayed and can be altered by the user from external observations, in which case the procedure jumps to the algorithmic step that first depends on the new patient state. Another window displays images, movies, or detailed information that might accompany the current instruction.

A help system includes tool tips and a help menu. Completed instructions are checked off to maintain context. Some of the ACLS procedures are time critical; others consume materials. RIVET can inventory items used and track time taken to perform procedure steps. Most instructions in the ACLS algorithm include yes/no questions; RIVET allows users to look ahead to the next instructions before choosing an answer.

Training mode includes sample patients and their symptoms. A user can practice procedures and algorithm navigation with the same interface as used in a real world setting. This provides better familiarity with the system and better use of the tool. A PowerPoint presentation of RIVET is available on the web via http://hms.upenn.edu/RIVET/.