

Operator Performance Laboratory (OPL) Research Project Synopsis



Cognitive Avionics Tool Set (CATS) Software



NASA Collaborative
Research Agreement
NNL07AA00A

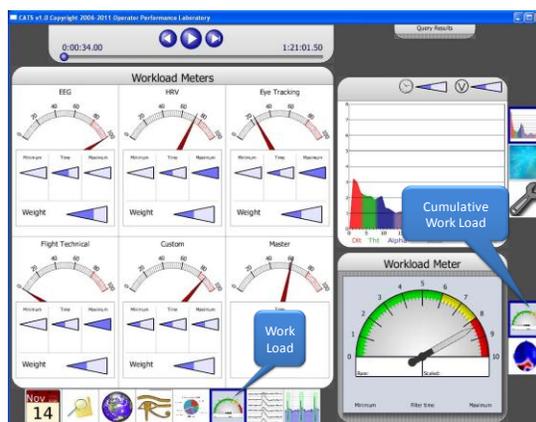
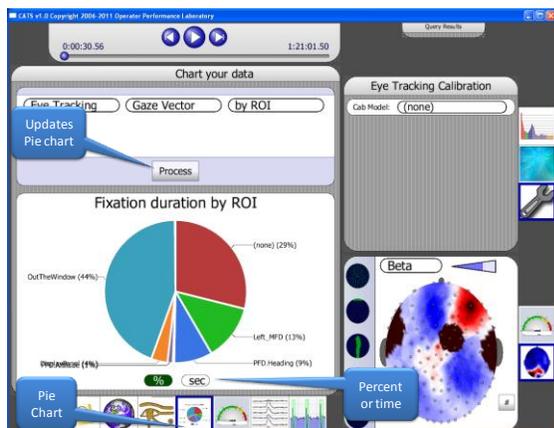
Current avionics are not aware of pilot workload. CATS gives avionics the ability to sense and adapt to situations of overload and underload. The development of Cognitive systems requires a physiological assessment capability able to measure a multitude of physiological parameters and to properly quantify external influences such as sustained accelerations, electromagnetic noise, illumination conditions, temperature fluctuations, and overall environment variables with a multi-sensory data fusion approach. We have developed a hardware and software framework that we call the Cognitive Avionics Tool set (CATS) that is useful to developers of Cognitive systems. The CATS includes software modules that allow Cognitive sensor fusion, visualization, synchronization, artifact removal, querying, and classification of data that was collected in the context of physiological testing in real-time. The goal of CATS is to give the researcher a hand in organizing the mass quantities of data and provide an opportunity to focus on the scientific aspects of the data.



Architecture:

At the core of CATS is a system that fuses sensor data and synchronizes the data from all available physiological sources. Data from physiological sensors (EEG, ECG, GSR, thermal imaging, eye tracking, etc.) are synchronized with flight or mission specific data. CATS allows for real-time and post hoc data analysis using a project time-line. Eye tracking data can be analyzed in many different ways, including Areas of Interest (AOI), link analyses, etc. EEG can be analyzed spatially and spectrally. FFT analyses can be performed on selectable areas of the scalp topography in any clinical band desired. Queries allow for quick and easy down select of pre-marked run data in a matter of seconds. Artifacts can be removed per channel and per occurrence. A graphical user interface and visualization of EEG and other bioelectrical activity provide the researcher with a powerful tool to explore experimental data. This technology has been featured on the Discovery Channel (see <http://www.ccad.uiowa.edu/opl/videos/>).

For a demonstration of CATS call Tom Schnell at 319 631 4445.



For more information visit <http://opl.ecn.uiowa.edu>