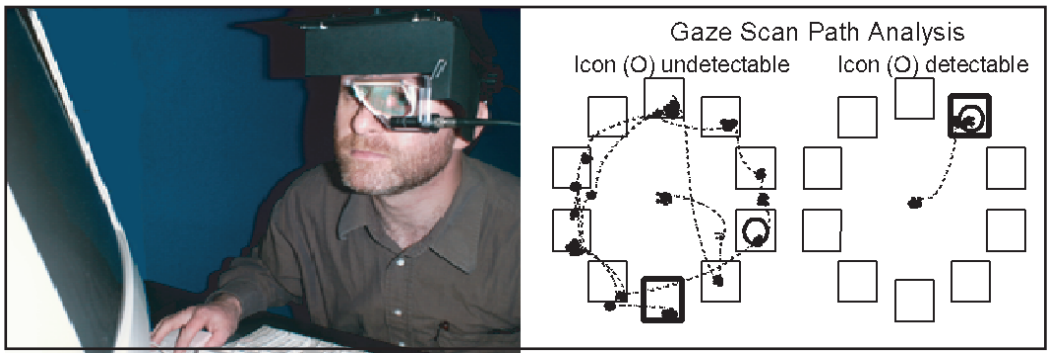
Human Systems
integration division

Eye-Movement Metrics: Non-Intrusive Quantitative Tools for Monitoring Human Visual Performance

Objective

To develop and validate eye-movement analysis methodologies that provide quantitative yet non-intrusive measures of human visual performance for use in the evaluation of visual displays and interfaces as well as training paradigms



Approach

To simultaneously measure eye movements and human psychophysical responses in aerospace-related search and tracking tasks and then to directly compare the model-based predictions of human performance accuracy from the eye-movement data with actual performance under rigorously controlled conditions. Thus, we can compare the output of candidate eye-movement analysis algorithms with ground truth in order to identify reliable on-line predictors of human operator accuracy and errors using tools that, unlike traditional psychophysical methods, can be used in applied aerospace settings.

Impact

A reliable quantitative yet non-intrusive measure of the effectiveness of information transfer from visual displays (as reflected in operator performance) is critical to the design of safe and efficient visual displays and interfaces. By monitoring the performance impact of changing display variables, eye-movement metrics will provide quantitative feedback to the engineer, which is critical for the reasoned identification and resolution of design trade-offs. Eye-movement metrics will also allow the on-line monitoring of performance enhancements during the course of training, as well as potential decrements due to fatigue, altered gravity, or lack of refresher training. Eye-movement metrics could also be used not only to facilitate feedback to the operator during training (and thereby potentially accelerate the process) but also to provide feedback to trainers in their efforts to refine and streamline training paradigms.

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