Improving Dynamic Resolution:
Why Higher Megapixel Displays May Not Be Worth It

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ABSTRACT

Eye-limiting resolution is often touted as the goal of simulator display system design. However, display system design frequently considers only static resolution while training tasks rarely involve purely static images. Modern frame-based display technologies which "draw" an image over time introduce artifacts in the human visual system when a viewer is tracking a moving image. The dominant artifact is smear, and this can cause the effective (dynamic) resolution of the display when showing moving images to be significantly lower than the static resolution.

This paper identifies key parameters for improving dynamic resolution and compares the effectiveness of smear-reduction technologies. First, the paper discusses the causes of smear and the current smear-reduction technologies employed by display systems and their associated system tradeoffs. Second, the paper evaluates an emerging technology that reduces smear without some of the tradeoffs of traditional approaches, thereby significantly improving dynamic image quality. Third, the paper describes the test methodology used to assess dynamic resolution and identifies the key parameters to improving resolution. Finally, the paper presents the results of dynamic resolution tests on a number of display systems and display system smear-reduction technologies.

Aware of these parameters, system designers will have the knowledge to better select display system technologies to achieve their target resolution (both static and dynamic) and thereby better equip the simulator to deliver on its training goals.

BIO

Stuart Nicholson is an Advanced Technology lead investigator and system architect at Christie. Over the past 9 years at Christie he has been the technical lead of the team that developed the innovative Christie Matrix StIM and Matrix StIM WQ DLP projectors which brought LED solid-state illumination, infra-red stimulation of Night Vision Goggles and high frame rate operation to the simulation market. His current projects include advanced smear reduction techniques and other projector enhancements to improve image fidelity and the immersion experience. Prior to Christie, Stuart worked for 10 years in the defense industry as a senior systems engineer working on radar and missile systems. Stuart holds a Bachelors of Applied Science in Engineering Science from the University of Toronto.