

Perceptual Performance Impact of Gpu-Based Warp & Anti-Aliasing for Image Generators

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ABSTRACT

In 2012 the U.S. Air Force School of Aerospace Medicine, in partnership with the Air Force Research Laboratory (AFRL) and NASA AMES, constructed the Operational Based Vision Assessment (OBVA) simulator. This 15-channel, 150-megapixel display system remains one of the highest resolution displays ever built. One of the original goals for the simulator was to implement a distortion correction system that introduces “zero” frame latency into the overall system. This distortion correction was achieved using a combination of Scalable Display’s EasyBlend SDK and NVIDIA’s Warp and Intensity adjustment API. This paper describes the results of a collaboration between USAFSAM, Scalable, and NVIDIA to evaluate NVIDIA’s WARP 2.0 API, which allows for several user-selectable filtering techniques. These filters have the potential to improve the quality of the display warp and improve anti-aliasing performance without change to the low latencies already achieved. This paper provides a brief review of the different filtering techniques under investigation, as well as an assessment of their performance within a flight simulation environment. The evaluation has been conducted using psychometric methods to determine threshold performance of human observers on an operationally relevant aircraft orientation task conducted at an eye-limiting resolution (1 arcmin/lp).

BIO

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Dr. Logan Williams is a senior research engineer at the U.S. Air Force School of Aerospace Medicine at Wright-Patterson AFB, Ohio, and currently leads technology development for the Operational Based Vision Assessment laboratory. Previously, he has led multiple lines of research in various fields such as human effectiveness, immersive environments, visual display system design, and distributed simulation for aircrew training. He has served as the lead systems engineer for F-16, A-10, and KC-135 aircrew training systems and has two decades of experience in analog and digital circuit design, networked control systems, optical & electro-optical system design, computer programming, and physics-based modeling and simulation. He has earned a PhD in Electro-Optics, ME and BS degrees in Electrical Engineering, as well as a BS in Physics.