Multi-channel systems, how to reach the ideal blend with the next generation optical blending technology

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ABSTRACT

A major challenge in a simulator design is to make multiple projectors acting as one. There are currently 2 different approaches to this problem. One is to accept that the seams can be visible, and as such going to facet with hard edge design, while the other one blends each projector image into its neighbors in order to totally eliminate the visibility of the different channels.

This problem exists since the day where one decided to make a visual system which could not be one via a single projector. Quickly, they found out that multiple challenges awaited them. These included visibility of a seam between projectors, of color and brightness mismatch of projectors, of geometry discontinuities…
For most, geometry discontinuities could be tackle with proper image processing to compensate. The visibility of the seam could be removed by adding the overlap (blendzone) between the projectors. Color and brightness mismatch could be tweaked away somehow, with the finding that a larger blendzone helped in hiding this mismatch.

For the blendzone concept to work, a brightness cross-fading is mandatory. While an image processing was enough to cope with it at the time of the CRT projectors, the limited "black level" of modern digital fixed matrix projectors enforces the use of "optical blending" for night simulation. This optical blending being in the optical path, it can impact the image quality of the display, yielding a lot of research and various solutions, each with their pro's and con's.

This paper first lays out the various elements leading to an increase or decrease of multi-channel artefacts visibility, highlighting the sensitive elements for a facetted design versus a blended design. It then dives into the various existing optical blending technologies, but also highlight what is the next technology which will finally live up to all the designer's expectations.

BIO

PRIMARY AUTHOR

Timothé Jahan is project manager at Esterline Simulation Visual Systems.
Timothé worked for over 5 years for Esterline and previously Barco Training & Simulation, most of the time studying and designing complex multi-channels visual systems.

Thanks to close interactions with worldwide customers Timothé built key knowledge on ins and outs of system design. He has triggered and led multiple initiatives, related to the design flow as well as to technological innovations, including the development of a new blending technology.

In his previous experience as mixed-signal chip designer for the automotive industry Timothé has been confronted to the very challenging cost versus reliability requirements of this industry. He holds a master in micro-electronic design from the "Institut Supérieur d'Electronique et du Numérique" (ISEN) in Lille, France.