A Cost Effective Means to Mask Blend Zones in Multiple Image Simulation Displays

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ABSTRACT

Simulators use multiple projectors to create displays to immerse a trainee into a realistic environment. Multiple image displays can either use edge butted flat displays such as large format monitors and flat projection screens butting edges to adjacent channels, or they can blend edges together to create a seamless display.

Blending the image requires neighboring channels to overlap. Several companies, including Barco, Panaram Technologies and others began creating methods of soft edge blending in the 1990's. Major airframe manufacturers such as Boeing, Flight Safety, Lockheed Martin and others also developed display algorithms for this capability.

One negative by-product of edge blending is control of stray light passing through projection lenses which cannot be contained within the projector. Stray light is caused by light created in projector's illumination system (e.g. lamp, LED, Laser Phosphor) bouncing off surfaces passing through the objective lens. Most projection systems have some low light level appearing on screen when projecting screen black. In blend applications, this overlap creates undesired pillars of light in scenes having either zero or low light such as night training.

Sophisticated Blend/Warp algorithms available today from companies like Scalable Display, 3DPerception and others have no ability to control the stray overlapped light. In the past 25 years there have been many developments to mask off this stray light in blend zones. The two most common ways to overcome the doubled low-light output are:

1. Utilizing baffles to optically mask the edges of the projected image
2. Projecting through clear "blend plates" having a gradient 0-100%edges

Blend plates are a highly effective way to eliminate the blend zone in night scenes, but they require extensive engineering and installation support. Each plate is custom designed relative to projector position and size of blend area. Over time, projector movement due to gravity, vibration from floor above/below, or potential repositioning due to removal for lamp change or other repair would alter blend plate position relative to the screen. In addition, the material comprising the gradient would emulsify after repeated projection via UV, IR, heat and light energies thus impairing the effectiveness. New plates would be needed.

While costs for blend plate solutions might approach $6000/channel which may be budget-worthy for some simulation projects, for many simulation displays this method of masking the overlap is financially beyond reach.

After having experiences with several simulator displays utilizing both blend plates and baffled edge masks, Electric Picture devised a new, simple, cost-effective way to provide excellent optical masking of blend zones. The device is patent-pending (US#15/290,642) and with 140 of these devices already in service in North America, we have a proven, effective means of effectively eliminating the blend zone for night training.

BIO
PRIMARY AUTHOR

R. P. Higgins began in the industry in 1985 at GE Projection Display Products after receiving an MBA from Syracuse University. He was Regional Sales Manager for the Mid-Atlantic Region working to develop an AV dealer network for both Talaria Light Valve and Imager CRT projectors. In 1994 he left to become VP of AmPro Corporation in Melbourne, FL. With the advent of DLP projection technology, he left AmPro for Electrohome and worked to assist in the sale of the company to Christie. He left Christie in 2001 for a more local position with VDC Display Systems in Cape Canaveral, FL. In 2003 he started Electric Picture. The Company is now in its 15th year. www.electricpicture.com

Electric Picture's customers include US Navy/NSST, NUWC, USNA, Lockheed Martin, Northrop Grumman, FAAC/General Motors, Fidelity Technologies, Kongsberg Maritime, CSRA, IDS/Augusta National, American Maritime Officers-STAR Center and several others.

Besides business, R. P. supports the Higgins Brothers Surgical Center of Hope in Fonds Parisien in Haiti. The surgical hospital is located 25 miles east of Port-au-Prince and is part of Haitian Christian Mission. It is a place where visiting teams of doctors and staff can provide time/talent in a place where it is most needed. The building was constructed by his brother and is dedicated to his father and uncle: http://www.haitianchristianmission.org/higgins-brothers-surgical-center/