

Lux Machina helps craft immersive in-camera VFX environments for a variety of projects, so you don't need to use traditional green screen compositing techniques

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MOVIE MASTERS OF ILLUSION

Film and TV productions are turning to display and playback technologies over traditional green screen compositing to create realistic environments.

Zoe Mutter takes a behind-the-scenes look at the techniques Lux Machina is employing that are transforming the entertainment industry.

A

s film makers continue to aspire to completely immerse their audiences in narratives by creating new, captivating worlds, one company is assisting them

in achieving pure movie magic. Broadcast, film and corporate entertainment specialist Lux Machina helps craft immersive in-camera VFX environments for a variety of projects, eliminating the need for traditional green screen compositing techniques.

Over the past decade, Lux Machina has worked with partners to evolve the use of display and playback technologies to produce a new kind of environment for actors and creatives to enjoy during the movie-making process whilst simultaneously offering organic lighting and reflections.

"The goal is always to help tell better stories, to have a direct connection to the art, and to provide more flexible toolkits to productions," says Philip Galler, chief technology officer, co-ceo and one of the founding partners of Lux Machina. "The techniques we helped develop have been used for multiple applications such as driving process replacement work during which having visualisation via on-set screens allows everyone in the collaborative process to make well informed creative decisions and to do so together on set. Movies are extremely complex creations requiring many parties to come together across the globe. Having accurate visual reference throughout the entire process, not just in pre-vis, is important for telling a well-crafted narrative."

The company's techniques can also transport entire sets to make believe or difficult to access locations or build environments that accommodate

endless magic hour - the time of day the light is the most beautiful outside.

Multiple applications

Los Angeles-based Lux Machina was set up seven years ago as a consulting firm to liaise between clients and vendors, ensuring the cutting-edge technology being used was successfully implemented. The company now tackles projects in various verticals including live broadcast, film and episodic TV and corporate installations.

Recent projects completed using techniques the team helped develop include *Solo: A Star Wars Story*, *Star Wars: Rise of Skywalker* and the upcoming film *Top Gun: Maverick*. In *Solo: A Star Wars Story*, Lux Machina was responsible for creating realistic environments in the Kessel Run

sequence, which sees the Millennium Falcon flying through asteroids and various space scenes whilst battling the Empire and space monsters.

Production specialist PRG also turned to Lux Machina for expert help with previsualisation, playback and LED system design for Martin Scorsese's latest film, *The Irishman*. Their technique was used for most of the movie's driving scenes, being an ideal fit for the production which was shot in New York City during the winter.

"This meant we had a cover set of LED set up for them if the weather got bad. It provided the flexibility they needed for their schedule as well as their approach to production," says Galler who, prior to launching the company, was a multi-discipline production coordinator, lighting programmer and designer with PRG in Los Angeles. "PRG was a good partner on this project as they have been involved in many car process projects and have a great inventory of equipment capable of handling the rigours and flexibility demands of film sets."

The LED and projection techniques developed by Lux Machina enable VFX departments to cut production costs by using screen technology and playback technology that reduces post work, helps others make the proper creative decisions on the day, and provides "final pixel" by creating environments that do not need to be replaced using VFX.

Other benefits of building immersive environments using large projection surfaces and LED screens that surround sets and actors include the high-quality and realistic lighting and reflections that can be created organically without needing to go on location. In turn this helps remove the guess work of fixing anything in post-production.

"Using realtime technologies with massive canvases is an even greater use case for display

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Lux Machina**



Utilising game engines, camera tracking technologies, lighting integration and dynamic lighting to relight a virtual world in realtime allows Lux Machina to finely tune the look and feel of a production

PHOTO CREDIT: EPIC GAMES/LUX MACHINA



Shooting sees Lux Machina work hand in hand with the cinematographer, visual effects team and director to line up and manipulate the content for each shot and every set

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At computer graphics conference SIGGRAPH, Epic Games partnered with Lux Machina to demonstrate how LED can be used to create virtual environments for film and TV as an alternative to green screens

and playback on set. By utilising game engines, camera tracking technologies, lighting integration and dynamic lighting to relight virtual worlds in realtime, we can start to fine tune the look and feel of a production," says Galler.

"This means we can finally escape being tied to the plates and use realtime for exploring an environment as if we were actually there instead of just peering through a window from a pre-designated point of view. It's the difference between playing an open world video game and just going through a photo album."

Ever-changing shoot environments

The process begins with discussions with the production team during the design phase to better understand the problems and needs of the sets the show wants to shoot on. Lux Machina then goes through an engineering and testing phase to verify the design.

"Once we are comfortable with the design work we refine the software platform we're going to use. If this is Unreal Engine we will create tools and proper workflow utilities for content integration. If using a pre-rendered workflow, we make content templates to guide the content creation process," explains Galler.

Significant physical set-up time is required, as well as off-site prep which involves making sure all media servers and render engines are functioning. During this step in the process, Galler and the team guarantee they have all the prep paperwork, technical drawings and logistics handled for load in. The install of the display and playback technologies is completed by working closely with the various production teams. Shooting then begins



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following a period of testing and rehearsal.

"This sees us work hand in hand with the cinematographer, visual effects team and director to line up and manipulate the content for each shot and every set. We make sure the programmer has the tools they need to efficiently respond to the demands of the ever-changing shoot environment," says Galler.

"This might mean having interactive elements such as laser fire or explosion content that is randomly triggered, or it might mean building complex content transitions to help reinforce creative narrative decisions and hopefully give the creative teams the flexibility to make decisions on the fly and not need to worry about the technology getting in their way."

High expectations

When crafting immersive and realistic environments Lux Machina relies on a wide array of platforms including disguise d3 media servers, Unreal Engine, Notch and Touch Designer. On the hardware side, ROE LED and Panasonic projectors are the team's products of choice.

"We like to think that each tool is best suited to a specific job and we design each job to fully utilise the platform," adds Galler.

"All the platforms we use really excel in their individual applications. Whether it is the beautiful and dynamic particle systems created using Notch, the super large canvas management and playback handled by disguise or the realtime world building carried out in Unreal, these platforms have proven time and time again to be the tools our clients

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react best to and they have grown to expect the most from them."

Another effective creative storytelling tool which the Lux Machina team interacted more with in the past is automated lighting. "We are often responsible for pixel mapping LED fixtures, but with automated lighting creatives usually want to have more granular control than we can typically offer with video-based solutions," says Galler.

"However, we will sometimes do a data merge, where we send colour information from videos to moving lights and the rest of the information - such as position, intensity and gobo - will be sent from the lighting console and merged with our colour

data."

A new focus on tools and content

The advent and renaissance of realtime rendering has already impacted on the entertainment sector as a whole and will increasingly continue to do so, according to Galler. He believes the effect on the wider AV market is most noticeable in the speed of content creation and iterating of creative using tools, such as Notch.

"The unknown future demand for AR and XR technologies in live production will be a dominant force in driving the need for realtime techniques and workflows to be adopted by the broader market," he says.

"In the near future owning an LED stage will be commonplace and productions will consider shooting on LED the new normal.

"When that happens, there will be a newfound focus on tools and content, and an entire ecosystem of service and service providers centred around using in-camera VFX. This might sound far-fetched, but I believe this will be the reality in the next two years or so." ■

Contacts

www.luxmc.com

www.disguise.one

www.notch.one

www.unrealengine.com

rovisual.com

www.panasonic.com



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