V-Ray Hybrid Advances GPU Rendering

First unveiled at the GPU Technology Conference in Silicon Valley, V-Ray's new hybrid rendering technology adds CPU support to its NVIDIA CUDA-powered GPU renderer

RENDER WITH ALL YOUR COMPUTING POWER
Now with V-Ray Hybrid, artists will have greater flexibility to render a scene using GPUs, CPUs or a combination of both. And the rendered images will be identical, regardless of hardware. This allows artists to use any and all computing power, from high-performance GPU workstations to CPU render nodes.

"GPU rendering is on the rise, and V-Ray Hybrid solves two important issues that could make it even more popular," said Vlado Koylazov, Chaos Group co-founder. "It lets artists use all of their existing hardware, and it gives them a fallback solution if they run into GPU RAM limitations. This makes GPU rendering a more practical solution for a much wider audience."

MAKING IT EASIER TO SWITCH TO GPU RENDERING
Tomas Wyszolmirski is the studio director at Dabarti Studio

outside Warsaw in Poland. He has been using V-Ray Hybrid, finding the choice refreshing for all kinds of quick internal jobs, as well as those more pressing time-crucial projects.

The 'Mars Rover' project was a quick but challenging piece which depicts a highly realistic view of the harsh environment of the red planet with its dim orange light washing in from every direction. "We started the 'Mars Rover' project two and a half weeks away from Christmas when the job was to go live, and so then the whole production was really tight," he explains. "Thankfully, the rendering times were very quick. The render times were three minutes per frame on the V-Ray render nodes."

"We use boosted high-end gaming GPUs like 1080ti and TitanX at Dabarti," says Wyszolmirski. "We do this because they have quite a decent amount of memory; 11GB or 12GB is perfect for us. We can fit 95% of scenes we produce on this. And if we can't, it is possible to render it with the Hybrid

Engine. We used the new features quite heavily like Aerial Perspective and Adaptive Lights as well. Running it all together like a production stress test, all the renders ran well, there were no issues."

'Salt And Pepper' was an internal project for Dabarti Studio. An experimental visual to render out photoreal peppercorns and large grains of rock salt. "We developed a tool for capturing textures and wanted to test it out," Wyszolmirski explains. "The imagery is all rendered on a GPU on the beta version of V-Ray 3.6. We've worked with V-Ray since it began, and with GPU for about three years now. We were early adopters of V-Ray GPU because we went full scale CPU to GPU, and there's no going back!"

"Everyone loves the speed of GPU rendering because it is also three to four times cheaper to render, and way faster as well, but it's also faster to work with in terms of creating the scenes and creating the shaders, so you're not only saving time on rendering, but also in preparation of the shot itself."

As CPU machines are ready to be replaced, V-Ray Hybrid can help ease the transition to GPU rendering, while continuing to take advantage of existing CPU resources. Additionally, if there is an empty PCIe slot on a workstation or render node, adding a GPU can give it a radical speed boost without replacing the whole machine.

"There are some very cool optimisations in V-Ray GPU, like on-demand textures which makes it possible to render truly huge amounts of textures," says Wyszolmirski. "I was able to fit close to 400 textures on 8GB of memory, including 150 textures that were 6K wide. You could use those textures for printing up billboard advertisements. This is 'crazy-impressive' to me!"

MARS ROVER: With the use of V-Ray Hybrid, the render times for this scene was reduced by 13%

SALT AND PEPPER: This scene had an incredible 25% reduction in render time thanks to V-Ray Hybrid

V-RAY HYBRID BENCHMARKS
To measure the speed boost of adding CPUs to the GPU mix, Chaos Group Labs benchmarked two scenes from Dabarti Studio.

HARDWARE
Benchmarks were run on a powerful Lenovo P900 workstation with 40 logical CPU cores, 128GB RAM, and two NVIDIA Quadro GP100s.

CPUs	GPUs
2 Intel Xeon E5-2687W v3 3.10 GHz 40 logical CPU cores 128 GB RAM	2 NVIDIA Quadro GP100 w/ 16GB each 7168 CUDA cores

GPU CORES VS. CPU CORES
While V-Ray Hybrid can render on CPUs and GPUs simultaneously, CPU cores and GPU cores are not the same. For example, a GPU with 2560 cores is not simply 320 times faster than an 8 core CPU. To determine the actual speed difference, real-world benchmark tests are required.

SCENE 1: MARS ROVER

	GPU only	CPU only	GPU and CPU
Mars Rover 1920 x 1080 0.01 noise threshold	5:03	26:25	4:27 13% faster than GPU only

SCENE 2: SALT AND PEPPER

	GPU only	CPU only	GPU and CPU
Salt and Pepper 1920 x 1080 0.01 noise threshold	11.33	40.52	9:11 25% faster than GPU only

For these scenes, the addition of CPUs helped reduce render times by 13% and 25%. It's a welcome speed boost, rather than leaving these powerful CPUs idle.

BREAKING THE GPU RENDERING MEMORY BARRIER
Memory limitations inherent to GPU computing have always been a fundamental challenge when rendering on GPUs. With recent advances to V-Ray GPU, Chaos Group has reduced overall memory usage by up to 70%, and up to 700% through On-demand Mip-mapping, an intelligent way to automatically resize textures. Since textures consume the most memory, solutions like these will radically increase the size and complexity of the scenes artists and designers can render. Now with V-Ray Hybrid, if a particular scene won't fit within GPU RAM limits, it can still render on CPU.

NVLink

In addition to memory-efficient software developments, V-Ray is now the first commercial renderer to support NVIDIA's powerful, high-bandwidth interconnect NVLink, which allows video memory to be shared between graphics cards. NVLink is now available in the latest NVIDIA Quadro GP100 and NVIDIA Tesla P100 cards.