

DS4 Marine



DS4 Marine is a government owned experimental Image Generator (IG) software application. It was developed to meet three primary goals: first, to improve the quality of visual simulations by improving the physical accuracy of the rendered scene; second, to emulate the human visual system to provide improved realism and training effectiveness, and third, to provide a method to vary the fidelity of its final output for experimental purposes.

Rendering with Physics

Physics-based rendering methods enable the accurate simulation and distribution of light energy rendered in day and night scenes. This involves the modeling of light propagation in the simulated scene in High Dynamic Range

(HDR). DS4 Marine does this by rendering the entire scene using accurate in-band floating point radiance values.

Simulating the Human Vision System

The human vision system is able to adapt to a wide variety of luminance conditions. This adaption enables us to perceive differences in luminance levels that span up to 14 orders of magnitude. The dynamic range of modern-day display systems have greatly improved over the past few years. However, they are typically only capable of displaying luminance levels that span three orders of magnitude. Additional rendering techniques are required to mimic certain effects experienced in our human visual system (i.e., glare and adaption) to account for the limitations of the display.



Without Bloom



With Bloom



DS4 Marine compensates for the limited dynamic range of modern day display systems by modeling the variations in human perception. This observer transformation converts the HDR scene to what can be displayed on a Low Dynamic Range (LDR) display system. The resulting realism can significantly improve training, particularly when high contrast scene content is present.

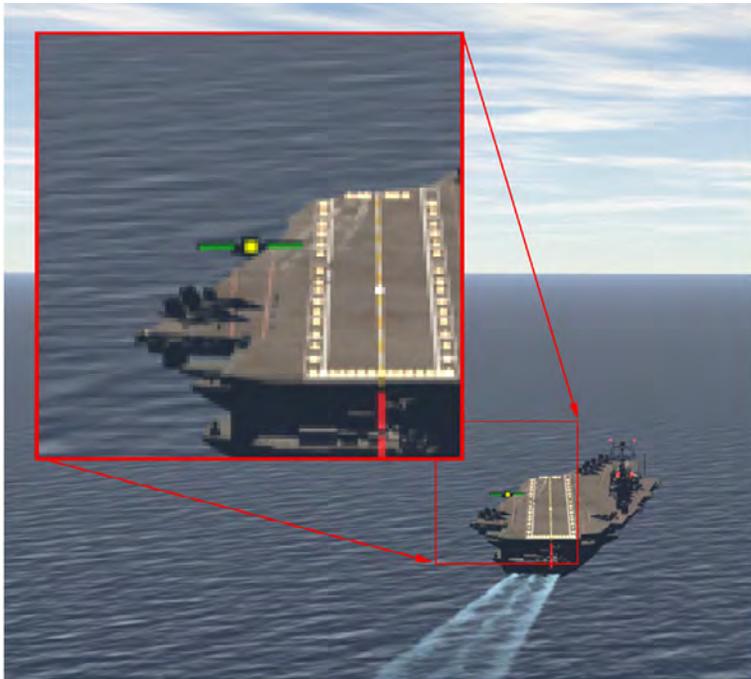
Varying Fidelity

DS4 Marine was developed in support of the Cognitive Fidelity Synthetic Environment (CFSE) project, which is investigating the training effectiveness of simulating carrier landings. In order to support this research, DS4 Marine had to fill the role of both a typical IG and that of an enhanced or next generation IG.

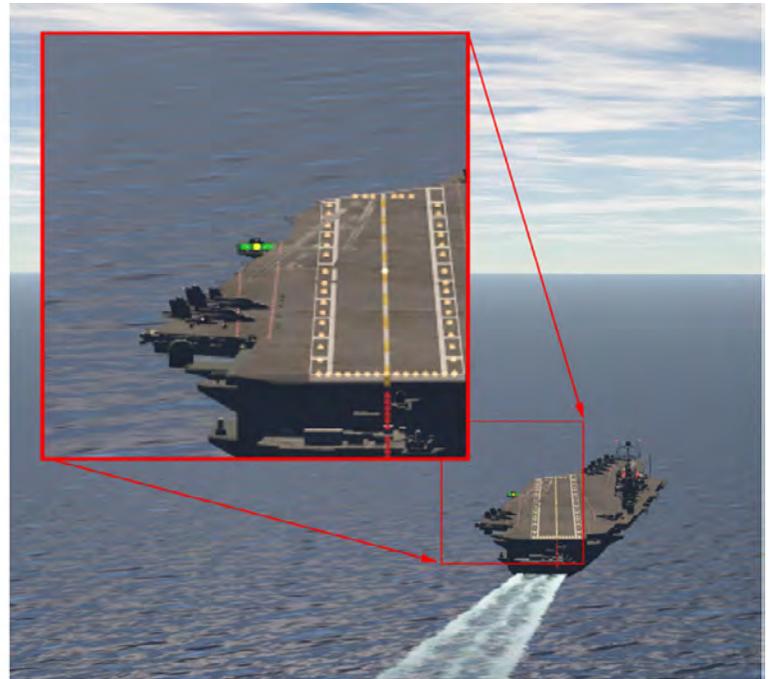
Additional Capabilities

In addition to the capabilities described above, DS4 Marine also provides many of the features found in commercially available IG software applications. It provides support for Common Image Generator Interface (CIGI) making it compatible with a wide variety of host applications. DS4 Marine can synchronously function across multiple computers to provide one contiguous image on a multi projector display device. It can page large-area, round-earth databases and provides support for entities. DS4 Marine is able to provide all of these features while maintaining real-time frame rates at high resolutions.

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Typical



Enhanced