

Department of the Navy SBIR/STTR Transition Program

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Topic # N131-018

Decoupled Rendering Channels to Reduce Logistical Support Spares Requirements of Large Scale Training Centers.

Diamond Visionics LLC

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA-205
Naval Aviation Training Systems

Transition Target: F-35 Joint Strike Fighter Program, Marine Common Aircrew Trainer (MCAT), F/A-18 Hornet Strike Fighter, Boeing P-8 Poseidon, Lockheed P-3 Orion, F-16 Mission Training Center, MH-60 Romeo and MH-60 Sierra Simulation and Training Systems, MQ-8B and MQ-8C Fire Scout, Navy Unmanned Combat Air System (UCAS)

TPOC:
(407) 380-4658

Other transition opportunities:

Fixed-wing flight simulation, rotary-wing flight simulation, shipboard training, mission planning and rehearsal, geospatial visualization

Notes: The above image is a screen capture of Diamond Visionics' GenesisIG showing the Bay Bridge in San Francisco. This scene consists of over 87,000 geo-specific OpenFlight models, along with every road, street and highway within the state of California. There are over 4M (4,000,000) polygons with run-time full-scene shadows and reflections and is rendered at 60Hz, made possible by the work performed on this SBIR.



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WHAT

Operational Need and Improvement:

As training and simulation have become more critical for preparing warfighters, the reduction of simulator visual system maintenance and life-cycle costs has become a greater need. In addition, factors such as heat generation, power consumption, and physical footprint significantly impact the long-term costs associated with large training facilities.

Specifications Required:

The objective of the SBIR was to demonstrate on a suite of flight simulators how to innovatively decouple image rendering channels from individual trainers, and instead provide imagery to multiple trainers simultaneously via a centralized pool of logistical support/spare resources, over a local video distributed network.

Technology Developed:

Diamond Visionics has successfully developed an image generator (IG) system that offers an 8-to-1 reduction in the number of PCs required for image generation. This is accomplished by utilizing multiple graphics cards in a single system and greatly reducing the CPU overhead required for rendering complex scenes. We have also demonstrated the feasibility of using GPU-based encoder technology which allows the video signal to be sent over a dedicated network. This allows the IG system to be decoupled from the display system, without the need of costly video switching hardware.

Warfighter Value:

High-fidelity simulation and training continues to take on greater importance. Traditional approaches do not effectively leverage modern hardware and therefore limit the fidelity of the visualization. Furthermore, large-scale training installations using traditional approaches are costly to operate and maintain. The technology developed for this SBIR provides significantly greater realism and reduces the life-cycle costs.

WHEN

Contract Number: N68335-14-C-0319 **Ending on:** January 31, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Video Streaming Research	Med	Produced potential solutions	TRL 2	July 2013
Video Streaming Prototype	High	Working prototype / demonstration	TRL 4	November 2013
Hardware Consolidation Prototype	High	Working prototype / demonstration	TRL 5	November 2013
Hardware Consolidation Delivery	Med	Delivered working system to Boeing	TRL 6	May 2014
Hardware Consolidation Refinement	Med	Demonstrated improvements at GPU Technology Conference	TRL 7	March 2015

HOW

Projected Business Model: Diamond Visionics is a mature and industry-recognized software development company which focuses on simulation software for fast-jet, UAV/UAS, helicopter and ground-based image generation applications. The technology being developed under this SBIR will be integrated into our GenesisRTX software architecture and made available as a license-managed module to our existing customer base. We will also provide integration and support services to aid clients with upgrades as needed. GenesisRTX is a unique and powerful real-time geospatial source data visualization engine which eliminates the need for traditional costly and time-consuming "off line" database generation. GenesisRTX supports standard GIS formats, including those defined by the Navy Portable Source Initiative (NPSI). In addition, GenesisRTX provides high-fidelity rendering effects required for simulation including physics-based sensors, advanced volumetric weather, and ocean wave modeling.

Company Objectives: Diamond Visionics will continue to be an industry leader in simulation visualization by continuing to develop and adapt this technology based on ever-changing consumer hardware trends that will provide higher simulation performance at a significantly reduced cost. We will work closely with prime contractors to ensure that our efforts are well-aligned to meet and exceed future program requirements.

Potential Commercial Applications: All of Diamond Visionics' GenesisRTX family of products (GenesisIG for out-the-window rendering, GenesisRDR for radar, and GenesisSN for sensors including NVG Simulation and Stimulation, EO and FLIR) are commercial-off-the-shelf products used in both military and commercial simulation applications. Some of these applications include, but are not limited to, fixed winged and helicopter general aviation research and development and training devices, geo-spatial visualization, robotics simulation analysis and testing as well as FAA Level-D commercial flight simulation applications.

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