Topic: N171-041

FoVI 3D

Graphics Scene Description and Application Interface for Heterogeneous 3D Display Environments
Object Graphics Language (ObjGL) is a novel, high-level, cross-platform, display agnostic application programming interface (API) streamlined to render simultaneously to a variety of multi-view displays. ObjGL enables a Heterogeneous Display Environment (HDE) allowing the operator to select the best visualization device for the task, increasing effectiveness and efficiency. To date, ObjGL demonstrations include a simple battle simulation application operating on a light-field, multi-planar, head-mounted, and 2D display simultaneously. Standardization of ObjGL/HDE enables the AEGIS display environment to exploit and integrate emerging 3D displays with ease. As the recognized world leader in light-field displays and enabling technologies, FoVI3D's small but deep technical team offers licensing and co-development opportunities to defense primes to manufacture, integrate, and deliver an improved system to support visualization technologies enabling quicker informed operator decisions.

Technology Category Alignment:
Human/Autonomous System Interaction and Collaboration
Machine Perception, Reasoning and Intelligence
Human Computer Interfaces (HCI) for Decision Making
Synthesis/Analytics/Decision Tools
System Interfaces & Cognitive Processes

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SYSCOM: NAVSEA
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Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-19-C-0184

Department of the Navy SBIR/STTR Transition Program

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WHO

SYSCOM: NAVSEA

Sponsoring Program: Program Executive Office Integrated Warfare Systems (PEO IWS 1.0)

Transition Target: AEGIS Combat System

TPOC:
(540)2840191

Other transition opportunities: Air Force Material Command: Air and Space Operation Center
Air Force Material Command: Space Command Enterprise Ground Services
National Geospatial-Intelligence Agency Campus East

Image courtesy of FoVI3D, Copyright 2018

Notes: FoVI3D has developed a novel graphics application programming interface (API), Object Graphics Language (ObjGL), specifically designed to accelerate multi-view rendering for a variety of 3D displays. With ObjGL the host application publishes a streaming scene and any number of prescribed displays render to their appropriate viewpoint. This promotes a Heterogeneous Display Ecosystem (HDE) allowing users to select the best visualization device increasing task/operator efficiency. Standardizing this API will ease display integration and reduce the manpower required to maintain, integrate, and modify applications.
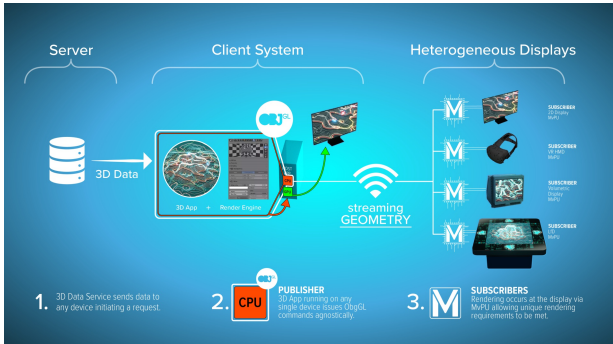
WHAT

Operational Need and Improvement: As the Navy continues reducing the manpower requirements associated with operating and maintaining ever-increasing technologically complex systems, material solutions are sought that will allow an operator to effectively and efficiently use various systems. Three-dimension (3D) visualization technologies promote improved operator task accuracy, faster operator response time, and reduce cognitive overload, but lack a common standard similar to the 2D application programming interface (API) that allows for the ease in integration. Lacking a common language/API inhibits the ability to exploit improved visualization technologies and improve sailor performance.

Specifications Required: Emerging novel Field of Light Displays (FoLD) have proprietary interfaces, require custom applications, and require significant computation resources to compute the 3D visuals. A common optimized 3D graphics standard/API should be developed that can be employed by novel 3D display developers to support a variety of 3D visualization technologies. The solution must enable an AEGIS display environment that allows the operator the flexibility to choose the best display device for the visualization task without an expensive and time-consuming integration or development effort. The API must support accelerated 3D rendering for novel multi-view display architectures and insulate the software application development from a variety of novel 3D display implementations.

Technology Developed: FoVI3D has developed a novel graphics API known as the Object Graphics Language (ObjGL). ObjGL is a high-level, cross-platform, and display-agnostic graphics API that can facilitate rendering on a wide range of FoLD architectures. ObjGL draws heavily from OpenGL, yet it is streamlined for fast rendering for multi-view display systems. ObjGL enables a modular implementation of the Heterogeneous Display Environments (HDE), allowing the operator to select the best visualization device for the task increasing task efficiency. Demonstrations include a single instance application operating on a light-field, multi-planar, head-mounted, and 2D display simultaneously.

Warfighter Value: Reduced integration efforts for various novel display technologies by 5x; Increased framerate and interactivity by 5-10x for radiance image computation; Flexibility to select best visualization technology for the task. With the addition of a light-field display: For operator decision and action – reduce time to decision making by 50% and increase time to action by 100%; for planning and training – reduce cognitive strain by 25%.

WHEN

Contract Number: N68335-19-C-0184

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Release version 0.9 for lab/beta use	Low	Sign up multiple users outside of FoVI3D	5	November 2018
Speed improvements in ObjGL v0.9	Med	Demo 5x OTS GPU render efficiency and/or speed improvement for render test case	5	December 2019
Release version 1.0 to LMCO RMS	Med	LMCO engineers are able to compile and build	6	July 2020
LMCO to identify scenario for demonstration	Med	Scenario approved by TPOC	6	December 2020
Develop scenario within FoVI3D's BattleSim Application	Med	Scenario approved by LMCO	7	May 2021
Demonstration and Transition	Med	Demonstrate at SNIC with multiple 3D displays with seamen executing identified tasks for scenario created	7	October 2021

HOW

Projected Business Model: For the acceptance and usage of any modern software API, it must be open-source. An open-source API ensures longevity in use and circulation beyond the company or creators. After ObjGL is released as an open-source API to prime developers, ObjGL will be pushed for an open-standard adoption through the Khronos consortium. The Khronos Group, Inc. is an open standards non-profit consortium that manages royalty-free application programming interfaces. In conjunction, FoVI3D will license the radiance image computation algorithm and the Multiview Processing Unit architecture. Both licensures are necessary to obtain framerate requirements for field of light displays. As the sole developer of light-field displays, FoVI3D will also license the system architecture to prime contractors responsible for manufacturing and assembling the command center visualization systems across the services.

Company Objectives: As the world leader in the development of light-field displays and light-field enabling technologies, FoVI3D strives to bring this superior visualization capability to the Department of Defense (DoD). With a small but deep technical team of specialized engineers, FoVI3D is uniquely poised to accelerate the research and development of light-field enabling technologies for licensing or co-development with the agencies' prime contractors. FoVI3D's extensive patent portfolio in the field of light space provides prime contractors with the acceleration to manufacture, integrate, and deliver an improved system to support simple, natural, collaborative data visualization for a quicker informed operator decision.

Potential Commercial Applications: Air Force Material Command (AFMC) has an outstanding requirement for a FoLD visualization system for collaborative and interactive analysis of 3D information from subsurface to geostationary earth orbit. AFMC represents customers from the Air and Space Operation Center and Space Command Enterprise Ground Services. With the promotion of mosaic-style warfare, an advanced visualization capability will be required to effectively and efficiently understand the battlespace. Within the commercial space, FoVI3D is talking to leading chip manufacturers AMD, NVIDIA, and Intel.

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