



Navy SBIR/STTR Success



Optical Celestial Navigation System for High Speed, High Altitude Operation

OCNS' passiveness can provide a major benefit to the fleet – the system does not give off any signals that could be detected by an enemy.

Topic Number: N08-073

SBIR Investment:
\$1,031,620

Phase III Revenue:
\$3,000,000

About the Technology:

Navy airborne platforms rely upon Global Positioning System (GPS) to accurately gauge one's location on the Earth by communicating heading, altitude, latitude and longitude. GPS impacts the success of military missions such as target tracking and missile and projectile guidance, making its presence all the more vital. However, at times when GPS becomes unavailable, whether from jamming or entering a GPS-denied environment, an alternative tool is needed. Optical Physics Company developed its Optical Celestial Navigation System (OCNS) in response to this need. The system measures angles between celestial objects in the sky to accurately assess one's location by using its patented interferometric star tracker. The concept is based on a straightforward algorithm, which locks celestial coordinates to an Earth-centric baseline.

Naval Benefit

GPS independent navigation has gained more importance and has been met with high demand in recent years to ensure mission success when GPS is not available. The Optical Celestial Navigation System can detect the angular separation of stars very accurately. This accuracy enables the user to calculate a GPS independent celestial fix, which includes latitude and longitude coordinates. The OCNS operates independently of GPS, and cannot be jammed. Its passiveness is a major benefit to the fleet – OCNS does not give off any signals that could be detected by an enemy. Platforms that can benefit from this technology include air vehicles flying at high altitudes and speeds that do not rely on satellite navigational systems, specifically future weapon systems with sustained high supersonic (Mach 3 to Mach 5) cruise capability that fly at altitudes in excess of 70,000 feet above ground level.

Transition

After completing a Phase I and II with ONR, the OCNS piqued the interest of several prime contractors, as well as the Air Force, for additional applications. Optical Physics Company has targeted multiple avenues for technology transition of its OCNS. Besides GPS-independent navigation on airborne platforms, the interferometric tracker can also be deployed in high precision star trackers for spacecraft guidance navigation and control and in telescopes for tracking satellites in Earth orbit from the ground. After aligning with Northrop Grumman, OPC was awarded a Navy Rapid Innovation Fund (RIF) to develop a complete navigation system prototype using Northrop Grumman's inertial measurement unit (IMU) instruments within its system.

Dr. Gail Erten

818.880.2907

gerten@opci.com

26610 Agoura Road, Suite 240

Calabasas, CA 91302

www.opci.com



Optical Physics Company

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