

SUCCESS STORY

TOPIC NUMBER: SB072-019

SBIR INVESTMENT: \$1,065,073

PHASE III FUNDING: \$61,700,000



WIDE AREA VIDEO IMAGE STORAGE TECHNIQUES

Leveraging SBIR funds, Logos Technologies developed a wide-area motion imagery (WAMI) sensor for use on Navy unmanned aircraft systems that greatly enhances situational awareness for the fleet.

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THE CHALLENGE

Sensors used by the Navy have the ability to cover large areas at high resolution, and a very high volume of imagery can be generated. Storing this data, however, has been a challenge. For instance, in an uncompressed or loosely compressed manner, it could easily require up to 1000 terabyte hard drives for a single surveillance mission. The issue with compressing data is both the computational time required to compress the data and compression artifacts, such as noise along curving edges and elimination of small objects. Because of this challenge, an SBIR solicitation was released looking for computationally efficient and innovative methods for storing data from wide area video sensors that would reduce the storage requirements by at least two orders of magnitude without introducing image artifacts into the stored data.

THE TECHNOLOGY

Logos designed an innovative imagery compression system capable of coding and storing airborne wide area persistent surveillance (WAPS) imagery at 20 gigapixel/second rates. The Logos system co-registers and combines frames from the WAPS image sequence into reference imagery, which represents the stable background scene used by the compression coder/decoder. Salient scene motion (moving vehicles, humans, etc.) is detected by differencing frames from the reference data, and this data is then filtered, compressed, coded and stored. This SBIR project paved the way for Logos' high-demand wide-area motion imagery (WAMI) sensor that is being used today by NAVAIR. WAMI is an approach to intelligence, surveillance, and reconnaissance that employs a sophisticated airborne sensor system to detect, image, and track every vehicle and moving dismount over a designated area several kilometers in diameter.

THE TRANSITION

Shortly after the completion of the Phase II SBIR project, Logos received a \$49.6M Phase III contract (N68335-10-G0036) from the Naval Air Systems Command (NAVAIR) to further evolve this technology.

Redkite was soon unveiled: a WAMI system that covered a city-sized area (12 square kilometers) at once; detecting, tracking and recording all significant movers within the scene and transmitting multiple imagery streams to users on the ground in real time. Redkite can store up to eight hours of geo-tagged mission data for real-time and forensic analysis. Logos conducted test flights of a Redkite fitted for the payload bay of the Insitu Integrator / RQ-21 Blackjack. This sensor version demonstrated its ability to capture and stabilize WAMI and stream it to multiple handheld devices. Soon thereafter, Logos was awarded two other Phase III contracts under basic ordering agreement N6833519-G0052; one for \$5.4M and one for \$6.7M from NAVAIR to develop, deliver, and perform proof-of-concept flight tests on a WAMI sensor. The sensor system is called Cardcounter and is being developed to integrate onto the Navy and Marine Corps RQ-21A small tactical unmanned aircraft system (UAS). Cardcounter is a missionized capability derived from Logos' BlackKite sensor. BlackKite is an ultra-lightweight WAMI prototype with infrared capability.

THE NAVAL BENEFIT

WAMI can be deployed at a moment's notice to deliver realtime wide-area situational awareness to the fleet. Since the WAMI records such an expansive coverage area, the operator does not have to worry about losing one target while tracking another going in a different direction. In addition, the WAMI system records and archives everything it sees, allowing users to conduct real-time and forensic analysis; uncovering critical ties between people, places, and vehicles, and identifying patterns of behavior that might otherwise have been missed.

THE FUTURE

Logos continues to fulfill its Phase III contracts with NAVAIR, which extend until 2024, to further evolve Cardcounter. Cardcounter leverage BlackKite's high-performance multimodal edge processor, which can store six or more hours of mission data. With this technology, users can forensically analyze the recorded imagery to better contextualize what is currently unfolding in the real-time imagery, drawing connections between people, places and events.