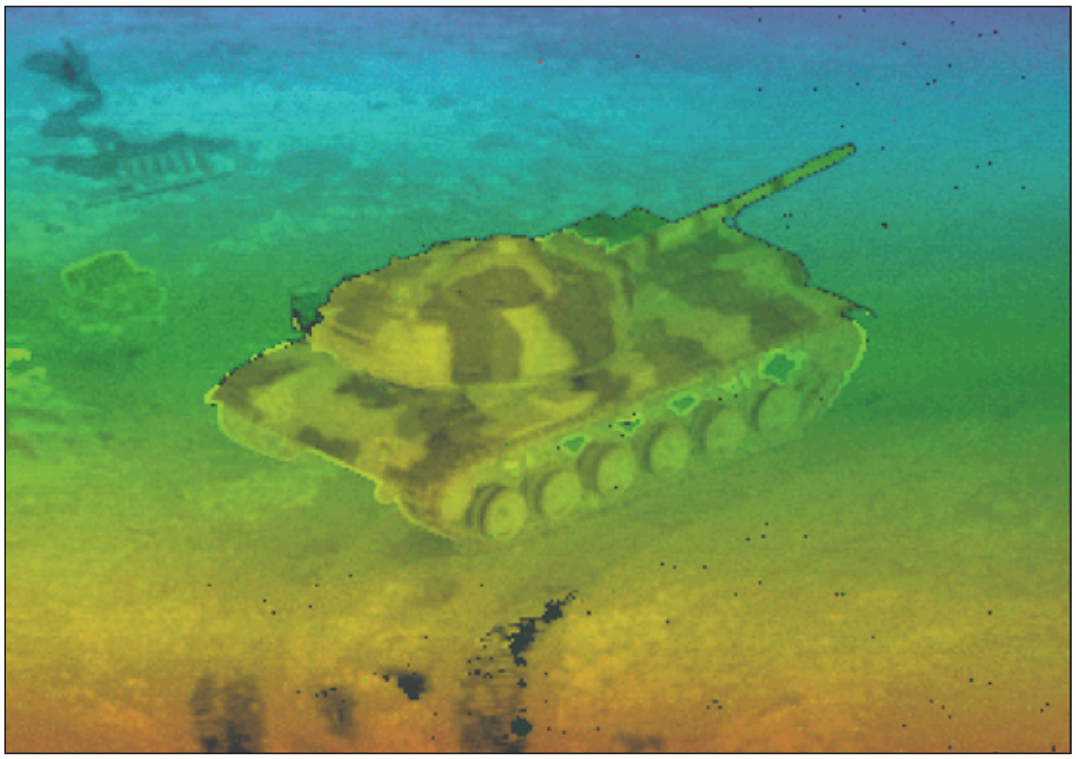
Air Force SBIR Transition Impact

Improved Seeker for Next Generation "Smart" Weapons



- **Rugged, compact, high performance miniaturized imaging laser radar receiver produces high resolution 3-D images**
- **New seeker carries its own laser, eliminating the need to expose laser designator personnel to enemy fire products from traditional light sources**

Air Force Requirements

The Air Force needs an improved seeker for the next generation of "smart" weapons. The seeker has to be very compact and rugged, and able to produce high resolution, 3-D images of the target, using an eye-safe laser. The new seeker envisioned by the Air Force carries its own laser, eliminating the need to expose laser designator personnel to enemy fire. The images produced by the seeker contain enough detail to allow the weapon to determine if the object is a legitimate target, which reduces the risk of fratricide and collateral damage.

SBIR Technology

Working with the Air Force under a Small Business Innovation Research Program (SBIR) Phase II contract, H.N. Burns Engineering investigated the application of new integrated circuit and micro optics technologies to the miniaturization of the laser radar seeker. Combining emerging technologies from a diverse group of industries, H.N. Burns Engineering developed the Multichannel Optical Receiver Photonic Hybrid (MORPH), the centerpiece of a new high performance imaging laser radar receiver. The MORPH measures the time of flight of the laser pulses to an accuracy of less than a billionth of a second. Fiber optic waveguides transport the laser signals between the weapon's optical and electronic systems. Using a MORPH as the nucleus, H.N. Burns Engineering produced a laser radar receiver in a package that fits in the palm of your hand.

Air Force Transition Payoff

The miniature packaging and signal processing technology developed under the USAF SBIR program transitioned into two families of military sensors, namely height-of-burst (HOB) proximity sensors and 3-D imaging systems. The HOB sensor developed by H.N. Burns Engineering was selected and flight qualified by Raytheon as the primary ground sensor for the Navy's Land Attack Standard Missile (LASM). In 2002 and 2003 H.N. Burns Engineering delivered more than 6,000 HOB sensors, which were used as smart fuzes. A prototype multichannel optical receiver photonic hybrid (MORPH) imaging laser radar system, delivered under the USAF SBIR program, has served as one of the primary data collection systems at the USAF laser radar research laboratory at Eglin AFB. The MORPH system was used by the USAF to generate multi-aspect 3-D target data that is currently being utilized for next-generation algorithm development at Eglin AFB and at the Defense Advanced Research Agency (DARPA).

Company Benefit

The MORPH has immediate military applications, in smart bombs, air-to-air and air-to-ground missiles, and other autonomous weapons, such as the cruise missile. H.N. Burns Engineering is now working with the Air Force and major defense contractors to incorporate the MORPH into a variety of laser-guided offensive and defensive weapon systems. There are numerous civilian uses for this high performance, eye-safe system. The high resolution, 3-D images generated by the MORPH will provide new capabilities in automated or augmented security and surveillance systems. The system uses an invisible laser beam, and works as well in the dark as it does in daylight. The MORPH is rugged and compact, and it can make images at a rate ten times faster than a television camera. Thus, the new laser radar system can be used as an automated guidance and collision avoidance sensor on a wide variety of vehicles.

SBIR Topic:
AF 95-219

Title:
Parallel Multichannel Imaging Laser Radar Receiver

Contract #:
F08630-96-C-0025

SBIR Partner:
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SBIR

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