LiDAR system maximizes crew protection.

Leonardo augments SAR capabilities of AW139 helicopter.

Abaco SYSTEMS

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Overview

In 2017, the United States Coast Guard Search and Rescue alone made almost 17,000 sorties, saving over 4,000 lives. In the same year, the UK government recorded over 500 SARH (Search and Rescue Helicopter) 'taskings', with over 300 people rescued. Technology is playing an increasingly vital role in improving the effectiveness of SAR missions, such as the multi-sensor imaging systems used by the Canadian Air Force to localize, track, identify and detect targets in day/night and difficult weather conditions. That's typical of the constant upgrade and adaptation necessary to meet emerging mission requirements.

Leonardo Helicopters is a premier provider of rotary wing aircraft specifically designed for SAR deployment. Take the AW139 multirole intermediate twin-engined helicopter, for example. Since entering service in 2003, some 900 aircraft are in service and have cumulatively achieved over two million flight hours across five continents. The AW139 has become one of the company's most influential products; it has been subsequently developed into two enlarged medium-lift helicopters, the military-orientated AW149 and the AW189 for the civil market. In its 15 year life, it has benefited from a wide-ranging series of upgrades. ●

4,000+ LIVES SAVED

900+ AW139 IN SERVICE

2,000,000+ FLIGHT HOURS

15+ YEARS OF SERVICE

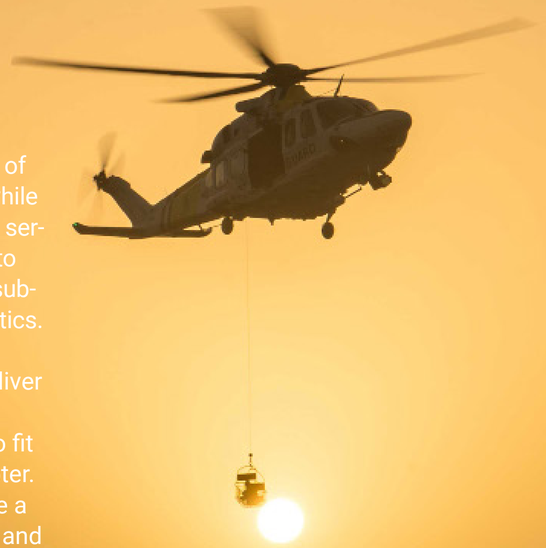
The challenge

In its continuing quest to improve the safety of missions flown by the AW139, Leonardo was looking to develop a system that would address one of the most dangerous elements of a mission: hovering. The danger arises as a result of perceptual judgment errors, wrong decision making, bad crew resource management, poor visibility and self-induced pressure.

Helicopters operating in SAR operations are often required to fly near obstacles - trees, buildings and so on - in daylight or darkness and in adverse conditions. Leonardo wanted to provide a sophisticated collision avoidance system that would aid the pilot by indicating the distance of the helicopter from these obstacles.

The OPLS - Obstacle Proximity LiDAR System - project was begun with the aim of improving safety during hovering flight while conducting SAR and emergency medical service (EMS) missions. Leonardo needed to identify a central embedded computing subsystem with a number of key characteristics.

A key requirement was that it should deliver high performance – but have a minimal SWaP (size, weight and power) profile to fit within the confined space of the helicopter. Also important was that it would provide a broad and flexible range of interfaces – and that the solution could be implemented with minimal NRE investment, reducing cost and time to market. ●



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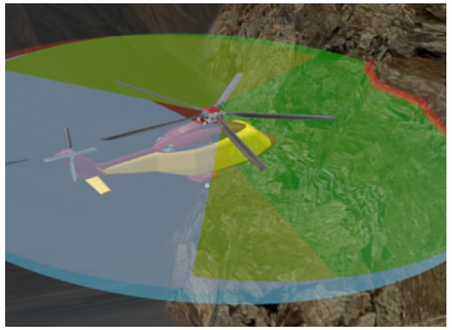
The solution

Leonardo borrowed a MAGIC1 Rugged Display Computer from Abaco. The 3U VPX system combines Intel Core i7 CPU technology with NVIDIA's EXK107 GPU (Graphics Processing Unit) to deliver unprecedented levels of performance for rugged applications. When deployed as a display computer, the MAGIC1 supports the industry's most demanding video and image applications, taking advantage of the significant processing power available from GPGPU (General Purpose computing on Graphics Processing Units) computing. It also provided the range of interfaces Leonardo's solution would require, including Ethernet, serial, USB and audio.

Having successfully integrated and proven the MAGIC1, Leonardo placed orders with Abaco for multiple units for installation in the AW139. The OPLS is based on a set of laser sensors, the data from which are collected by MAGIC1 and displayed in the cockpit.

The OPLS consists of three main rotor-head-mounted LiDAR (Laser imaging Detection and Ranging) sensors that generate a 360 degree radial view around the aircraft and a dedicated cockpit control panel. The OPLS



ensures fast and accurate detection and tracking of short range obstacles up to 25 metres (80 feet) away by time-of-flight measurement at different angles. Pilots can operate and monitor the system from the control panel while video and audio indications are provided on the multi-function displays (MFDs) and through the aircraft's inter communication system (ICS).

The video indications provide a realistic 360° top-view representation of the helicopter and any obstacles, obstacle profiles on a polar grid, range captions, minimum safety margin indication, critical radial indication and safety color coding. The audio indications include adjustable distance thresholds, frequency coded margin ("beep"), band transition annunciations and mute functionality with automatic audio re-engagement. The system is also Night Vision Goggle (NVG) compatible.

MAGIC1 Rugged Display Computer.

The outcome

The OPLS is now an option on the AW139 and is fully integrated with the type's avionics with information accessible on the cockpit multi function displays, and allows mutual reinforcement with the AW139 hovering mode.

Leonardo has secured orders for over 1,000 aircraft from more than 300 customers in 80 countries around the world, and the AW139 is said to be the best-selling helicopter in its weight category and the most successful helicopter programme in the last 15 years. The AW139 is available with more than 1,000 certified equipment options. Among them is not only OPLS but also LIPS and FIPS (Limited and Full Icing Protection Systems), and the OPLS (Obstacle Proximity LiDAR System) - all designed to enhance mission capability and safety.

The system was subsequently made available for additional platforms including the AW169, AW189 and AW101 helicopters, facilitating synergies for operators of these types in areas such as training, maintenance and support, and has made an important contribution to the ability of Leonardo's rotary wing aircraft to conduct and complete safe, successful missions and save more lives.

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Abaco Systems is a business unit of AMETEK, Inc., a leading global manufacturer of electronic instruments and electromechanical devices with 2021 sales of more than $5.5 billion.