Ground Control System for Unmanned Aircraft Uses Radisys COM Express Module

Case Study

radisys.

Industry/Market

Military equipment manufacturer.

The Challenge

Consolidate a laptop, controller and antenna into a portable system that does not require much space.

The Business Environment

The increasing use of drones is driving the need for ground control systems with advanced guidance and video capabilities.

The Solution

Run the guidance, video and control applications on ruggedized COM Express modules from Radisys.

The Benefits

The low-power, compact design enables reconnaissance and surveillance missions in the harshest environments.

Customer Profile

The equipment manufacturer develops energy-efficient Mil/Aero systems, including small unmanned aircraft systems (UAS).

Revolutionizing warfare, a new breed of remarkably small and light unmanned aircraft is enabling rapid deployment and high mobility in difficult terrain. Likewise, the ground control systems for these drones are easily portable, fitting in a small backpack along with other essentials.

Keeping up with these advancements, a military equipment manufacturer decided to redesign its handheld ground control system to make it more compact. The system, comprising a laptop, controller and antenna, could be consolidated if all the applications ran on a single processor. Committed to deliver prototypes in nine months, the manufacturer based the design on COM Express architecture to reduce development time, while satisfying small form factor and low power consumption requirements.

The manufacturer's engineers took a close look at Radisys' extensive COM Express module offerings and requested two enhancements to one of the standard modules, the CEZ5XT. They asked Radisys to increase the system memory to 2GB and test over the -40˚ to 85˚ C temperature range. Radisys created a new product SKU and provided prototypes with the memory upgrade in six weeks, and prototypes validated for extended temperature in five months.

In addition to supplying a large portfolio of COM Express modules, we are willing to create specialized SKUs to meet the demands of military systems.

Lorraine Orcino COM Express Product Line Manager at Radisys

Why COM Express?

The need to increase performance on a number of fronts—compute, I/O and imaging—while maintaining a low power thermal envelope, is making it harder for designers of small and handheld systems to mutually satisfy these requirements. Avoiding many headaches associated with complex computer system design, some military equipment manufacturers are using commercial off-the-shelf (COTS) compute modules based on COM Express architecture, which was developed for space constrained, low power environments. This approach reduces product development cost and time, and provides a large number of other benefits, including:

- **Lowers risk** when proven COM Express modules are used.
- **Enables easy upgrades** to next-generation processors and features by exchanging modules.
- **Reduces manufacturing inventory** as boards don't have to be built in-house.
- **Minimizes test development** since modules come pre-tested.

Rugged and Reliable

With Radisys, the military equipment manufacturer could count on a proven track record of delivering ruggedized modules, which leveraged HALT (Highly Accelerated Life Testing) and HASS (Highly Accelerated Stress Screening) testing. The roots of HALT and HASS processes can be traced back to 1969,[1] when Dr. Hobbs developed advanced practices for increasing equipment reliability and ruggedness.

The premise is to subject products to extreme environmental conditions up until the point of failure in order to determine the weakest aspects of the design. Subsequently, primary, secondary and tertiary failures are removed by reengineering and redesigning the product until the fundamental limits of technology are reached (i.e., the physics of semiconductor devices). As a result, the product has an increased functional and physical design margin, which safeguards against failure. After a Radisys design is released to manufacturing, 100 percent of the products are subjected to HASS screening, comprising test limits that can be set beyond the product specification to ensure a wide operating margin.

Custom Carrier Board

The military equipment manufacturer also required a custom carrier board, which was designed and manufactured by a third party partner of Radisys. Working closely together, Radisys and the design house delivered an extended temperature hardware platform that met an aggressive timetable. There was a "teaming" aspect, which enabled the system design to be expedited. For example, Radisys engineers worked in tandem with the carrier board design team and made expeditious BIOS changes to the COM Express compute module.

[1] http://www.haltandhass.com.

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