Brainstorm: Unmanned Systems

Edited by Jason Lomberg, Technical Editor

What is the next big advancement in unmanned weapons systems?

Jeff Clarke, Array Connector, www.arrayconnector.com [1]

As is the case with just about everything else in the world, defense industry scientists and engineers have been tasked with making unmanned weapons systems smaller and lighter. Most unmanned aerial vehicles are too small to carry the current array of missiles and bombs, creating the need for smaller air-to-ground missiles. The current anti-tank missiles weigh more than 100 pounds, and U.S. Air Force officials have challenged their suppliers to develop comparable munitions that weigh one pound or less. So, with munitions becoming smaller and lighter, components such as connectors and laser guidance systems will also have to follow suit. The challenge for manufacturers of rugged mil-spec connectors like Array Connector is to find innovative ways to make connectors smaller and lighter and still meet the military's stringent standards for reliability and efficiency.

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The next big advancement is system integration. The next generation of unmanned aerial vehicles (UAVs) must have ability to move from one deployment to the next without a change to the payload, which requires cramming more functionality into the UAV payload and reducing size, weight and power (SWaP).

The next generation of UAVs should incorporate as many subsystems in a common

computing architecture or board. Designers must focus not just on raw performance but on GFLOP-per-mW, MIPS- per-mW or both. With commercial off the shelf (COTS) multicore and multiprocessors, in a System-on-Chip (SoC), designers have the performance needed to integrate multiple applications in one subsystem, such as sensor systems, infrared cameras and video surveillance, as well supporting the communications in a single board. This implementation provides the advantages of a single processing board for multiple sensor and antennas. The use of multicore and multiprocessor SoCs for these types of integrations can translate to different unmanned weapons systems such as such as telemetry, flight control, target acquisition, surveillance, armament deployment and communications.

Multiprocessors and multicore SoCs provide designers with the capability to meet the SWaP and functionality requirements for the next generation of unmanned weapon systems.

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Unmanned weapon systems will continue their evolution into more powerful, integrated military platforms that can undertake multiple roles that combine joint service operations. Currently the US Navy is building unmanned vehicles for carrier operations that are designed to execute both reconnaissance and targeting missions. The Robotic Systems Joint Program Office (Army and Marines) are also enhancing their current unmanned ground systems to have both attack and defensive capabilities for joint missions. The drive to increase loiter time and time over target capabilities, along with joint executing joint missions will drive new advances in efficiency, and will require systems designs to be smaller, lighter, and consume less power while adhering to open standards.

To meet these challenging demands, we predict that multi-core technology will play a big role in future unmanned systems. Multi-core technology allows designers to build in more functionality, such as active radar and targeting systems, which are integrated with onboard weapons and control systems. These multi-core systems will enable the integration of systems that today are on separate boards or in separate federated environments. Additionally, the use of multi-core technology, when combined with open standards, will allow for rapid reuse and consolidation of hard real time applications with less critical applications on single instances of silicon, reducing size, weight, and power (SWaP) to meet critical performance constraints.

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