APPLICATION EXAMPLE

Using Intel®-based COTS for On-deck Optical Threat Detection

CURTISS-WRIGHT

DEFENSE SOLUTIONS

Challenge

- Process and display a high bandwidth data stream
- Low latency from image capture to information
- SWaP constraints and harsh environment

Solution

- CHAMP-AV9 6U OpenVPX™ COTS module
- Two quad-core Core i7 processors on a single module
- Complex processing and display in a single chip

Results

- Image processing plus tactical display on multiple stations
- Operating close to the sensor for low latency
- Deploying the latest COTS technology

Challenge

Curtiss-Wright recently engaged with a customer tasked with building a new, state-of-the-art optical threat protection system for a NATO naval surface program. This on-deck system will be used to detect and identify small craft, determining if they pose a potential threat and transferring information to a fire control system if they do.

Our customer is using sensors comprised of focal plane arrays (FPA), which generate a deluge of high definition pixel data. A large portion of the design challenge was finding a way to process and display this high bandwidth data stream, with very low latency from image capture to actionable information.

The processing requirements are complex, involving image enhancement, identification algorithms and trajectory extrapolation, while display involves rendering an image for human perception and transferring that image to multiple display stations. Keeping the image processing hardware in close proximity to the sensor FPA provides significant latency advantages but places limits on volume, weight and power while exposing the hardware to a harsh maritime environment.

CHAMP-AV9
Rugged, air-cooled*

Solution

The system's challenging performance and ruggedization requirements are met by the Curtiss-Wright CHAMP-AV9 6U OpenVPX COTS module, harnessing the varied capabilities of the Intel Core i7 processor to efficiently support both complex processing and display within a single piece of silicon. A CHAMP-AV9 DSP module features two Intel Core i7-4700EQ quad-core 4th generation processors, each running at 2.4 GHz. Each of the Core i7's four cores contains a 256-bit floating point vector unit, ideal for linear algebraic, matrix math, DSP, and image processing. Additionally, the Core i7 contains a single graphics processor unit (GPU) based on the Intel HD Graphics 4600, also known as the GT2; this GPU's output can support up to 3 displays.

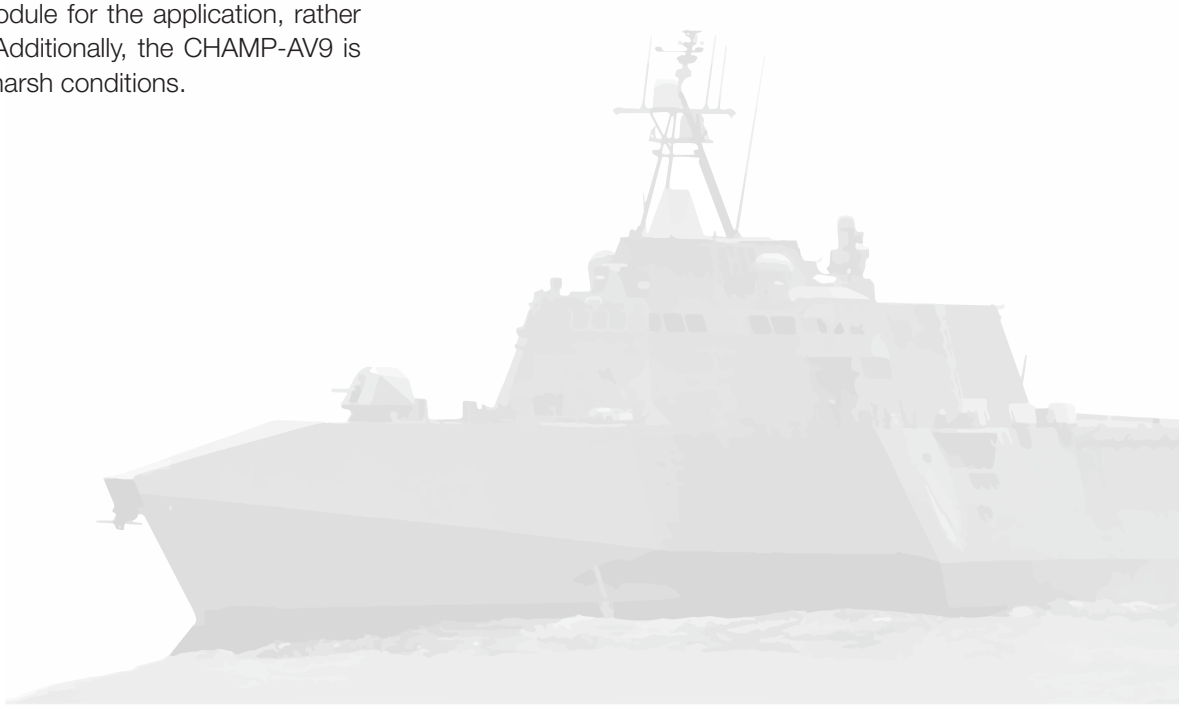
Within a Core i7 the pixel data stream can be manipulated, compared and enhanced by each core, then moved to the GPU for display rendering. This single-chip capability has tremendous throughput and latency advantages. Because the CHAMP-AV9 contains two of these Core i7 devices, there is a high level of computational processing throughput as well as failsafe redundancy. Space requirements are minimized by using one module for the application, rather than a multi-module set. Additionally, the CHAMP-AV9 is rugged, built to operate in harsh conditions.

Results

The Curtiss-Wright customer's system uses the CHAMP-AV9 to provide advanced processing and display as part to the new tactical display system, deploying the latest COTS technology to meet mission requirements.

Because the CHAMP-AV9 is deployed close to the sensor, latency is minimized and, as an added benefit, the weight and complexity of associated cabling is reduced. Operational efficiency is increased because the display images generated by the CHAMP-AV9 are available to multiple stations throughout a vessel.

*Also available in conduction-cooled configurations



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