Use of high performance GPUs in Aerospace and Defense applications

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Traditional application of GPUs
Emerging applications for GPGPUs
Challenges unique to Aerospace & Defense products
Conclusion
Aerospace & Defense platforms using GPUs

- Cockpit Display
- Embedded Training
- Commander Display
- Video Tracking
- Mission Computer
- Digital Map
- Radar Processing
Cockpit displays
Radar displays
Digital mapping
Embedded Training

Demo courtesy of Presagis and b.design
Distributed aperture sensor
Rugged GPGPU solutions

Increasing functional capability while decreasing size, weight & power (SWaP)
Radar processing

**Typical older system:**
4 cu ft., 105 lbs., 2000W
576 GFLOPS peak

**New system:**
0.8 cu ft., 10 lbs., 200W
574 GFLOPS peak
Video processing applications

The GPGPU will extend the range of functions that can be performed on a variety of platforms, with greater levels of autonomy.
Video tracking
Image stabilization
What’s special about A&D products?

The requirements for A&D products make regular commercial boards unsuitable

- Environment
- Configuration control
- Obsolescence management
- Long term support
Environment

Wide temperature range
-40°C to +85°C (-40°F to 185°F)
No air flow in many applications
Extensive thermal cycling
Boards must be designed to endure repeated shock.
Boards must be designed to endure continuous vibration.
Boards must be designed to endure repeated HUMIDITY, SALT, and FOG.
Typical Aerospace & Defense products

- Thermal path for conduction cooling
- Rugged MIL-STD connectors
- Wedge lock restraint
- Hermetically sealed enclosure
Configuration control

A&D platforms go through multiple phases during their lifetime.

Once deployed, full component traceability is required to ensure no changes are made.

GE Fanuc has teams dedicated to managing these lifecycle issues.
Obsolescence management

Commercial silicon lifetimes do not support A&D deployment cycles.

Obsolescence planning is critical
- Close partnerships with silicon vendors
- Frequent “health checks” on component availability
- Storage of silicon following End of Life (EOL)
Conclusion

A&D products will always want more performance and less SWAP.

GPUs will change the A&D market.

Aerospace and Defense customers are ultimately the winners from this NVIDIA / GE Fanuc partnership.

http://www.gefanuc.com/cuda.html