

SRC Reconfigurable Computing Solutions for UAV Applications



Image courtesy of the Dept. of Defense



SRC Ten-Module Signal Data Processor



SRC Mid-Size Signal Data Processor



SRC-7 Ruggedized Portable MAPstation™ System



SRC Portable MAPstation Systems

Summary

Reconfigurable computing solutions from SRC Computers provide powerful processing for the Unmanned Aerial Vehicles (UAV) market in a much smaller footprint with significantly reduced weight and volume over microprocessor-based systems.

- Reduction in power consumption and volume of approximately 90%
- Developers can use ANSI standard languages to port large scale applications to the system very rapidly
- Significant performance gains* on UAV applications over microprocessor-based systems using the SRC-7 Series H MAP® processor:
 - The Spatial Domain Normalized Cross-Correlation implementation with a 112 Mpixel sensor size resulted in a **292x** gain;
 - The Panchromatic Sharpening implementation with a 112 Mpixel sensor size resulted in a **102x** performance gain;
 - KLT Feature Tracking performance with a 112 Mpixel sensor size resulted in a **82x** gain;
 - The Spotlight Synthetic Aperture Radar (SAR) Backprojection algorithm using the Series H MAP processor with one User Logic Chip resulted in a **38x** performance gain. A two User Logic Chip implementation is projected to achieve a **101x** gain.

Challenges

The use of UAVs has grown considerably over the last decade. UAVs are now a vital component of modern military, homeland/border security and airborne intel operations, as well as applications in the commercial/civil markets, in the United States and around the world.

As their use expands, UAVs are being required to detect an ever-increasing array of objects which in turn requires multiple sensors over several spectra (visible, radar, infrared). Multiple sensors not only generate enough data to create enormous RF data link bandwidth requirements, they also greatly increase the processing power required for multispectral image fusion and analysis. On-board processing using traditional microprocessors has exceeded the strict weight, power and physical space requirements for UAVs, forcing most data to be relayed to ground-based stations for processing and interpretation which greatly reduces the timeliness of decision-making.

Solutions

SRC reconfigurable computing systems provide high-performance on-board processing power for compute-intensive UAV visualization applications in compact lightweight form-factors. SRC systems accomplish this by providing a balanced peer relationship between microprocessors and the SRC FPGA-based MAP processors. These systems are programmed using standard ANSI C or Fortran provided by the Carte™ Programming Environment.

For airborne or mobile applications, SRC Signal Data Processing solutions, Portable MAPstation™ systems, 2U MAPstation™ systems, and custom embedded solutions provide powerful computing for real-time, compute-intensive processing. SRC Computers has a full line of computing solutions for small to large UAVs. For ground-based applications, MAPstation workstations harness the performance of large multi-rack servers into a single desktop unit.

System Attributes

Attributes of SRC reconfigurable computing solutions that help achieve significant application performance gains include:

- MAP® processors, the SRC reconfigurable compute element, that deliver orders of magnitude speedup over microprocessors using very low power and generating very little heat;
- Multiple user logic chips which provide an extension of the compute logic to handle the contribution of multiple input swaths into Image Sum Array at the same time;
- Use of Global Common Memory Banks (GCM) which allows for arbitrarily large Image Sum Arrays up to gigasample arrays;
- 16 on-board memory banks that store intermediate compute results for larger number of input swaths.

Ease of Programming with the Carte Programming Environment

The SRC Carte Programming Environment takes high-level language C or Fortran code, compiles portions of it to run on the implicitly controlled microprocessors, and creates the configuration information needed for the explicitly controlled reconfigurable MAP processors. Everything needed to control both types of processors is then combined by the Carte Programming Environment into a single Unified Executable.

Carte is designed to maximize performance, including features such as:

- Parallel compute sections
- Streaming DMAs
- Optimized FFT library
- Streams between computation on the two user logic chips
- Easy debugging environment

Find Out More

Contact SRC Computers today to find out how you can get more performance in greatly reduced form factors over traditional microprocessor-based systems. **Call (719) 262-0213** or **e-mail sales@srccomputers.com** to speak with our applications experts. Please also visit our web site at **www.srccomputers.com**.



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* For more information on SRC Computers' performance gains in airborne applications, please request a copy of the SRC white paper "SRC Computers' MAP® Processors for Airborne Intelligence, Reconnaissance, and Surveillance Applications" document number MKT-043-01 by e-mailing sales@srccomputers.com.