Multi-Objective Geometric Optimization for Heterogeneous Architectures

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Research Objective

• Demonstrate methods for computational intensive processing using tactical HPC resource.

• Multi-objective geometric optimization for blue force positioning using full 3D representation of an urban environment.

ARL Facilities and Capabilities Available to Support Collaborative Research

• Variety of CPU/GPU clusters to utilize from ARL/DSRC
  http://www.arl.hpc.mil/hardware/index.html

• Variety of hardware accelerators to test parallel codes
  • Intel Xeon Phi (MIC)
  • AMD W9100
  • Nvidia M2070, K20, K40

Challenges

• Tactical HPC networks will be dynamic, heterogeneous, unreliable, and highly constrained.

• Parallel programming methods and algorithms for such systems require development.

• Complex problem to give concurrent real-time and realistic solutions.

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

• Experience in low power and high performance architectures (FPGA, ARM, Epiphany).

• Incorporate realistic modeling such as weather, dust and smog.

• Mathematical programming for multi-objective geometric optimization.

• Integrate dynamic scenarios with moving targets and threats and account for uncertainty in the locations.

Publications:


• Computational Science and Engineering (CSE), 2013 IEEE 16th International Conference, December 2013