

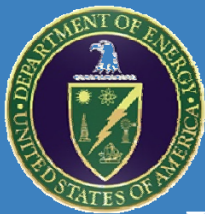
QR Decomposition: Demonstration of Distributed Computing on Wireless Sensor Networks



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High Performance Embedded Computing (HPEC)
Workshop

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(A) Approved for public release; distribution is unlimited.

Scope

- Kernel for distributed numerical algorithms on **Energy and Resource-constrained** Wireless Embedded Platforms
- Wireless Sensor Network is an example of a severely resource constrained platform

QR in WSN

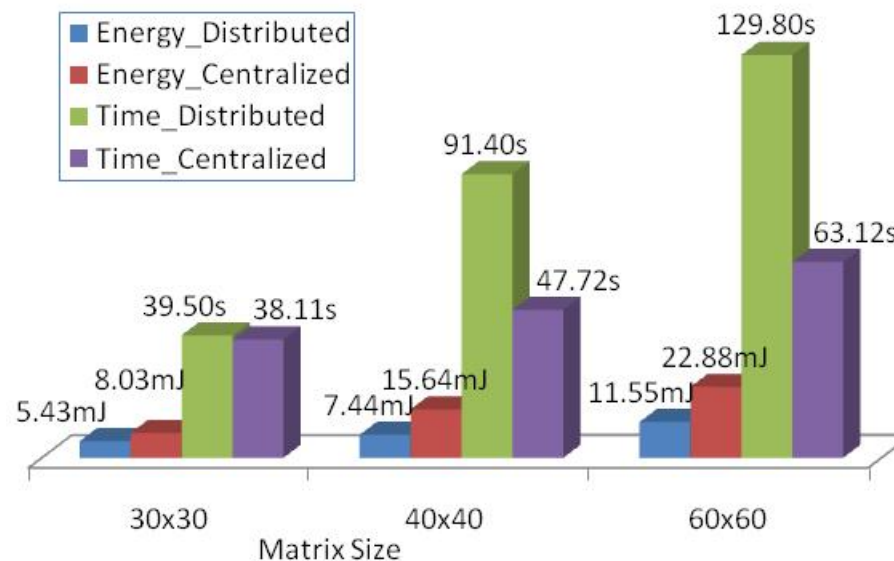
- QR-based least mean square (LMS)
- QR-based recursive least mean square (RLS)
- RLS and LMS in adaptive filtering and beamforming

Proposed QR

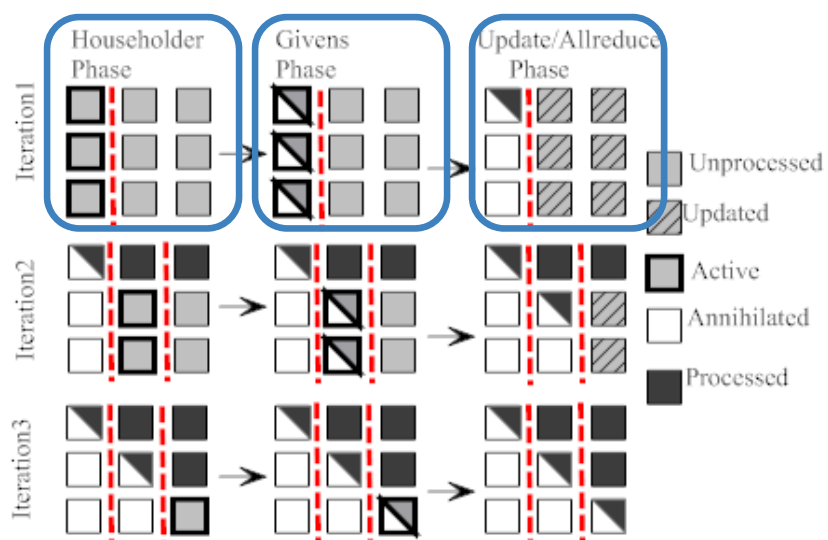
Blend of Householder reflections, Givens rotations, and AllReduce

Contributions

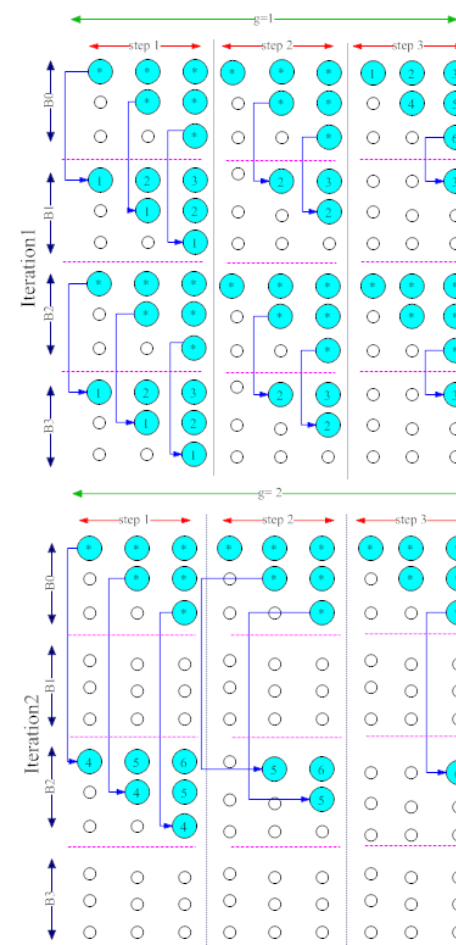
- ✓ Develop a new distributed QR algorithm
- ✓ Achieve a balanced tradeoff between degree of parallelism and communication cost
- ✓ Propose a resource-aware distribution
- ✓ Achieve 2x speedup and 2x energy savings per node vs. centralized (single node) approach



Proposed Algorithm



Givens Phase



Proposed Distribution on WSN

