



High Performance Embedded Computing Workshop

AGENDA
27-29 November 2001

27 November

0730 **Check-In & Continental Breakfast**

AUDITORIUM

0830 **Welcome**
David Briggs / MIT Lincoln Laboratory

0835 **Keynote Address**
Options for Embedded Systems
Mr. Gordon Bell / Microsoft

0905 **Opening Remarks**
Robert Bond / Jeremy Kepner / MIT Lincoln Laboratory

0915 **Session 1: Emerging Technologies**
Richard Games / MITRE

0925 **Invited Speaker**
A DoD Perspective on High Performance Computing
Mr. John Grosh / OSD

0955 **Application Requirements Analysis for Polymorphous Computing Architectures**
Janice McMahon / MIT Lincoln Laboratory

1025 **Break**

1040 **Invited Speaker**
SERIAL RapidIO
Mr. Douglas Endo / Raytheon

1110 **Invited Speaker**
Infiniband Architecture and Application to HPEC
Robert Zak / Sun Microsystems

1140 **Poster Session A: System Applications**
Joseph Germann / Sky Computers

Poster Session A Précis

Poster A.1 *Computational Analysis and Proposed Mapping for the Next Generation Mk 48 Heavyweight Torpedo Embedded Processor*
Masahiro Arakawa / MIT Lincoln Laboratory

Poster A.2 *Fault Tolerant Signal and Data Processing in Missile Defense Radars*
Jay Cooper / Raytheon
Robert Oravits / United States Army Space and Missile Defense
Christopher Barnes / Georgia Tech Research Institute

Poster A.3 *Dependence of Recognition Accuracy on Available Network Bandwidth*
Michael Devore / Washington University
Joseph O'Sullivan / Washington University
Roger Chamberlain / Washington University
Mark Franklin / Washington University

Poster A.4 *Parallel ATR Evaluation on NOW and Embedded Multiprocessor Systems*
Gil Ettinger / ALPHATECH, Inc.
Monica Burke / ALPHATECH, Inc.

Poster A.5 *Scalability of Embedded Automatic Target Recognition Algorithms*
Paul Harmer / AFRL / SNAS
Tracey Smith / CSC
Terry McClurg / CSC

Poster A.6 *Fault-Tolerance for Matrix and Signal Processing Applications*
Daniel Katz / Jet Propulsion Laboratory

Poster A.7 *Metric-Based Searches for Best Bands in Hyperspectral Imaging*
Nirmal Keshava / MIT Lincoln Laboratory
Gary Shaw / MIT Lincoln Laboratory

Poster A.8 *Parallel Multiple Hypothesis Tracker*
Thomas Kurien / Mercury Computer Systems

Poster A.9 *Dynamic Workload Scheduling in a Parallel Radar Signal Processor*
James Lebak / MIT Lincoln Laboratory
Glenn Schrader / MIT Lincoln Laboratory
Jim Daly / MIT Lincoln Laboratory

Poster A.10 *Floating Point Utilization of Commodity Processor SIMD Extensions for SIP Applications*
Richard Linderman / AFRL
* Jules Bergmann / AFRL
Dennis Fitzgerald / AFRL

Poster A.11 *Video Processing for Defense Surveillance Applications*
Rick Post / Agile Vision LLC
* Arlan Pool / Mercury Computer Systems
Scott Thieret / Mercury Computer Systems

Poster A.12 *A Givens Rotation-Based VLSI Bit-Level Systolic Sample Matrix Inversion Architecture*
Daniel Rabinkin / MIT Lincoln Laboratory
William Song / MIT Lincoln Laboratory
Michael Vai / MIT Lincoln Laboratory
Huy Nguyen / MIT Lincoln Laboratory

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1235 **Lunch**

1345 **Session 2: New Applications**
Daniel Katz / Jet Propulsion Laboratory

1355 **Parallel Matched-Field Tracking (MFT) for Distributed Deployable Systems**
Jeong-Hae Han / University of Florida
Byungll Koh / University of Florida
Alan George / University of Florida
* Keonwood Kim / Florida State University

1425 **A Case Study for Utilizing Commercial Products for Radar Control Computing**
Jeffrey Truslow / NSWC DD

1455 **Commodity Based, High Availability Radar Signal Processing**
Joseph Caruso / Computer Sciences Corporation

1525 **Break**

1550 **Flexible Architecture for Hyperspectral Image Processing on Reconfigurable Computers**
Anthony Nelson / Los Alamos National Laboratory
Kevin McCabe / Los Alamos National Laboratory

1620 **Wideband Networked Sensors Processing**
Joseph Usoff / MIT Lincoln Laboratory
Bill Beavers / MIT Lincoln Laboratory
* Jennifer Cox / MIT Lincoln Laboratory

1650 **Adjourn**

1700 **Reception**

1800 **Banquet Speaker Computing with Life**
Dr. Thomas Knight / MIT AI Lab

1845 **Banquet**

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28 November

0730 **Check-in & Continental Breakfast**

AUDITORIUM

0830 **Announcements**
Robert Bond / Jeremy Kepner / MIT Lincoln Laboratory

0835 **Invited Speaker**
Matlab on Many Computers
Mr. Cleve Moler / The Mathworks

0905 **Session 3: Matlab / Simulink on Many Processors**
Stan Ahalt / Ohio State

0915 **Parallel Matlab**
Alan Edelman / MIT
Ron Choy / MIT

0930 **Heterogeneous Cluster Computing (HCC)**
Cosmo Castellano / Integrated Sensors Inc.
* Edward McDermott / Integrated Sensors Inc.

0945 **Parallel Programming with MatlabMPI**
Jeremy Kepner / MIT Lincoln Laboratory

1000 **Break**

1015 **Session 4: Reconfigurable Computing**
Robert Bernecky / NUWC

1025 **Optimized Compilation of Embedded Applications on FPGAs**
Wim Bohm / Colorado State University
Bruce Draper / Colorado State University
Walid Najjar / Colorado State University
Jeff Hammes / Colorado State University
Charlie Ross / Colorado State University
Monica Chawathe / Colorado State University

1055 **Debugging Techniques for FPGA-Based Configurable Computing Systems**
Brent Nelson / Brigham Young University
Brad Hutchings / Brigham Young University
* Michael Wirthlin / Brigham Young University

1125 **Employing Reconfigurable Hardware in a Networked Environment**
Miriam Leeser / Northeastern University
Heather Quinn / Northeastern University
Laurie Smith King / College of the Holy Cross

1155 **Poster Session B: Hardware / Systems Technologies**
Henk Spaanenburg / Mercury Computer Systems

Poster Session B Précis

Poster B.1 Reconfigurable Processing in Electronic Warfare Systems
Byron Coker / Georgia Tech Research Institute
Michael Kopp / Georgia Tech Research Institute
Michael Willis / Georgia Tech Research Institute

Poster B.2 Embedded Real-Time Signal Processing: A Distributed Memory Multicomputer Architecture with Low Latency, Flexible Data Distribution
Michael Harris / BAE Systems IEWS
Mark Law / BAE Systems IEWS
* Todd Birkebak / BAE Systems IEWS

Poster B.3 Field Programmable Gate Arrays for Signal Processing
Matthew Krzych / NUWC

Poster B.4 Parameterized K-means Clustering for Rapid Hardware Development to Accelerate Analysis of Satellite Data
Miriam Leeser / Northeastern University
Pavle Belanovic / Northeastern University
Michael Estlick / Northeastern University
Maya Gokhale / Los Alamos National Laboratory
John Szymanski / Los Alamos National Laboratory
James Theiler / Los Alamos National Laboratory

Poster B.5 DG2VHDL: A Suite of Tool for Synthesizing VLSI Array Architectures
Elias Manolakos / Northeastern University
Andrew Stone / Northeastern University

Poster B.6 Simulated Radar Returns in Field Programmable Gate Arrays
Christopher Parris / Naval Surface Warfare Center Dahlgren Division
Ronald Stapleton / Naval Surface Warfare Center Dahlgren Division

Poster B.7 A New Data Distribution for Parallel LU Decomposition
Thomas Steck / Johns Hopkins University
Gerard Meyer / Johns Hopkins University

Poster B.8 Mission Specific Signal Processing (MSSP) Custom Core Technology
Michael Vai / MIT Lincoln Laboratory
Huy Nguyen / MIT Lincoln Laboratory
William Song / MIT Lincoln Laboratory

1250 **Lunch**

1400 **Session 5: Advanced Hardware**
Kenneth Teitelbaum / MIT Lincoln Laboratory

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1410 **An 0.25 Micron SOI Transposable Memory with Built-in Self-Test Circuitry**
Jay Brockman / University of Notre Dame
Bedros Hanounik / University of Notre Dame
Peter Kogge / University of Notre Dame

1440 **PIM- and Stream Processor-Based Systems**
Jinwoo Suh / University of Southern California
Changping Li / University of Southern California
Steve Crago / University of Southern California
Robert Parker / University of Southern California

★ 1510 **The Raw Processor: A Composable 32-Bit Fabric for Embedded and General Purpose Computing**
Michael Taylor / MIT
Jason Kim / MIT
Jason Miller / MIT
Fae Ghodrat / MIT
Ben Greenwald / MIT
Paul Johnson / MIT
Walter Lee / MIT
Albert Ma / MIT
Nathan Shnidman / MIT
* David Wentzlaff / MIT
Matt Frank / MIT
Saman Amarasinghe / MIT
Anant Agarwal / MIT

1540 **Break**

1605 **Performance Evaluation of a Reconfigurable, Embedded Photonic Multiring Interconnection Network**
Roger Chamberlain / Washington University
Mark Franklin / Washington University
Praveen Krishnamurthy / Washington University

1635 **How High Performance Computing May Enhance the Magnetospheric Multi Scale Mission**
Michael Rilee / Emergent IT
Steven Curtis / NASA
Scott Boardsen / Emergent IT
Maharaj Bhat / Emergent IT

1705 **Invited Speaker Computing Biology**
Dr. John Reynders / Celera Genomics

1735 **Adjourn**

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29 November

0730 **Check-In & Continental Breakfast**

AUDITORIUM

0830 **Announcements**

Robert Bond / Jeremy Kepner / MIT Lincoln Laboratory

0835 **Invited Speaker**

Network Centric Warfare and the Role of High Power Computing
RADM Thomas Elliott USN (Ret.) / DSR

0905

Session 6: Software Standards

Rick Pancoast / Lockheed Martin

0915 **Status of the Vector, Signal, and Image Processing Library (VSIPL)**

Mark Richards / Georgia Tech Research Institute
Randall Judd / SPAWAR Systems Center
James Lebak / MIT Lincoln Laboratory
Rick Pancoast / Lockheed Martin
Dan Campbell / Georgia Tech Research Institute

0930 **Data Parallel CORBA Status**

James Kulp / Mercury Computer Systems

0945 **Data Reorganization Interface (DRI)**

Kenneth Cain, Jr. / Mercury Computer Systems
Anthony Skjellum / MPI Software Technology

1000 **Software Communications Architecture (SCA)**

Jeffrey Smith / Mercury Computer Systems
S. Murat Bicer / Northeastern University

1015 **Break**

1030

Session 7: Advanced Software

Richard Linderman / AFRL

1040 **Measuring CORBA Performance for HPEC Algorithms**

Bill Beckwith / Objective Interface Systems, Inc.

1110 **Generating Platform-Adapted DSP Libraries Using SPIRAL**

Jose Moura / Carnegie Mellon University
Jeremy Johnson / Drexel University
Robert Johnson / MathStar Inc.
David Padua / University of Illinois at Urbana-Champaign
Viktor Prasanna / University of Southern California
Markus Pueschel / Carnegie Mellon University
Bryan Singer / Carnegie Mellon University
Manuela Veloso / Carnegie Mellon University
Jianxin Xiong / University of Illinois at Urbana-Champaign

1140 **S3P: Automatic, Optimized Mapping of Signal Processing Applications to Parallel Architectures**

Hank Hoffmann / MIT Lincoln Laboratory
Jeremy Kepner / MIT Lincoln Laboratory
Robert Bond / MIT Lincoln Laboratory

1210

Poster Session C: Software / System Technologies

Bill Bent / CSPI

Poster Session C Précis

Poster C.1 Customizable Middleware for Networks of Embedded Systems

Gul Agha / University of Illinois at Urbana-Champaign

Po-Hao Chang / University of Illinois at Urbana-Champaign

Koushik Sen / University of Illinois at Urbana-Champaign

* Reza Ziaei / University of Illinois at Urbana-Champaign

Poster C.2 The Acoustic Analysis Workbench

Keith Bromley / SPAWAR
Robert Dukelow / SPAWAR
Jerry Symanski / SPAWAR

Poster C.3 Automatic Vectorization for Altivec

John Carbone / Green Hills Software, Inc.

Poster C.4 Profile-Guided Optimization Targeting High Performance Embedded Applications

David Kaeli / Northeastern University
Jeffrey Smith / Mercury Computer Systems
S. Murat Bicer / Northeastern University
Efe Yardimci / Northeastern University

Poster C.5 JavaPorts: An Environment for the Rapid Prototyping of Heterogeneous Network-Centric Distributed Processing Applications

Elías Manolakos / Northeastern University
Demetris Galatopoulos / Northeastern University
Andy Funk / Northeastern University

Poster C.6 SAGE: A Multiple Platform Software Development and Integration Environment for Diverse Applications

Minesh Patel / Honeywell Space Systems
Matthew Clark / Honeywell International
John Samson, Jr. / Honeywell Space Systems

Poster C.7 Open Standards and Source Advantages to the High Performance Embedded Computers Industry

Stephen Prause / CSPI

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Poster C.8 **Software Tools for High Performance Embedded Computing System Design and Code Generation**
Christopher Robbins / MCCI

Poster C.9 **Advanced VSIDL Computations Using C++**
Anthony Skjellum / MPI Software Technology
Gary Boudreaux / MPI Software Technology

Poster C.10 **VSIDL / ERI: Enhanced Reference Implementation of the Core VSIDL Library**
Anthony Skjellum / MPI Software Technology
Gary Boudreaux / MPI Software Technology
Tim Campbell / Logicon
Walter Schakelford / Logicon
Howard Cohl / Logicon

Poster C.11 **Implementation of the Intelligent Detector-Tracker Algorithm on Embedded Hardware Connected to a Local Area Network**
James Steed / Blue Horizon Development Software
William Lundgren / Blue Horizon Development Software
Kerry Barnes / Blue Horizon Development Software
Doug Rawson-Harris / Thomson Marconi Sonar Limited
Roger Benton / Thomson Marconi Sonar Limited
Rob Taylor / Thomson Marconi Sonar Limited

1305 **Lunch**

1415 **Session 8: Fault Tolerance**
Craig Lund / Mercury Computer Systems

1425 **MPI / FT ä : Enabling Technology for High Performance, High Availability Embedded User Applications**
Murali Beddhu / MPI Software Technology
Anthony Skjellum / MPI Software Technology
Rajanikanth Batchu / Mississippi State University

1455 **Application Level Fault Tolerance and Detection**
Eric Ciocca / University of Massachusetts
Israel Koren / University of Massachusetts
C.M. Krishna / University of Massachusetts

1525 **Break**

1550 **Session 9: Advanced Systems (U.S. Only)**
Philip Sementilli / Raytheon

1600 **Invited Speaker**
Export Control of High Performance Computing: Analysis and Future Directions
Mr. John Grosh / OSD

★ 1630 **Standards-Based Real-Time Embedded High Performance Computing: Common Imagery Processor**
Brian Sroka / MITRE
David Szakovits / Northrop Grumman

1700 **Lessons Learned in the Testbed Development of a High Performance, High Availability Radar Signal Processing System Using COTS Hardware and Software Standards**
Nathan Doss / Lockheed Martin
Michael Iaquinto / Lockheed Martin

1730 **High Performance COTS Computing with a Two Microsecond Latency Budget: A Challenge to Embedded Processing Standards**
Charles Kuning / Northrop Grumman

1800 **Adjourn**

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