

*Commenced Publication in 1973*

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

## Editorial Board

David Hutchison

*Lancaster University, UK*

Takeo Kanade

*Carnegie Mellon University, Pittsburgh, PA, USA*

Josef Kittler

*University of Surrey, Guildford, UK*

Jon M. Kleinberg

*Cornell University, Ithaca, NY, USA*

Friedemann Mattern

*ETH Zurich, Switzerland*

John C. Mitchell

*Stanford University, CA, USA*

Moni Naor

*Weizmann Institute of Science, Rehovot, Israel*

Oscar Nierstrasz

*University of Bern, Switzerland*

C. Pandu Rangan

*Indian Institute of Technology, Madras, India*

Bernhard Steffen

*University of Dortmund, Germany*

Madhu Sudan

*Massachusetts Institute of Technology, MA, USA*

Demetri Terzopoulos

*New York University, NY, USA*

Doug Tygar

*University of California, Berkeley, CA, USA*

Moshe Y. Vardi

*Rice University, Houston, TX, USA*

Gerhard Weikum

*Max-Planck Institute of Computer Science, Saarbruecken, Germany*

Laurence T. Yang Xingshe Zhou  
Wei Zhao Zhaohui Wu Yian Zhu  
Man Lin (Eds.)

# Embedded Software and Systems

Second International Conference, ICESS 2005  
Xi'an, China, December 16-18, 2005  
Proceedings



Springer

## Volume Editors

Laurence T. Yang  
Man Lin  
St. Francis Xavier University  
Department of Computer Science  
Antigonish, NS, B2G 2W5, Canada  
E-mail: {lyang,mlin}@stfx.ca

Xingshe Zhou  
Yian Zhu  
Northwestern Polytechnical University  
No. 127 West Youyi Road, P.O. Box 404  
Xi'an City, Shaanxi Province, 710072, China  
E-mail: {zhouxs,zhuya}@nwpu.edu.cn

Wei Zhao  
Texas A&M University, Department of Computer Science  
College Station, TX 77843-1112, USA  
and  
National Science Foundation, Division of Computer and Network Systems  
4201 Wilson Blvd, Arlington, VA 22230, USA  
E-mail: w-zhao@tamu.edu

Zhaohui Wu  
Zhejiang University  
College of Computer Science  
Hangzhou, Zhejiang Province, 310027, China  
E-mail: wzh@zju.edu.cn

Library of Congress Control Number: Applied for

CR Subject Classification (1998): C.3, C.2, C.5.3, D.2, D.4, H.4

ISSN	0302-9743
ISBN-10	3-540-30881-4 Springer Berlin Heidelberg New York
ISBN-13	978-3-540-30881-2 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springeronline.com

© Springer-Verlag Berlin Heidelberg 2005  
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India  
Printed on acid-free paper SPIN: 11599555 06/3142 5 4 3 2 1 0

# Preface

Welcome to the proceedings of the 2005 International Conference on Embedded Software and Systems (ICESS 2005) held in Xian, China, December 16-18, 2005.

With the advent of VLSI system level integration and system-on-chip, the center of gravity of the computer industry is now moving from personal computing into embedded computing. Embedded software and systems are increasingly becoming a key technological component of all kinds of complex technical systems, ranging from vehicles, telephones, aircraft, toys, security systems, to medical diagnostics, weapons, pacemakers, climate control systems, etc.

The ICESS 2005 conference provided a premier international forum for researchers, developers and providers from academia and industry to address all resulting profound challenges; to present and discuss their new ideas, research results, applications and experience; to improve international communication and cooperation; and to promote embedded software and system industrialization and wide applications on all aspects of embedded software and systems.

Besides the main conference, we also featured the following four workshops to extend the spectrum of the main conference:

- Scheduling Techniques for Real-Time Systems
- IXA/IXP Application in Embedded Systems
- The Modeling and Security of Ubiquitous Systems
- Intelligent Storage System and Technology

There was a very large number of paper submissions (360) for the ICESS 2005 main conference, not only from Asia and the Pacific, but also from Europe, and North and South America. All submissions were reviewed by at least three program or technical committee members or external reviewers. It was extremely difficult to select the papers for the conference because there were so many excellent and interesting submissions. In order to allocate as many papers as possible and keep the high quality of the conference, we finally accepted 140 papers and 31 papers for the main conference and for the workshops, respectively. There were 63 main conference papers and 8 workshop papers selected in the LNCS proceedings. We believe that all of these papers and topics not only provided novel ideas, new results, work in progress and state-of-the-art techniques in this field, but also promoted cutting-edge research and future cooperation, and stimulated future research activities in the area of embedded software and systems.

The exciting conference program was the result of the hard and excellent work of program vice-chairs, external reviewers, and program and technical committee members under a very tight schedule. We were also grateful to the members of the local organizing committee for supporting us in handling so many organizational

tasks. Last but not least, we hoped you enjoyed the conference's technical and social program, and the natural and historic attractions of the ancient city of Xian.

October 2005

Laurence T. Yang, Xingshe Zhou, Wei Zhao,  
Zhaohui Wu, Yian Zhu and Man Lin

# Organization

ICCESS 2005 was organized by Northwestern Polytechnical University, China in collaboration with St. Francis Xavier University, Canada.

## Sponsors

National Natural Science Foundation of China  
Important Software Committee of National 863 Program  
China Computer Federation  
Northwestern Polytechnical University, China  
Springer, Lecture Notes in Computer Science (LNCS)

## Executive Committee

General Chairs:	Zhaohui Wu, Zhejiang University, China Wei Zhao, Texas A&M University and NSF, USA
Program Chairs:	Laurence T. Yang, St. Francis Xavier University, Canada Xingshe Zhou, Northwestern Polytechnical University, China
Program Vice-chairs:	Huiyang Zhou, University of Central Florida, USA Walid Taha, Rice University, USA Yann-Hang Lee, Arizona State University, USA Naehyuck Chang, Seoul National University, Korea Luis Gomes, Universidade Nova de Lisboa, Portugal Mohammed Y. Niamat, The University of Toledo, USA Susumu Horiguchi, Tohoku University, Japan Elhadi Shakshuki, Acadia University, Canada Wenjing Lou, Worcester Polytechnic Institute, USA Pin-Han Ho, University of Waterloo, Canada Hong-Va Leong, Hong Kong Polytechnic University, China Qun Jin, Waseda University, Japan Arjan Duresi, Louisiana State University, USA Marios D. Dikaiakos, University of Cyprus, Cyprus
Workshop Chairs:	Yian Zhu, Northwestern Polytechnical University, China
Panel Chairs:	Man Lin, St. Francis Xavier University, Canada Joseph K. Ng, Hong Kong Baptist University, China Xu Cheng, Peking University, China

Conference Secretary: Yuying Wang, Northwestern Polytechnical University, China

Publication Chair: Tony Li Xu, St. Francis Xavier University, Canada

Local Executive

Committee: Zhanhuai Li (Chair)

Hong Tang, Yubo Wang, Mingxing Sun, Yumei Zhang

## Program/Technical Committee

Raza Abidi	Dalhousie University, Canada
Esma Aimeur	Université de Montréal, Canada
H. Amano	Keio University, Japan
Leonard Barolli	Fukuoka Institute of Technology, Japan
Darcy Benoit	Acadia University, Canada
Marian Bubak	Cyfronet University of Krakow, Poland
Jun Cai	University of Waterloo, Canada
Jiannong Cao	Hong Kong Polytechnic University, China
Keith Chan	Hong Kong Polytechnic University, China
Karam Chatha	Arizona State University, USA
Xiangqun Chen	Peking University, China
Phoebe Chen	Deakin University, Australia
Jing Chen	National Cheng Kung University, Taiwan
Yu Chen	Tsinghua University, China
Zhanglong Chen	Fudan University, China
Xiuzhen Cheng	George Washington University, USA
Xu Cheng	Peking University, China
Jen-Yao Chung	IBM, USA
Debatosh Debnath	Oakland University, USA
Yunwei Dong	Northwestern Polytechnical University, China
Stephen Edwards	Columbia University, USA
Tomoya Enokido	Rissho University, Japan
Thomas Fahringer	University of Innsbruck, Austria
Farzan Fallah	Fujitsu Laboratory in America, USA
Ling Feng	University of Twente, The Netherlands
Hakan Ferhatosmanoglu	Ohio State University, USA
Joao Miguel Fernandes	Universidade do Minho, Portugal
Antonio Ferrari	Universidade de Aveiro, Portugal
Jose Manuel Ferreira,	Universidade do Porto, Portugal
Yue Gao	Hopen Software Eng. Co. Ltd., China
Mukul Goyal	University of Wisconsin Milwaukee, USA
Rick Ha	University of Waterloo, Canada
Naiping Han	Chinasoft Network Technology Co. Ltd., China
Anwar Haque	Bell Canada, Canada
Takahiro Hara	Osaka University, Japan
Martin Hofmann	University of Munich, Germany
Seongsoo Hong	Seoul National University, Korea

## Program/Technical Committee (continued)

Zhigang Hu	IBM T.J. Watson Research Center, USA
Michael C. Huang	University of Rochester, USA
Xinming Huang	University of New Orleans, USA
Liviu Iftode	Rutgers University, USA
Clinton L. Jeffery	New Mexico State University, USA
Hai Jiang	University of Waterloo, Canada
Xiaohong Jiang	Tohoku University, Japan
Roumen Kaiabachev	Rice University, USA
Masashi Kastumata	Nippon Institute of Technology, Japan
Vlado Keselj	Dalhousie University, Canada
Ismail Khalil Ibrahim	Johannes Kepler University of Linz, Austria
Chee-ha Kim	Pohang University of Science and Technology, Korea
Jihong Kim	Seoul National University, Korea
Jung Hwan Kim	University of Toledo, USA
Kwanho Kim	Samsung Electronics, Korea
Sung Won Kim	Yeungnam University, Korea
Aris Kozyris	National Technical University of Athens, Greece
C.M. Krishna	University of Massachusetts, USA
Morihiro Kuga	Kumamoto University, Japan
Younggoo Kwon	Sejong University, Korea
Anchow Lai	Intel, USA
Wai Lam	Chinese University of Hong Kong, China
Hsien-Hsin Lee	Georgia Tech, USA
Chin-Laung Lei	National Taiwan University, Taiwan
Qun Li	College of William and Mary, USA
Tao Li	University of Florida, USA
Minghong Liao	Harbin Institute of Technology, China
Xinhau Lin	University of Waterloo, Canada
Yen-Chun Lin	Taiwan University of Science and Technology, Taiwan
Antonio Liotta	University of Essex, UK
Chunlei Liu	Troy University, USA
Xiang Long	Bei Hang University, China
Yung-Hsiang Lu	Purdue University, USA
Jing Ma	University of New Orleans, USA
Wenchao Ma	Microsoft Research Asia, China
Zakaria Maamar	Zayed University, UAE
Ricardo Machado	Universidade do Minho, Portugal
Paulo Maciel	Federal University of Pernambuco, Brazil
Evangelos Markatos	ICS-FORTH and University of Crete, Greece
Grant Martin	Tensilica, USA
Janise McNair	University of Florida, USA

## Program/Technical Committee (continued)

Teo Yong Meng	National University of Singapore, Singapore
Yan Meng	Stevens Institute of Technology, USA
Tulita Mitra	National University of Singapore, Singapore
S.M.F.D. Syed Mustapha	University of Malaysia, Malaysia
Soraya K. Mostefaoui	University of Fribourg, Switzerland
Tomasz Muldner	Acadia University, Canada
Horacio Neto	Instituto Superior Tecnico, Portugal
Naoki Nishi	NEC, Japan
WenSheng Niu	Aeronautics Computing Research Institute, China
Sebnem Ozer	Motorola Inc., USA
Gordon Pace	University of Malta, Malta
Jens Palsberg	University of California at Los Angeles, USA
Seung-Jong Park	Louisiana State University, USA
Ian Philp	Los Alamos National Lab, USA
Massimo Poncino	University of Verona, Italy
Sunil Prabhakar	Purdue University, USA
Elliott Rachlin	Honeywell, USA
Omer Rana	Cardiff University, UK
Minghui Shi	University of Waterloo, Canada
Timothy K. Shih	Tamkang University, Taiwan
Basem Shihada	University of Waterloo, Canada
Youngsoo Shin	KAIST, Korea
Dongkun Shin	Samsung Electronics, Korea
Kimura Shinnji	Waseda University, Japan
Sandeep Shukla	Virginia Tech, USA
Valery Sklyarov	Universidade de Aveiro, Portugal
Prasanna Sundararajan	Xilinx Inc, USA
Wonyong Sung	Seoul National University, Korea
Abd-Elhamid M. Taha	Queen's University, Canada
Makoto Takizawa	Tokyo Denki University, Japan
Jean-Pierre Talpin	INRIA, France
Kian-Lee Tan	National University of Singapore, Singapore
Xinan Tang	Intel Corp., Intel Compiler Lab., USA
Zahir Tari	RMIT, Australia
P.S. Thiagarajan	National University of Singapore, Singapore
Xuejun Tian	Aichi Prefectural University, Japan
Hiroyuki Tomiyama	Nagoya University, Japan
Ali Saman Tosun	University of Texas at San Antonio, USA
Nur A. Toubia	University of Texas at Austin, USA
Andre Trudel	Acadia University, Canada
Lorna Uden	Staffordshire University, UK

## Program/Technical Committee (continued)

Alexander P. Vazhenin	University of Aizu, Japan
Jari Veijalainen	University of Jyväskylä, Finland
Salvatore Vitabile	University of Palermo, Italy
Sarma Vrudhula	Arizona State University, USA
Wenye Wang	North Carolina State University, USA
Xiaoge Wang	Tsinghua University, China
Ying-Hong Wang	Tamkang University, Taiwan
Weng-Fai Wong	National University of Singapore, Singapore
Eric Wong	University of Texas at Dallas, USA
Jing Wu	CRC, Canada
Dong Xie	IBM China Research Lab, China
Yuan Xie	Pennsylvania State University, USA
Lin Xu	National Natural Science Foundation, China
Dong Xuan	Ohio State University, USA
Ryuichi Yamaguchi	Matsushita Co., Japan
Jie Yang	Spirent Communications, Inc., USA
Jun Yang	University of California, Riverside, USA
Chi-Hsiang Yeh	Queen's University, Canada
Y. Yokohira	Okayama University, Japan
Muhammed Younas	Oxford Brookes University, UK
Hsiang-Fu Yu	National Center University, Taiwan
Demetrios Zeinalipour-Yazti	University of California at Riverside, USA
Surong Zeng	Motorola Inc., USA
Guozhen Zhang	Waseda University, Japan
Daqing Zhang	Agent for Science, Technology and Research, Singapore
Shengbing Zhang	Northwestern Polytechnical University, China
Zhao Zhang	Iowa State University, USA
Wei Zhang	Southern Illinois University, USA
Youtao Zhang	University of Texas at Dallas, USA
Baihua Zheng	Singapore Management University, Singapore
Jun Zheng	University of Ottawa, Canada
Kougen Zheng	Zhejiang University, China
Dakai Zhu	University of Texas at San Antonio, USA

## Additional Reviewers

Iouliia Skliarova	Universidade de Aveiro, Portugal
Mário Véstias	INESC-ID, Portugal
Anikó Costa	Universidade Nova de Lisboa, Portugal
António Esteves	Universidade do Minho, Portugal
Raimundo Barreto	Universidade do Amazonas, Brazil

# Workshop on Scheduling Techniques for Real-Time Systems

## Introduction

Welcome to the proceedings of the 2005 International Workshop on Scheduling Techniques for Real-Time Systems (IWSRT 2005) held in conjunction with ICESS 2005 in Xi'an, China, December 16-18, 2005. Traditionally, scheduling has been an important aspect of real-time systems in ensuring soft/hard timing constraints. As real-time computing becomes complicated and has more limitations (e.g., power consumption), the demand for more sophisticated scheduling techniques becomes increasingly apparent.

The purpose of this workshop was to bring together researchers from both universities and industry to advance real-time scheduling techniques and its applications. IWSRT 2005 focused on the current technological challenges of developing scheduling algorithms:

- Power aware scheduling for real time systems
- Heuristic scheduling for real-time systems
- Parallel real-time scheduling
- Scheduling for distributed real-time systems
- Schedulability test, analysis and verification
- QoS scheduling for multimedia applications

From the many submissions, six papers were included in the workshop program. The workshop consisted of short presentations by the authors and encouraged discussion among the attendees. We hope that IWSRT 2005 provided a relaxed forum to present and discuss new ideas and new research directions, and to review current trends in this area. The success of the workshop was the result of the hard work of the authors and the program committee members. We were grateful for everyone's efforts in making the conference a success. Special thanks go to the members of the ICESS 2005 organizing committee for their support and help in many organizational tasks. We hoped you enjoyed the workshop program and the attractions of the ancient city of Xi'an.

## Workshop Chairs

Man Lin, St. Francis Xavier University, Canada

Fan Zhang, Hong Kong University of Science and Technology, China

Dakai Zhu, University of Texas at San Antonio, USA

## **Program/Technical Committee**

Samarjit Chakraborty	National University of Singapore, Singapore
Deji Chen	Emerson Process Management, USA
Yuanshun Dai	Indiana University-Purdue University, USA
Zonghua Gu	Hong Kong University of Science and Technology, China
Hai Jin	Huazhong University of Science and Technology, China
Rodrigo de Mello	University of Sao Paulo, Brazil
Xiao Qin	New Mexico Institute of Mining and Technology, USA
Gang Quan	University of South Carolina, USA
Chi-Sheng Shih	National Taiwan University, Taiwan
Shengquan Wang	Texas A&M, USA

# **Workshop on IXA/IXP Application in Embedded Systems**

## **Introduction**

The 2005 International Workshop on IXA/IXP Application in Embedded Systems (IWIXA) was held in conjunction with the International Conference on Embedded Software and Systems (ICESS 2005), December 16-18, 2005, at Northwestern Polytechnical University, Xi'an, P.R. China. The workshop aimed to provide a stimulating environment for IXA/IXP researchers and developers to share their experience in order to promote the understanding of the latest trends in Network Processors and their application development in embedded systems. The workshop invited new and original submissions addressing theoretical and practical topics in the following fields (but not limited to these topics):

- Internet eXchange Architecture (IXA) in embedded systems
- Network Processors and IXP
- The IXA/IXP Network Processors-based applications
- New Network Technology
- IXA/IXP-related training and experiments

The workshop received 21 paper submissions. After careful review, 11 papers were accepted for the workshop program. The workshop committee was grateful to all authors for their interesting contributions.

## **Workshop Chair**

Naiqi Liu, University of Electronic Science and Technology, China

## **Workshop Coordinator**

Jeffrey Cao, Intel, China

## **Program/Technical Committee**

Luo Lei	University of Electronic Science and Technology, China
Hang Lei	University of Electronic Science and Technology, China
Guangjun Li	University of Electronic Science and Technology, China

# Workshop on the Modeling and Security of Ubiquitous Systems

## Introduction

Rapid progress in computer hardware technology has made computers compact (e.g. laptop, palmtop), powerful, and more affordable. Furthermore, recent advances in wireless data communications technology have spawned an increasing demand for various types of services. As a result, we are witnessing an explosive growth for research and development efforts in the field of ubiquitous communication and computing systems.

The global growth of interest in the Internet and in high-quality audio, and video conferencing and VOD, coupled with a growing high-bandwidth structure, will lead to a rapidly expanding market for ubiquitous multimedia services. The popularity of mobile services should eventually affect the market for ubiquitous networks. For this reason, mobile based technologies, such as mobile synchronization, QoS assurance, mobile IP-based multimedia technologies and the security of mobile information systems, need to be studied and developed for future services offered to subscribers in future mobile information systems. This ubiquitous information technology will allow users to travel within an office building, from office to home, around the country and the world with a portable computer in their hands. Disconnection will no longer be a network fault, but a common event intentionally caused by the user in order to preserve a consequence of mobility.

The workshop on Modeling and Security in Ubiquitous Information Systems contained a collection of high-quality papers on this subject. In addition to this, we received a few more papers, as a result of the call-for-papers for this topic. Each paper went through a rigorous, peer review process as required by the conference. Based upon the review committee's decision, four papers were selected for their original contributions as well as their suitability to the topic of this workshop.

Many people have contributed to the creation of this workshop. Thanks are due to the members of Howon University's Mobile Networks Laboratory and the members of Kyonggi University's Security Laboratory for their support. Special thanks go to the members of the review committee for their excellent cooperation. Their hard work, comments and suggestions really helped to improve the quality of the papers. We would like to take this opportunity to thank everyone who made this workshop possible: the authors, the ICSS 2005 organizing committee and the publisher.

## Workshop Chair

Dong Chun Lee, Howon University, Korea

**Program/Technical Committee**

Bernard Burg	HP Labs., USA
Kijoon Chae	Ewha Womans University, Korea
Ying Chen	IBM China Research Lab., China
Anthony Chung	Depaul University, USA
Alex Delis	New York Polytechnic University, USA
Maggie Dunham	Southern Methodist University, USA
Adrian Friday	Lancaster University, UK
ReX E. Gantenbein	Wyoming University, USA
Takahiro Hara	Osaka University, Japan
Yong-Sok Her	Kyushu University, Japan
Hang Dai Hoon	Kyung Won University, Korea
Jadwiga Indulska	Queensland University, Australia
Christian S. Jensen	Aalborg University, Denmark
Hai Jin	Huazhong University of Science and Technology, China
Myuhang-Joo Kim	Seoul Women's University, Korea
Sang-Ho Kim	Korea Information Security Agency, Korea
Masaru Kitsuregawa	Tokyo University, Japan
Shonali Krishnaswamy	Monash University, Australia
Tae Won Kang	Agency for Defense Development, Korea
Taekyoung Kwon	Sejong University, Korea
Young Bin Kwon	Chung-Ang University, Korea
Alexandros Labrinidis	Pittsburgh University, USA
Jeong Bae Lee	Sun Moon University, Korea
Wang-Chien Lee	Pennsylvania State University, USA
Hui Lei	IBM T. J. Watson Research Center, USA
Jong-In Lim	Korea University, Korea
Seng Wai Loke	Monash University, Australia
Hanqing Lu	Chinese Academy of Science, China
Sanjay Kumar Madria	Missouri-Rolla University, USA
Se Hyun Park	Chung-Ang University, Korea
Oscar Pastor	Valencia University, Spain
Evaggelia Pitoura	Ioannina University, Greece
Andreas Pitsillides	Cyprus University, Cyprus
Indrajit Ray	Colorado State University, USA
Peter Reiher	University of California at Los Angeles, USA
Claudia Runcancio	ENSIMAG/LSR, France
Seref Sagiroglu	Gazi University, Turkey
Ming-Chien Shan	HP, USA
Theodore E. Simos	Peloponnese University, Greece
SungWon Sohn	Electronics and Telecommunications Research Institute, Korea
Ki-Sung Yoo	Korea Institute of Science and Technology Information, Korea

# Workshop on Intelligent Storage Systems and Technology

## Introduction

With the present explosive growth in information, the demand for storage systems is increasing rapidly. To satisfy such mounting demand, storage systems are required to be more scalable, reliable, secure and manageable than they are currently. There is a clear and recent trend in which some intelligence is moved from host machines to storage devices and implemented in the embedded controller. The 2005 International Workshop on Intelligent Storage Systems and Technology (ISST 2005) brought together storage systems researchers and practitioners to explore new directions in the design, implementation, evaluation, and deployment of storage systems. ISST 2005 was one of the workshops held in conjunction with the 2nd International Conference on Embedded Software and Systems (ICESS 2005) held in Xian, China, December 16-18, 2005.

We were extremely grateful to the program committee members who worked under a very tight schedule to complete the rigorous review process for the large number of submissions received by ISST 2005. Their hard work lead to the selection of the 10 papers presented at the workshop.

## Workshop Chairs

Dan Feng, Huazhong University of Science and Technology, China

Hong Jiang, University of Nebraska-Lincoln, USA

## Program/Technical Committee

Liang Fang	National University of Defense Technology, China
Jizhong Han	Chinese Academy of Sciences, China
Ben Xubin He	Tennessee Technological University, USA
Xiao Qin	New Mexico Institute of Mining and Technology, USA
Fang Wang	Huazhong University of Science and Technology, China
Frank Zhigang Wang	Cranfield University, UK
Song Wu	Huazhong University of Science and Technology, China
Changsheng Xie	Huazhong University of Science and Technology, China
Lu Xu	Chinese Academy of Science, China
Ke Zhou	Huazhong University of Science and Technology, China
Yifeng Zhu	University of Maine, USA

# Table of Contents

## Keynote Speech

Are Lessons Learnt in Mobile Ad Hoc Networks Useful for Wireless Sensor Networks? <i>Lionel Ni</i> .....	1
Compiler-Directed Scratchpad Memory Management <i>Jingling Xue</i> .....	2
Heterogeneous Multi-processor SoC: An Emerging Paradigm of Embedded System Design and Its Challenges <i>Xu Cheng</i> .....	3

## Track 1: Embedded Hardware

Trace-Based Runtime Instruction Rescheduling for Architecture Extension <i>YuXing Tang, Kun Deng, HongJia Cao, XingMing Zhou</i> .....	4
Bioinformatics on Embedded Systems: A Case Study of Computational Biology Applications on VLIW Architecture <i>Yue Li, Tao Li</i> .....	16
The Design Space of CMP vs. SMT for High Performance Embedded Processor <i>YuXing Tang, Kun Deng, XingMing Zhou</i> .....	30
Reconfigurable Microarchitecture Based System-Level Dynamic Power Management SoC Platform <i>Cheong-Ghil Kim, Dae-Young Jeong, Byung-Gil Kim, Shin-Dug Kim</i> .....	39

## Track 2: Embedded Software

A Methodology for Software Synthesis of Embedded Real-Time Systems Based on TPN and LSC <i>Leonardo Amorim, Raimundo Barreto, Paulo Maciel, Eduardo Tavares, Meuse Oliveira Jr, Arthur Bessa, Ricardo Lima</i> .....	50
---	----

Ahead of Time Deployment in ROM of a Java-OS  
*Kevin Marquet, Alexandre Courbot, Gilles Grimaud* ..... 63

The Research on How to Reduce the Number of EEPROM Writing to Improve Speed of Java Card  
*Min-Sik Jin, Won-Ho Choi, Yoon-Sim Yang, Min-Soo Jung* ..... 71

A Packet Property-Based Task Scheduling Policy for Control Plane OS in NP-Based Applications  
*Shoumeng Yan, Xingshe Zhou, Fan Zhang, Yaping Wang* ..... 85

RBLs: A Role Based Context Storage Scheme for Sensornet  
*Huaifeng Qin, Xingshe Zhou* ..... 96

CDP: Component Development Platform for Communication Protocols  
*Hong-Jun Dai, Tian-Zhou Chen, Chun Chen, Jiang-Wei Huang* ..... 107

TrieC: A High-Speed IPv6 Lookup with Fast Updates Using Network Processor  
*Xianghui Hu, Bei Hua, Xinan Tang* ..... 117

Separate Compilation for Synchronous Modules  
*Jia Zeng, Stephen A. Edwards* ..... 129

Implementation of Hardware and Embedded Software for Stream Gateway Interface Supporting Media Stream Transmissions with Heterogeneous Home Networks  
*Young-choong Park, Seung-ok Lim, Kwang-sun Choi, Kaung-mo Jung, Dongil Shin*..... 141

**Track 3: Real-Time Systems**

On Using Locking Caches in Embedded Real-Time Systems  
*A. Martí Campoy, E. Tamura, S. Sáez, F. Rodríguez, J.V. Busquets-Mataix* ..... 150

Trace Acquirement from Real-Time Systems Based on WCET Analysis  
*Meng-Luo Ji, Xin Wang, Zhi-Chang Qi* ..... 160

Elimination of Non-deterministic Delays in a Real-Time Database System  
*Masaki Hasegawa, Subhash Bhalla, Laurence Tianruo Yang* ..... 172

Solving Real-Time Scheduling Problems with Model-Checking <i>Zonghua Gu</i> .....	186
Efficient FPGA Implementation of a Knowledge-Based Automatic Speech Classifier <i>Sabato M. Siniscalchi, Fulvio Gennaro, Salvatore Vitabile, Antonio Gentile, Filippo Sorbello</i> .....	198
<b>Track 4: Power-Aware Computing</b>	
A Topology Control Method for Multi-path Wireless Sensor Networks <i>Zhendong Wu, Shanping Li, Jian Xu</i> .....	210
Dynamic Threshold Scheme Used in Directed Diffusion <i>Ning Hu, Deyun Zhang, Fubao Wang</i> .....	220
Compiler-Directed Energy-Aware Prefetching Optimization for Embedded Applications <i>Juan Chen, Yong Dong, Huizhan Yi, Xuejun Yang</i> .....	230
A Dynamic Energy Conservation Scheme for Clusters in Computing Centers <i>Wenguang Chen, Feiyun Jiang, Weimin Zheng, Peinan Zhang</i> .....	244
<b>Track 5: Hardware/Software Co-design and System-On-Chip</b>	
Realization of Video Object Plane Decoder on On-Chip Network Architecture <i>Huy-Nam Nguyen, Vu-Duc Ngo, Hae-Wook Choi</i> .....	256
Network on Chip for Parallel DSP Architectures <i>Yuanli Jing, Xiaoya Fan, Deyuan Gao, Jian Hu</i> .....	265
A New Methodology of Integrating High Level Synthesis and Floorplan for SoC Design <i>Yunfeng Wang, Jinian Bian, Xianlong Hong, Liu Yang, Qiang Zhou, Qiang Wu</i> .....	275
Designing On-Chip Network Based on Optimal Latency Criteria <i>Vu-Duc Ngo, Huy-Nam Nguyen, Hae-Wook Choi</i> .....	287

**Track 6: Testing and Verification**

Microprocessor Based Self Schedule and Parallel BIST for  
System-On-a-Chip  
*Danghui Wang, Xiaoya Fan, Deyuan Gao, Shengbing Zhang,  
Jianfeng An* ..... 299

Self-correction of FPGA-Based Control Units  
*Iouliia Skliarova* ..... 310

Detecting Memory Access Errors with Flow-Sensitive Conditional  
Range Analysis  
*Yimin Xia, Jun Luo, Minxuan Zhang* ..... 320

Deductive Probabilistic Verification Methods of Safety, Liveness and  
Nonzenoness for Distributed Real-Time Systems  
*Satoshi Yamane* ..... 332

Specification and Verification Techniques of Embedded Systems Using  
Probabilistic Linear Hybrid Automata  
*Yosuke Mutsuda, Takaaki Kato, Satoshi Yamane* ..... 346

Formalization of  $\mathcal{J}$ FSM Model and Its Verification  
*Sachoun Park, Gihwon Kwon, Soonhoi Ha* ..... 361

**Track 7: Reconfigurable Computing**

Dynamic Co-allocation of Level One Caches  
*Lingling Jin, Wei Wu, Jun Yang, Chuanjun Zhang,  
Youtao Zhang* ..... 373

Jaguar: A Compiler Infrastructure for Java Reconfigurable Computing  
*Youngsun Han, Seon Wook Kim, Chulwoo Kim* ..... 386

CCD Camera-Based Range Sensing with FPGA for Real-Time  
Processing  
*Chun-Shin Lin, Hyongsuk Kim* ..... 398

**Track 8: Agent and Distributed Computing**

Best Web Service Selection Based on the Decision Making Between  
QoS Criteria of Service  
*Young-Jun Seo, Hwa-Young Jeong, Young-Jae Song* ..... 408

Data Storage in Sensor Networks for Multi-dimensional Range Queries <i>Ji Yeon Lee, Yong Hun Lim, Yon Dohn Chung, Myoung Ho Kim . . . .</i>	420
--	-----

An OSEK COM Compliant Communication Model for Smart Vehicle Environment <i>Guoqing Yang, Minde Zhao, Lei Wang, Zhaohui Wu . . . . .</i>	430
--	-----

## Track 9: Wireless Communications

Resource Allocation Based on Traffic Load over Relayed Wireless Access Networks <i>Sung Won Kim, Byung-Seo Kim . . . . .</i>	441
---	-----

An Adaptive Cross Layer Unequal Protection Method for Video Transmission over Wireless Communication Channels <i>Jinbo Qiu, Guangxi Zhu, Tao Jiang . . . . .</i>	452
---	-----

Power-Efficient Packet Scheduling Method for IEEE 802.15.3 WPAN <i>Sung Won Kim, Byung-Seo Kim . . . . .</i>	462
---	-----

Two Energy-Efficient, Timesaving Improvement Mechanisms of Network Reprogramming in Wireless Sensor Network <i>Bibo Wang, Yu Chen, Hongliang Gu, Jian Yang, Tan Zhao . . . . .</i>	473
---	-----

On Location-Free Node Scheduling Scheme for Random Wireless Sensor Networks <i>Jie Jiang, Chong Liu, Guofu Wu, Wenhua Dou . . . . .</i>	484
--	-----

Leading Causes of TCP Performance Degradation over Wireless Links <i>Chunlei Liu . . . . .</i>	494
---	-----

The Study and Implementation of Wireless Network Router NPU-1 <i>Yi'an Zhu . . . . .</i>	506
---	-----

## Track 10: Mobile Computing

Performance Evaluation of Air Indexing Schemes for Multi-attribute Data Broadcast <i>Qing Gao, Shanping Li, Jianliang Xu . . . . .</i>	512
---	-----

Hierarchical Route Optimization in Mobile Network and Performance Evaluation <i>Keecheon Kim, Dongkeun Lee, Jae Young Ahn, Hyeong Ho Lee . . . . .</i>	522
---	-----

**Track 11: Pervasive/Ubiquitous Computing and Intelligence**

Swarm Based Sensor Deployment Optimization in Ad Hoc Sensor Networks  
*Xiaoling Wu, Lei Shu, Jie Yang, Hui Xu, Jinsung Cho, Sungyoung Lee* ..... 533

Weighted Localized Clustering: A Coverage-Aware Reader Collision Arbitration Protocol in RFID Networks  
*Joongheon Kim, Wonjun Lee, Jaewon Jung, Jihoon Choi, Eunkyo Kim, Joonmo Kim* ..... 542

A Kind of Context-Aware Approach Based on Fuzzy-Neural for Proactive Service of Pervasive Computing  
*Degan Zhang, Guangping Zeng, Xiaojuan Ban, Yixin Yin* ..... 554

**Track 12: Multimedia and Human-Computer Interaction**

A Novel Block-Based Motion Estimation Algorithm and VLSI Architecture Based on Cluster Parallelism  
*Tie-jun Li, Si-kun Li* ..... 564

Software-Based Video Codec for Mobile Devices  
*Jiajun Bu, Yuanliang Duan, Chun Chen, Zhi Yang* ..... 576

Real-Time Expression Mapping with Ratio Image  
*Weili Liu, Cheng Jin, Jiajun Bu, Chun Chen* ..... 586

Power Consumption Analysis of Embedded Multimedia Application  
*Juan Chen, Yong Dong, Huizhan Yi, Xuejun Yang* ..... 596

**Track 13: Network Protocol, Security and Fault-Tolerance**

A Dynamic Threshold and Subsection Control TCP Slow-Start Algorithm  
*ShiNing Li, JiPing Fang, Zheng Qin, XingShe Zhou* ..... 608

An Improved DRR Packet Scheduling Algorithm Based on Even Service Sequence  
*Fan Zhang, Shoumeng Yan, XingShe Zhou, Yaping Wang* ..... 618

An Improvement on Strong-Password Authentication Protocols  
*Ya-Fen Chang, Chin-Chen Chang* ..... 629

Two-Step Hierarchical Protocols for Establishing Session Keys in Wireless Sensor Networks <i>Kyungsan Cho, Soo-Young Lee, JongEun Kim</i> .....	638
A Revenue-Aware Bandwidth Allocation Model and Algorithm in IP Networks <i>Meng Ji, Shao-hua Yu</i> .....	650
Control Flow Error Checking with ISIS <i>Francisco Rodríguez, Juan José Serrano</i> .....	659
Support Industrial Hard Real-Time Traffic with Switched Ethernet <i>Alimujiang Yiming, Toshio Eisaka</i> .....	671
Integer Factorization by a Parallel GNFS Algorithm for Public Key Cryptosystems <i>Laurence Tianruo Yang, Li Xu, Man Lin</i> .....	683
Localized Energy-Aware Broadcast Protocol for Wireless Networks with Directional Antennas <i>Hui Xu, Manwoo Jeon, Lei Shu, Xiaoling Wu, Jinsung Cho, Sungyoung Lee</i> .....	696
<b>Track 14: Workshop Selected Papers</b>	
The Optimal Profile-Guided Greedy Dynamic Voltage Scaling in Real-Time Applications <i>Huizhan Yi, Xuejun Yang, Juan Chen</i> .....	708
A Parallelizing Compiler Approach Based on IXA <i>Ting Ding, Naiqi Liu</i> .....	720
The Design of Firewall Based on Intel IXP2350 and Autopartitioning Mode C <i>Ke Zhang, Naiqi Liu, Yan Chen</i> .....	726
AMT6: End-to-End Active Measurement Tool for IPv6 Network <i>Jahwan Koo, Seongjin Ahn</i> .....	732
Semantic Web Based Knowledge Searching System in Mobile Environment <i>Dae-Keun Si, Yang-Seung Jeon, Jong-Ok Choi, Young-Sik Jeong, Sung-Kook Han</i> .....	741

A General-Purpose, Intelligent RAID-Based Object Storage Device  
*Fang Wang, Song Lv, Dan Feng, Shunda Zhang* ..... 747

The Design and Implement of Remote Mirroring Based on iSCSI  
*Qiang Cao, Tian-jie Guo, Chang-sheng Xie* ..... 757

Improvement of Space Utilization in NAND Flash Memory Storages  
*Yeonseung Ryu, Kangsun Lee* ..... 766

**Keynote Speech**

Smart u-Things and Ubiquitous Intelligence  
*Jianhua Ma* ..... 776

**Author Index** ..... 777