<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message from the General Chair</td>
<td>xix</td>
</tr>
<tr>
<td>Message from the Program Chairs</td>
<td>xxii</td>
</tr>
<tr>
<td>VLSI Design 2004 Conference Committee</td>
<td>xxiv</td>
</tr>
<tr>
<td>VLSI Design 2004 Technical Program Committee</td>
<td>xxvi</td>
</tr>
<tr>
<td>VLSI Design 2003 Steering Committee</td>
<td>xxviii</td>
</tr>
<tr>
<td>VLSI Design 2003 Conference Awards</td>
<td>xxix</td>
</tr>
<tr>
<td>Reviewers</td>
<td>xxx</td>
</tr>
<tr>
<td>VLSI Design Conference: History</td>
<td>xxxiv</td>
</tr>
<tr>
<td>Workshop on Embedded Systems Design: History</td>
<td>xxxv</td>
</tr>
<tr>
<td>Tutorials</td>
<td></td>
</tr>
<tr>
<td>Technology CAD: Technology Modeling, Device Design and Simulation</td>
<td>3</td>
</tr>
<tr>
<td>Physical Design Trends and Layout-Based Fault Modeling</td>
<td>6</td>
</tr>
<tr>
<td>High Level Design Validation: Current Practices and Future Directions</td>
<td>9</td>
</tr>
<tr>
<td>System Software for Embedded Applications</td>
<td>12</td>
</tr>
<tr>
<td>Design Challenges in Sub-100nm High Performance Microprocessors</td>
<td>15</td>
</tr>
<tr>
<td>Bridging the Gap between Asynchronous Design and Designers</td>
<td>18</td>
</tr>
<tr>
<td>Embedded Test for Low Cost Manufacturing</td>
<td>21</td>
</tr>
<tr>
<td>Synchronous Methodology for Designing Hardware, Software and Mixed Embedded Systems</td>
<td>24</td>
</tr>
<tr>
<td>Plenary Talks</td>
<td></td>
</tr>
<tr>
<td>High Speed Integrated A to D Converters</td>
<td>29</td>
</tr>
<tr>
<td>CMOS Scaling for Sub-90 nm to Sub-10 nm</td>
<td>30</td>
</tr>
<tr>
<td>Low Voltage Analog Design</td>
<td></td>
</tr>
<tr>
<td>Embedded Keynote</td>
<td></td>
</tr>
<tr>
<td>Techniques for Very Low-Voltage Operation of Continuous-Time Analog CMOS Circuits</td>
<td>39</td>
</tr>
<tr>
<td>Papers</td>
<td></td>
</tr>
<tr>
<td>Comparative Study of Low Voltage OTA Designs</td>
<td>47</td>
</tr>
<tr>
<td>Design of Amplifier with Rail-to-Rail CMR with 1V Power Supply</td>
<td>52</td>
</tr>
<tr>
<td>Design of Low Voltage Low Power CMOS OP-Amps with Rail-to-Rail Input/Output Swing</td>
<td>57</td>
</tr>
<tr>
<td>Low Power Logic Synthesis</td>
<td></td>
</tr>
<tr>
<td>Embedded Keynote</td>
<td></td>
</tr>
<tr>
<td>Modeling and Estimation of Leakage in Sub-90nm Devices</td>
<td>65</td>
</tr>
<tr>
<td>Papers</td>
<td></td>
</tr>
<tr>
<td>Energy-aware Logic Synthesis and Technology Mapping for MUX-Based FPGAs</td>
<td>73</td>
</tr>
<tr>
<td>Low Power Combinational Circuit Synthesis Targeting Multiplexer Based FPGAs</td>
<td>79</td>
</tr>
<tr>
<td>Synthesis of Low Power High Performance Dual-VT PTL Circuits</td>
<td>85</td>
</tr>
<tr>
<td>Formal Verification</td>
<td></td>
</tr>
<tr>
<td>Embedded Keynote</td>
<td></td>
</tr>
</tbody>
</table>
Formal Verification of C Language Based VLSI Designs  p. 93
Papers
Formal Verification of Modules under Real Time Environment Constraints  p. 103
Property Refinement Techniques for Enhancing Coverage of Formal Property Verification  p. 109
Towards the Complete Elimination of Gate/Switch Level Simulations  p. 115
Embedded System Design
Embedded Keynote
Tiniest Web Server
Papers
On Design and Implementation of an Embedded Automatic Speech Recognition System  p. 127
Embedded Hardware Face Detection  p. 133
Mixed Signal Design
Embedded Keynote
Algorithmic Macromodelling Methods for Mixed-Signal Systems  p. 141
Papers
An Element Rotation Algorithm for Multi-bit DAC Nonlinearities in Complex Bandpass [Delta Sigma]AD Modulators  p. 151
Error Correction in Pipelined ADCs Using Arbitrary Radix Calibration  p. 157
A 2.5GHz CMOS Fully-Integrated [Delta Sigma]-Controlled Fractional-N Frequency Synthesizer  p. 163
A Switch-Cap Regulator for SoC Applications  p. 168
Design Methodology
Papers
Automated Architectural Optimization of Digital FIR Filters  p. 177
Partial Tag Comparison: A New Technology for Power-Efficient Set-Associative Cache Designs  p. 183
Bridge over Troubled Wrappers: Automatic Interface Synthesis  p. 189
Gate Sizing and Buffer Insertion Using Economic Models for Power Optimization  p. 195
Charge-Sharing-Problem Reduced Split-Path Domino Logic  p. 201
Leakage Reduction
Papers
Low Energy Switch Block for FPGAs  p. 209
Leakage Reduction Techniques in a 0.13um SRAM Cell  p. 215
Leakage-Proof Domino Circuit Design for Deep Sub-100nm Technologies  p. 222
A New Technique for Leakage Reduction in CMOS Circuits Using Self-Controlled Stacked Transistors  p. 228
Analysis and Optimization of Enhanced MTCMOS Scheme  p. 234
Efficient Algorithms for Identifying the Minimum Leakage States in CMOS Combinational Logic  p. 240
Embedded OS and Software
Embedded Keynote

New Frontiers for Embedded Computing

Papers

An ILP Formulation for System Level Throughput and Power Optimization in Multiprocessor SoC Architectures

Energy-Optimizing Source Code Transformations for OS-driven Embedded Software

Profiling Driven Computation Reuse: An Embedded Software Synthesis Technique for Energy and Performance Optimization

VLSI Technology

Embedded Keynote

Technological Challenges of Advanced CMOS Processing and Their Impact on Design Aspects

Papers

Response Surface Modeling of 100nm CMOS Process Technology Using Design of Experiment

Screening of Hot Electron Effect during Plasma Processing

Reconfigurable Design

Embedded Keynote

Designing Reconfigurable Systems in Lava

Configuration Platforms with Dynamic Platform Management: An Efficient Alternative to Application-Specific System-on-Chips

Design Tools

Embedded Keynote

Assertion Based Verification Using HDVL

Papers

Design and Implementation of a Parallel Verilog Simulator: PVSim

Energy Profiler for Hardware/Software Co-design

Emerging Areas in VLSI

Embedded Keynote

A Tutorial on the Emerging Nanotechnology Devices

Design Considerations for Next Generation Wireless Power-Aware Microsensor Nodes

Panel Session

Which new Design Methodologies are required for the Giga Scale Era?

Banquet Speech

A Vision for the Broadband Network

Plenary Talks

A System Approach to Energy Management

Design for Verification with SystemVerilog

RF Design

Embedded Keynote

A 800 MHz System-on-Chip for Wireless Infrastructure Applications
Papers

A Low Voltage, Low Noise CMOS RF Receiver Front-End p. 393
Design of RF Tuner for Cable Modem Applications p. 398
Design and Implementation of 935 MHz FM Transceiver for Radio Telemetry and 2.45 GHz Direct AQPSK Transmitter in CMOS p. 404
Design of Power Amplifiers at 2.4 GHz/900 MHz and Implementation of On-chip Linearization Technique in 0.18/0.25[µm] CMOS p. 410

Interconnect

Embedded Keynote

Interconnect Modeling for Copper/Low-k Technologies p. 425

Papers

Wire Swizzling to Reduce Delay Uncertainty Due to Capacitive Coupling p. 431
Static Timing Analysis of Irreversible Crosstalk Noise Pulse Faults p. 437
A Bus Encoding Technique for Power and Cross-Talk Minimization p. 443
Intra-Bus Crosstalk Estimation Using Word-Level Statistics p. 449
On Buffering Schemes for Long Multi-layer Nets p. 455

Fault Detection

Embedded Keynote

On-Chip Testing of Embedded Transducers p. 463

Papers

Defect Diagnosis Based on Pattern-Dependent Stuck-at Faults p. 475
Un-testable Fault Identification Using Recurrence Relations and Impossible Value Assignments p. 481
Easily Testable Realization of GRM and ESOP Networks for Detecting Stuck-at and Bridging Faults p. 487
Open Defects Detection within 6T SRAM Cells Using a No Write Recovery Test Mode p. 493
Neural Network Model for Testing Stuck-at and Delay Faults in Digital Circuit System on Chip p. 499

System on Chip

Embedded Keynote

Challenges in the Design of Embedded Real-Time DSP SoCs p. 507
Multiprocessor Architectures for Embedded System-on-Chip Applications p. 512
System-on-Chip (SoC): Clocking and Synchronization Issues p. 520

Papers

Package-Silicon Co-Design--Experiment with an SoC Design p. 531

Analog Design

Papers

A Tunable g[subscript m]-C Filter with Low Variation across Process, Voltage and Temperature p. 539
The Influence of Process Variations on the Halo MOSFETs and Its Implications on the Analog Circuit Performance p. 545
A CMOS Beta Multiplier Voltage Reference with Improved Temperature Performance and Silicon Tunability

Design Methodology

Papers

Evaluation of Pausible Clocking for Interfacing High Speed IP Cores in GALS Framework

A Novel Technique Towards Eliminating the Global Clock in VLSI Circuits

A Distributed and Pipelined Controller for a Modular and Scalable Hardware Emulator

Rapid Prototyping for Configurable System-on-a-Chip Platforms: A Simulation Based Approach

Test Pattern Generation

Papers

Can SAT Be Used to Improve Sequential ATPG Methods?

Program Slicing for ATPG-Based Property Checking

Fast, Layout-Aware Validation of Test-Vectors for Nanometer-Related Timing Failures

Embedded Systems

Embedded Keynote

Embedded Systems

Tamper Resistance Mechanisms for Secure, Embedded Systems

Poster Session A

A Reduced Complexity 3rd Order Digital Delta-Sigma Modulator for Fractional-N Frequency Synthesis

A New Approach to Topology Selection for Cell-Level Analog Circuits

Quantitative Model for Thermal Behaviour of an Analog Integrated Circuit

Chip Package Co-design of a Heterogeneously Integrated 2.45GHz CMOS VCO Using Embedded Passives in a Silicon Package

A Tuned Wideband LNA in 0.25[mu]m IBM Process for RF Communication Applications

A Low Noise Current-Mode Readout Circuit for CMOS Image Sensing Applications

Sizing Consideration for Leakage Control Transistor

A Quasi Static Model for a SimplySupported Beam in a Circuit Simulation Framework

Analytical Expressions for Static Characteristics of Submicron CMOS Inverters

Real Time Dynamic Voltage Scaling for Embedded Systems

Designing Leakage Aware Multipliers

On Maximum Current Estimation in CMOS Digital Circuits

Exploring the Novel Characteristics of Fully Depleted Dual-Material Gate (DMG) SOI MOSFET Using Two-Dimensional Numerical Simulation Studies

Analog VLSI Architecture for Discrete Cosine Transform Using Dynamic Switched Capacitors
Game Theoretic Modeling of Voltage and Frequency Scaling during Behavioral Synthesis  p. 670

Poster Session B

An ASIC Implementation of Kohonen's Map Based Color Image Compression  p. 677
A Compact Low-Power Buffer Amplifier with Dynamic Bias Control Technique  p. 681
Preventing Crosstalk Delay Using Fibonacci Representation  p. 685
An Area-Efficient Pipelined Array Architecture for Euclidean Distance Transformation and Its FPGA Implementation  p. 689
The Nostrum Backbone--A Communication Protocol Stack for Networks on Chip  p. 693

VLSI Architecture of Centroid Tracking Algorithms for Video Tracker  p. 697
A Narrow Pulse-Suppressing Filter for Input Buffer  p. 701
Improved Approach for Noise Propagation to Identify Functional Noise Violations  p. 705
An Efficient Approach to Crosstalk Noise Analysis at Multiple Operating Modes  p. 709

Energy Model Based Macrocell Placement for Wirelength Minimization  p. 713
NoCGEN: A Template Based Reuse Methodology for Networks on Chip Architecture  p. 717
Net Buffering in the Presence of Multiple Timing Views  p. 721
Path Based Approach for Crosstalk Delay Analysis  p. 727
Carry Circuitry for LUT-Based FPGA  p. 731
An Optically Differential Reconfigurable Gate Array with a Partial Reconfiguration Optical System and Its Power Consumption Estimation  p. 735

Poster Session C

On Interconnecting Circuits with Multiple Scan Chains for Improved Test Data Compression  p. 741
ILP Models for Energy and Transient Power Minimization during Behavioral Synthesis  p. 745
Cycle-Accurate Energy Model and Source-Independent Characterization Methodology for Embedded Processors  p. 749
Built-in Self-Test Technique for Selective Detection of Neighbourhood Pattern Sensitive Faults in Memories  p. 753
Synthesis of a Full Adder Circuit Using Reversible Logic  p. 757
Performance Analysis of Inter-Cluster Communication Methods in VLIW Architecture  p. 761
Boolean Decomposition Using Two-Literal Divisors  p. 765
An Efficient Method to Generate Test Vectors for Combinational Cell Verification  p. 769
Design of an Application Specific Instruction Set Processor for Parametric Speech Synthesis  p. 773
OaSis: An Application Specific Operating System for an Embedded Environment  p. 776
Synthesis of Application Specific Multiprocessor Architectures for Process Networks  p. 780
Enhancing SAT-Based Bounded Model Checking Using Sequential Logic Implications p. 784
Reset Careabouts in a SoC Design p. 788
Panel
VLSI Education: Should the Industry Decide the Curriculum?
Banquet Speech
Data-Driven Asynchronous Architecture and Its Implementation for Consumer Electronics
Plenary Talk
Building Giga-Transistor [Enterprise] Microprocessors p. 801
Device Physics
Embedded Keynote
Device Reliability and Failure Mechanisms Related to Gate Dielectrics and Interconnects p. 805
ESD Protection for the Deep Sub Micron Regime--A Challenge for Design Methodology p. 809
Papers
Inclusion of Thermal Effects in the Simulation of Bipolar Circuits Using Circuit Level Behavioral Modeling p. 821
A New Surface Accumulation Layer Transistor(SALTran) Concept for Current Gain Enhancement in Bipolar Transistors p. 827
A Novel Technique for Steady State Analysis for VLSI Circuits in Partially Depleted SOI p. 832
Routing and Interconnect
Embedded Keynote
High-Performance Power Grids for Nanometer Technologies p. 839
On-Chip Networks: A Scalable, Communication-Centric Embedded System Design Paradigm p. 845
Papers
Shrubbery: A New Algorithm for Quickly Growing High-Quality Steiner Trees p. 855
An Area Efficient Router for the Data-Intensive Architecture (DIVA) System p. 863
Estimating Pre-placement FPGA Interconnection Requirements p. 869
Testing
Embedded Keynote
Digital Design: The Components of a New Paradigm p. 877
Papers
Random Access Scan: A Solution to Test Power, Test Data Volume and Test Time p. 883
Comparison of Effectiveness of Current Ratio and Delta-I[subscript DDQ] Tests p. 889
At-Speed Built-in Self-Repair Analyzer for Embedded Word-Oriented Memories p. 895
Integrating Self Testability with Design Space Exploration by a Controller Based Estimation Technique p. 901
Evaluating the Reliability of Defect-Tolerant Architectures for Nanotechnology with Probabilistic Model Checking
Processor Architecture
Embedded Keynote
Application Specific Instruction Set Processors: Redefining Hardware-Software Boundary
Papers
Synthesis-Driven Exploration of Pipelined Embedded Processors
Cosynthesis of Multiprocessor Architectures with High Availability
Instruction-Based Delay Fault Self-Testing of Processor Cores
UWB RF
Embedded Keynote
Analog/RF Physical Layer Issues for UWB Systems
UWB System Design
Design Contest
1st Prize
Katha-Mala: A Voice Output Communication Aid for the Children with Severe Speech and Multiple Disorders (SSMI)
2nd Prize
High-Speed Optoelectronics Receivers in SiGe
Layout and Placement
Papers
Ant Colony Optimization Technique for Macrocell Overlap Removal
Constrained Floorplanning with Whitespace
Floorplan Classification Algorithms
Maximum Multiplicity Distributions for Length Prediction Driven Placement
Noise Analysis
Papers
Computing Silent Gate Models for Noise Analysis from Slew and Delay Tables
Application of Wavelets and Generalized Pencil-of-Function Method for the Extraction of Noise Current Spectrum and Simulation of Simultaneous Switching Noise
Dynamic Noise Margin: Definitions and Model
Analog and RF Test
Embedded Keynote
Advanced LCD Timing Controller IC with Memory-Assisted Response Time Compensation
Papers
Concurrent RF Test Using Optimized Modulated RF Stimuli
A Current Sensor for On-Chip, Non-intrusive Testing of RF Systems
A Built-in-Self-Test Scheme for Digital to Analog Converters
Low Power Design
Papers

CMOS Circuit Design for Minimum Dynamic Power and Highest Speed p. 1035
Dynamic Power Optimization for Interactive Systems p. 1041
A Framework for Low Power Audio Design p. 1048
H/W Impl. of Algorithms

Papers

An Efficient Algorithm to Construct Reduced Visibility Graph and Its FPGA Implementation p. 1057
VLSI Implementation of Visible Watermarking for a Secure Digital Still Camera Design p. 1063

Motion Estimation

Papers

A Parallel Architectural Implementation of the New Three-Step Search Algorithm for Block Motion Estimation p. 1071
An Architecture for Motion Estimation in the Transform Domain p. 1077
A 27 mW 1.1 mm$^2$ Motion Estimator for Picture-Rate Up-Converter p. 1083
Call for Papers and Participation: The Eighteenth International Conference on VLSI Design p. 1089
Call for Papers and Participation: 8th IEEE VLSI Design&Test Workshops p. 1090
Author Index p. 1091

Table of Contents provided by Blackwell's Book Services and R.R. Bowker. Used with permission.