

R&D of ICT Application LSI IP and Its Cutting-edge Design Technology

<Program for Fostering Regional Innovation (Global Type) >

Project Team

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Enterprises

NEC Corporation/NEC Micro Systems, LTD./Toshiba Corporation/
Toppan Technical Design Center Co., Ltd./IPFlex Inc.

Purpose of the Research

In the next-generation Information and Communication-oriented society, "a safe, secure, and ambient living-environment" is required, and it has been a challenge to develop a high-performance and highly-reliable ICT* application LSI timely as an information communication technology to realize the living environment.

In this research, we will further enhance IPs, hardware algorithms and LSIs which are achieved by the participating institutions in their research, and also the fundamental design-technologies such as design methods, high-level synthesis and verification. In this way, we will establish a design technology for ICT application, perform research and development of IPs and realize ICT application LSIs by using leading-edge design methodologies.

(*ICT: Information & Communication Technology)

Summary of the Research

Targeted ICT application IP

Wireless communication

- Ultrahigh-reliability error-correcting IP
- Multirate irregular LDPC

Cryptographic processing

- Ultralow power cryptographic processing IP: A few mW AES cryptogram and others
- Ultrahigh-reliability cryptographic processing IP: Tamper resistant technology

Video processing

- Ultrahigh-definition TV Video compression IP: Super HDTV and others
- Ultralow power Video compression IP: 50 mW - 100 mW @ HDTV
- High-performance image processing IP: Media recognition function

Fundamental technology for designing ICT application IP

To cope with requirements for very large scale, various functions, high speed processing and high reliability of IPs

Optimization of IP design

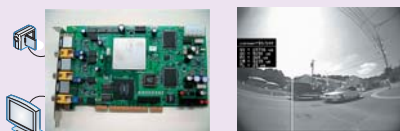
- High-level synthesis and verification
- Floor plan
- Circuit optimization
- Power optimization

IP architecture and configuration method

- IP customize
- Multi-core based design

Results of the Research

Real-time video recognition system

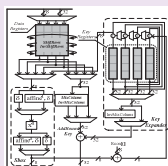


IMAPCAR evaluation board

Vehicle detection

Real-time (33ms) KLT tracker using IMAPCAR

AES cryptographic processing LSI architecture

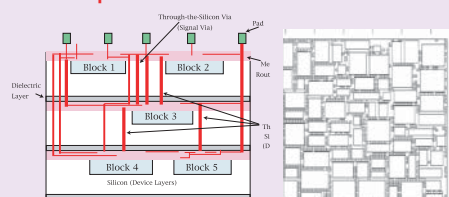


Mixed Bus method
8 mW @ 51 Mbps
4.7 k gate, 80 MHz

Algorithm for a high-level design and verification system

- Parallel processing algorithm for BDD
- Interactive simulator
- Property coverage
- Multi-cycle bus analysis
- LUT optimization

3-D floor plan



Prospective Fields of Application



Car-electronics



Digital home appliance



Monitoring system



TV conference



Information

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Information

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