



Σχεδίαση ολοκληρωμένων κυκλωμάτων σε τεχνολογίες nm για εφαρμογές επεξεργασίας εικόνας/video

**Μικροηλεκτρονική
& Ενσωματωμένα Συστήματα**
συνεργασία στην έρευνα και
επαγγελματικές προοπτικές νέων επιστημόνων



- **Alma's Overview**

- Job Opportunities at Alma

- Research Directions

Alma
Technologies

Alma's Overview

- Established in Aug. 2001, as an employee owned company (spin-out of University of Patras)
- **Mission:** To provide reliable and efficient image/video compression solutions in the form of Silicon IP cores.
- **Distribution:** Worldwide via CAST-Inc
- **Growth rate:** 37% per year (average '03-'07), profitable from 2002

Alma's Overview

- **Products' Differentiator:** Novelty, excellence, level of associated support
- **Achievements:**
 - JPEG2000 :
 - 2002: 1st to launch a core
 - 2007: Among few that can support HD on FPGA
 - 2008: 1st to launch a rad-hard ASIC
 - JPEG:
 - 2002-2007: Fastest and among smallest cores in the market
 - JPEG-LS and Lossless JPEG:
 - 2006-2007: Sole provider for JPEG-LS and Lossless JPEG cores
 - More in near future...

Alma's Overview

- **Customers:** More than 50 companies, ranging from start-ups to Aerospace and Consumer Electronics giants

Actel

Apple

Bitwave

CESVIT

Chipwrights

CMicro

Covi

CREO (KoDak)

DragonChip

Foveon

Galileo Avionics

GlobalMedia

IAI/MBT

iBiquity

IT-SoC

Kapsch

Karl Storz Imaging

Keymed

LSI Logic

Malin Space

Marvel

MBDA

Meisei Electric

Mitsubishi

NASA

Nehra Imaging

NHK

O2Micro

Philips UltraSound

Phonetics

PixelVelocity

Pratt&Whitney

PrimeSense

Qpixel

SAIC

Samsung

Sarnoff

SCI

Serma

SERMA

Sirius Sat. Radio

TLSI

Toyon Research

TransChip (Samsung)

VCR

VMTS

Wavecom

(more ...)



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Alma's Culture

- Employees are Alma's most valuable asset
 - Employees are involved in company's growth and get tangible benefits
 - Initiative is encouraged, new ideas are welcome, productivity is rewarded
- Technological focus is essential to built leading edge technology
 - We train our people to become world-wide experts in a well specified field
 - Working in Alma is about **R&D**

Job Opportunities at Alma

■ Junior Design and Verification Engineers

□ Pre-requisites

- University in EE or in CS
- Solid background in DSP and hardware architecture
- Skills in RTL coding and C/C++

□ Path

- 6-12 months training/evaluation via assignment of a design task outside the critical path
- Full involvement to Alma's development activities

Job Opportunities at Alma

■ Senior Design and Verification Engineer

□ Pre-requisites

- Post-graduate degree in the field
- 5+ years of experience in the field of digital VLSI design
- Developed skills in the entire design flow

□ Path

- 1 month evaluation in Alma's working environment
- Full involvement to Alma's development activities

The Job of a Design and Verification Engineer

- Specifications Study or Preparation
- Architectural Design – RTL Coding
- Verification
 - Reference Behavioral Model in C/C++, System-C
 - Code-coverage analysis (RTL simulation)
 - Post-Synthesis Timing Closure
 - Formal Verification of netlist VS RTL
 - FPGA prototyping
- Scripts coding for design flows support
 - Xilinx, Altera, Actel, Lattice, ASIC ...
- Documentation



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Research Directions

- Hardware architectures for emerging image/video compression standards
 - AVS, H264 etc
- Algorithmic optimization and architectures of critical algorithmic kernels
 - DWT, VBSME, Arithmetic Coding etc
- Algorithms and architectures for 3D image/video compression
- Security of image/video content



*Thank you for
your attention*

Alma
Technologies

Do we still need custom hardware for Image/Video compression?

- Image and Video compression algorithms evolve to:
 - Increase compression efficiency
 - Enhance error resilience
 - Provide new features (e.g. ROI)
 - Cover wider application range
- Algorithmic enhancements comes at the cost of computational complexity and memory requirements

Do we still need custom hardware for Image/Video compression?

- On top of that resolutions are getting bigger and bigger
- Computational and memory requirements for image/video compression grow faster than speed of DSPs and micro-Processors
- Dedicated custom hardware will always provide lower power consumption and smaller area

An Example: JPEG vs JPEG2000

JPEG
PSNR =
28.1
Filesize =
9 KB

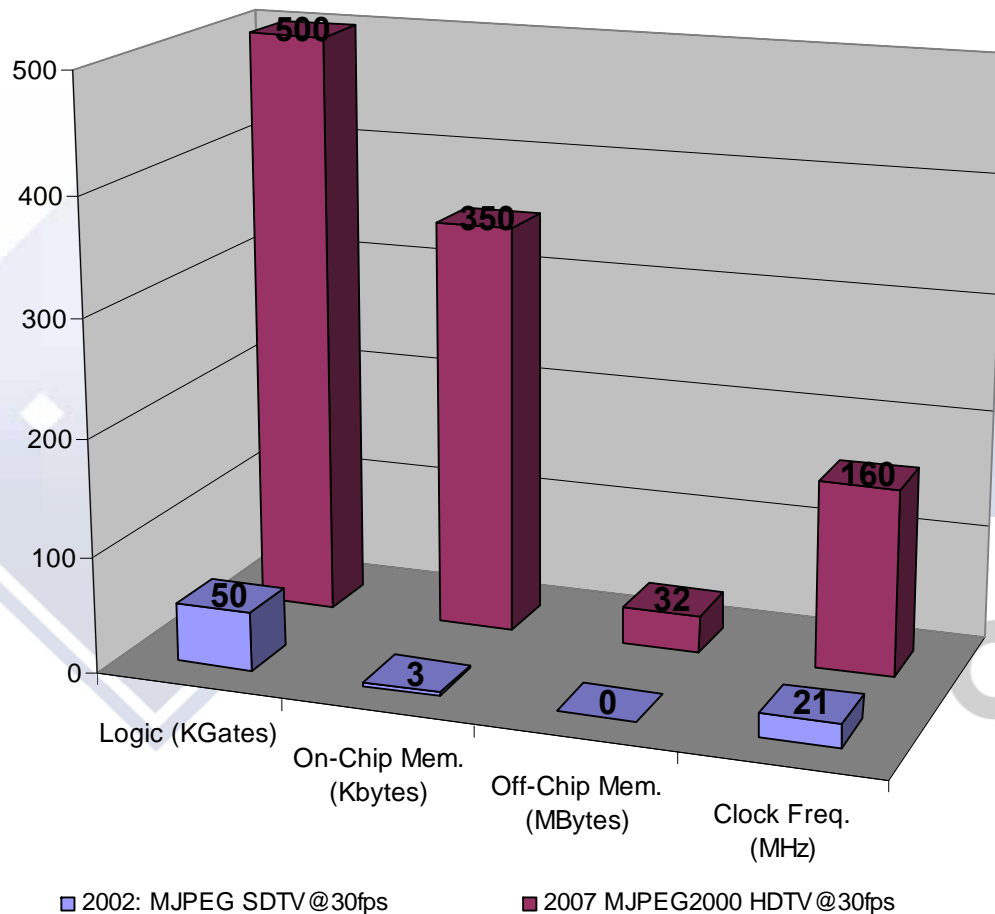


JPEG 2000
PSNR =
31.7
Filesize =
9 KB



*From Aware's "JPEG vs JPEG 2000 comparison" available at:
www.aware.com/products/compression/demos/girl_compare.html*

An Example: JPEG vs JPEG2000



What are the challenges?

■ Traditional:

- Meet the speed at smallest possible area and power
- Meet the cost of older technology solutions...

■ Less Traditional:

- Invent or optimize the architecture that implements this new algorithm

■ Industry-Related:

- Do all that according to highest design and verification quality standards
- Be there in time!!!