

# DALI

## Digits, Architecture Computer Software

Montpellier Laboratory of  
Informatics, Robotics and  
Microelectronics

Informatics  
Department

Director:

Philippe Langlois  
langlois@univ-perp.fr  
tel: +33 4 68 66 21 35

COMPUTER ARITHMETIC, ARCHITECTURE, PROCESSOR MICO-ARCHITECTURE, SIMULATION OF CALCULATION UNITS, DIGITAL VALIDATION, ERROR ANALYSIS, SEMANTIC TRANSFORMATION OF PROGRAMS, STATIC ANALYSIS, CRYPTOGRAPHY, HIGH-PERFORMANCE COMPUTING, HYBRID SYSTEMS

### ● Presentation

The DALI team is developing a unified research area in order to improve the digital quality and high performance of calculations. DALI enables experts in architecture, micro-architecture, simulation, and computer compilation and arithmetic to work together in the same team, which is considered as rare in France.

Research activities carried out over the 2005-2009 period involve hardware (generalist processors, emerging architectures), software (arithmetic and precision), simulation and automatic certification tools, and applications (digital algorithmics, cryptography, critical embedded systems, formal calculation, control theory).

### ● Team Members (May, 2009)

Permanent	• Defour David	01/09/2004	MCF UPVD
	• Goossens Bernard	01/09/2003	PR UPVD - HDR
	• Langlois Philippe (dir.)	01/09/2003	PR UPVD - HDR
	• Negre Christophe	01/09/2006	MCF UPVD
	• Martel Matthieu	01/09/2007	MCF UPVD - HDR
	• Parello David	01/09/2005	MCF UPVD
Other PhD candidates	• Bouache Mourad	01/09/2006	01/09/2010
	• Collange Sylvain	01/09/2007	01/09/2010
	• El Moussaoui Ali	01/09/2007	01/09/2011
	• Ke Chen	01/09/2007	01/09/2011
	• Ioualalen Arnault	01/09/2009	31/08/2012
	• Giorgi Pascal	01/01/2006	31/08/2007
Other	• Petit Eric	01/01/2009	31/08/2010 (ATER)
	• Senouci Benaoumeur	01/09/2007	31/08/2009
	• Vecchié Eric	01/01/2005	31/08/2005

### Theses supervised

- Grailat Stef      Defended Nov. 2005      (MCF UPMC, LIP6)
- Louvet Nicolas      Defended Nov. 2007      (MCF, U. Lyon 1, LIP)



## ● Publications (from 01/01/2005 to 31/08/2009)

	ACL	ACLN	ASCL	INV	ACTI	ACTN	COM	AFF	OS	OV	DO	AP	BV	Prix	Orga
2005-2009	17			3	46	5	11	7				16			3

## ● Highlights

- Consolidation of team created as young researcher ACI 2003-2006 via heavy external recruitment over 2005-2007
- Thematically-coherent unit with complementary expertise
- Recognition and integration of PhDs trained within the team

## ● Contracts, Transfers and Development

- Research contract with Airbus and CEA, MASSANE project: validation tool for control systems on digital flights
- Research contract with FNRAE, SARDANES project: certified transformation of Scade codes for digital precision
- Research contract 2006-2008 between DALI, Polytech'Paris and a French energy group, new architectures for scientific computing
- Technology intelligence collaboration with N'Vidia and ATI since 2007 on general computing on graphics cards (equipment donation)
- Young researcher ACI 2003-2006: Digital software and arithmetic quality on computers
- ANR white program 2007, EVA-Flo (Automatic Evaluation and Validation for FLOttant)
- ANR white program 2007, BioWic (Workflow for intensive bioinformatics processing)
- Member of UNISIM Consortium with CEA, INRIA, Princeton University, Brigham University, Univ. Polytech. Catalunya, Barcelona Computer Center, Ghent University, ARM, ST: software simulation platform (participating institution)

## ● International Cooperation

- University of Bumerdès, Algeria
- T.U. University, Hamburg-Harburg, Germany
- Universitat de Girona, Spain
- University of Manchester, United Kingdom
- University of Szeged, Hungary
- University of Waterloo, Canada
- Intel Nizhnyi-Novgorod, Russia
- University of Novosibirsk, Russia
- University Waseda, Tokyo, Japan
- University of California, Irvine, USA
- Rice University, Houston, USA

## ● Software Platforms

- OOSim: modular cycle-level simulator of generic superscalar processor based on the PowerPC instruction set. UNISIM, licence BSD
- Barra: NVIDIA G80 - CUDA graphics processor simulator. UNISIM, BSD license
- Boost: Interval on GPU: guaranteed interval arithmetic in CUDA and Cg. Boost Software Licence