



9th European Congress
EMBEDDED REAL TIME
SOFTWARE AND SYSTEMS

ERTS² 2018

FROM JANUARY 31st TO FEBRUARY 2nd / TOULOUSE, FRANCE
PIERRE BAUDIS CONGRESS CENTER



Welcome Address



Joseph Sifakis

*Turing Award 2007, Verimag Laboratory - France
& Congress General - Co Chair
and Technical Programme Committee Chair*

The Internet of Things (IoT) is the ultimate vision for ICT. We now have the ability to measure, sense and see the exact condition of practically everything. People, systems and objects can communicate and interact with each other in entirely new ways. We are moving slowly but inevitably toward a unification of networking infrastructures, including telecommunication networks, the internet, industrial and home networks. Finally, we should be able to respond to changes quickly and accurately, by predicting events and optimizing resources.

To what extent this ambitious IoT vision of “universal global neural network” is reachable today? There exist two important roadblocks to this evolution. One is the lack of security guarantees. The internet infrastructure and systems in general, are vulnerable. They have been built in an ad hoc manner and it is impossible to provably enhance their security.

The other roadblock is the lack of guarantees for response time and latency in the internet. This is a major impediment to the development of automated services.

Additionally, the IoT vision advocates the extensive deployment of autonomous systems and services which are often critical. These challenge our ability to guarantee their trustworthiness: 1) they rely on learning techniques that cannot be formally validated; 2) they are open and their software needs to be frequently updated; 3) they should tightly integrate critical and non-critical features.

Embedded systems play a central role in the IoT vision. They are essential components of the Internet of Things and as such, their evolution should adequately address the changing needs in the area.

ERTS 2018 as the unique European cross-sector event on Embedded Software and Systems gathering together researchers, engineers and professionals, is an excellent forum for addressing all these issues and exchanging on future challenges and opportunities.

Welcome Address



Alexandre Corjon

*Alliance Renault-Nissan Global Vice President - France
Congress General - Co Chair*

Embedded systems are becoming more and more important in our day to day life, most of the devices that we are using contain « Electronics » and « Software » and are pushing us towards Industry 4.0 and digitalization. All major industry changes have been fueled by major technology steps and this one can be considered as the one of the software.

Expressed as such, we are focusing on technology only but there is also a major transformation from User perspective. User Experience is the new most important point in the development of new products and this focus is at the origin or the consequence of a services-oriented industry.

In the Automotive domain, we are facing these exact same new challenges with our developments for Electrical, Autonomous and Connected Vehicles, with increasing risks on Safety and Security. Software is becoming the first value of our vehicles and also the main asset we need to create and maintain. This will support introducing different User interactions with our products and work on the loyalty to our brands. Continuous relationship and evolutions are key to achieve our goals.

All these new features require interactions between on-board and off-board resources and their development will need to rely on robust System Engineering methods.

ERTS is now a very well-known convention, with people coming from almost all parts of the world with representatives from Academia to Industry teams. It is a real opportunity to exchange across domains, to share best practices, to discover roadblocks and items in research phase, to present difficulties and solutions.

The more the attendance, the better the exchanges!

General Information

Registration conference access

All attendees must register upon arrival and receive a conference badge which will be requested to access all ERTS² 2018 events. The registration desk opening hours are as follows:

| | |
|-----------------------------|----------------------|
| Tuesday 30 January | 16:00 - 18:00 |
| Wednesday 31 January | 08:00 - 18:00 |
| Thursday 1 February | 08:30 - 18:30 |
| Friday 2 February | 08:30 - 14:00 |

Conference proceedings

All conference attendees will receive a conference Folder including the Programme, proceedings on usb key and Book of Abstracts. Proceedings will be also available to download on the website after the conference.

Exhibition

A major exhibition is run in parallel to ERTS² 2018, covering a wide range of products and services in the field of embedded software. The exhibition is located in the room Concorde, level -1.

| | |
|-----------------------------|----------------------|
| Wednesday 31 January | 09:00 - 20:00 |
| Thursday 1 February | 09:00 - 19:00 |
| Friday 2 February | 09:00 - 14:00 |

Coffee Breaks

Coffee breaks will take place in the Exhibition Hall, Room Concorde, level -1.

| | |
|-----------------------------|--|
| Wednesday 31 January | from 11:15 to 11:45 and from 16:30 to 17:00 |
| Thursday 1 January | from 10:30 to 11:00 and from 16:00 to 16:30 |
| Friday 2 January | from 10:30 to 11:00 |

Conference Meals

Lunches are included in the Registration fees and will be served from Wednesday to Friday in room Caravelle, level 0, Wednesday from 12:30 to 14:00, Thursday from 12:45 to 14:00 & Friday from 12:45 to 14:00

Transportation

A complimentary transportation pass will be distributed to the attendees at the badge withdrawal. This pass gives access to the Toulouse official transportation: tramway, metro, buses and shuttle to airport.

Internet Access

A WIFI system will be provided, giving free internet access to all ERTS² 2018 Conference delegates.

Network: ERTS2018
Password: ERTS2018

Luggage room

A cloakroom is at the delegates' disposal at the Conference centre, in front of the Registration desk, level 0

Social Events

- Cocktail party on Wednesday 31 January - from 18:30 to 19:30 Exhibition Hall, Room Concorde, level -1
- Gala Evening on Thursday 1 February - from 19:30 to 22:30, Room Caravelle 1+2, level 0 of the Congress Center. The invitation will be requested at the main entrance (given at the badge withdrawal for those who benefit from a full registration including the gala dinner).

Additional gala dinner can be purchased onsite (until Wednesday 31 January, upon availabilities) at the price of 90€

Pierre Baudis Congress Center

ERTS² 2018 will be held at the Pierre Baudis Convention Center, located in the centre of Toulouse.

Address:

Centre de Congrès Pierre Baudis

11, esplanade Compans Caffarelli
31000 Toulouse

Access:

By Metro

Compans Caffarelli (Line B) Station

By bus

The congress centre is served by bus lines:
N°1 N°70 & N°71 (Bus stop Compans Caffarelli),
N°16 (Bus stop Jeanne d'Arc)

From/To Airport

A shuttle bus every 20 minutes with a station in front of the Pierre Baudis Congress Centre (Compans Caffarelli)

Taxi

A station is available just in front of the entrance of the Hotel Mercure Atria, Boulevard Lascrosse
To call a taxi: + 33 (0)5 61 20 90 00

ERTS² 2018 at Pierre Baudis Congress Center

Level 2

Auditorium St Exupéry

- Plenary sessions, panels & Sessions A

Room Guillaumet 1+2

- Sessions B

Level 1

Room Ariane 1 • Sessions C

Room Ariane 2 • Sessions D

Level 0

Main Entrance Hall • Conference registration

Room Caravelle 1+2 • Lunches and Gala Evening

Level -1

Room Concorde 1+2

- Exhibition registration
- Poster exhibition in Foyer Concorde
- Exhibition & B to B meetings
- Welcome reception & Coffee Breaks

ERTS² 2018 PROGRAMME AT-A-GLANCE

| | | | | | | | |
|--------------------------------------|--|--------------------------------|----------------------------------|----------------|------------------------|----------------------|------------------------------------|
| Intelligent Systems & Smart Vehicles | Certification, Safety, Security, Fault-tolerance | Model Based System Engineering | Multi-core (intensive computing) | Formal Methods | Platforms and Networks | Software Engineering | Virtual Engineering and Simulation |
|--------------------------------------|--|--------------------------------|----------------------------------|----------------|------------------------|----------------------|------------------------------------|

WEDNESDAY 31 JANUARY

| | Auditorium St Exupéry | Room Guillaumet 1+2 | Room Ariane 1 | Room Ariane 2 |
|-------|--|---------------------------------------|---|-------------------------------------|
| 09:00 | Opening Allocutions | | | |
| 09:15 | Opening Session by Joseph Sifakis , Verimag - France | | | |
| 09:45 | Plenary Session : Industrial Co chair: Alexandre Corjon , Alliance Renault-Nissan Global Vice President - France & Keynote Address 1: Airbus representative, France | | | |
| 11:15 | Exhibition visit & Refreshment break (Room Concorde, level -1) | | | |
| 11:45 | Keynote Address 2 - Raja Chatila, Director of Institute of Intelligence Systems and Robotics, ISIR - UPMC, France | | | |
| 12:30 | Lunch (Room Caravelle, level 0) | | | |
| 14:00 | We.1.A Model Based System Engineering 1 | We.1.B Agility for Certification | We.1.C Lightweight Platforms | We.1.D Smart Vehicles Simulation |
| 15:00 | We.2.A Model Based System Engineering 2 | We.2.B Challenges of Certification | We.2.C Distributed Real Time Platforms | We.2.D Smart Vehicles |
| 16:30 | Exhibition visit & Refreshment break (Room Concorde, level -1) | | | |
| 17:00 | Panel 1 - Trends and challenges for autonomous vehicles | | | |
| 18:30 | Welcome Reception - Exhibition Hall, Room Concorde level -1 | | | |

THURSDAY 1 FEBRUARY

| | Auditorium St Exupéry | Room Guillaumet 1+2 | Room Ariane 1 | Room Ariane 2 |
|-------|---|---|--------------------------------|--|
| 09:00 | Th.1.A Model Based System Engineering 3 | Th.1.B Safety and Security | Th.1.C Execution Platforms | Th.1.D Intelligent Systems |
| 10:30 | Exhibition and Poster visit & Refreshment break (Room Concorde, level -1) | | | |
| 11:00 | Keynote Address 3 - Max Lemke, DG Connect EU | | | |
| 11:45 | Th.PO. / Poster Overview | | | |
| 12:45 | Lunch (Room Caravelle, level 0) | | | |
| 14:00 | Panel 2 - How Machine learning could be used (or not) for safety - critical applications? | | | |
| 15:00 | Th.2.A Software Verification | Th.2.B Safety and Dependability Assessment | Th.2.C Manycore | Th.2.D Virtual Engineering |
| 16:00 | Exhibition and Poster visit & Refreshment break (Room Concorde, level -1) | | | |
| 16:30 | Th.3.A Model Based System Engineering 4 | Th.3.B Formal Requirements | Th.3.C Design for Multicore | Th.3.D Cyber Physical System Simulation |
| 19:30 | Gala Evening (Pierre Baudis Congress Center, Room Caravelle, level 0) | | | |

FRIDAY 2 FEBRUARY

| | Auditorium St Exupéry | Room Guillaumet 1+2 | Room Ariane 1 | Room Ariane 2 |
|-------|--|--------------------------|---------------------|------------------------------------|
| 09:00 | Fr.1.A Software Development | Fr.1.B Formal Methods | Fr.1.C Networks | Fr.1.D Digitalization |
| 10:30 | Exhibition visit & Refreshment break (Room Concorde, level -1) | | | |
| 11:00 | Keynote Address 4 - Xavier Leroy, Senior Research Scientist, INRIA | | | |
| 11:45 | Fr.2.A Software Tools | Fr.2.B Resilience | Fr.2.C Field Bus | Fr.2.D Multicore Implementation |
| 12:45 | Lunch (Room Caravelle, level 0) and Closing Session | | | |
| 14:00 | Conference End | | | |

WEDNESDAY 31 JANUARY

ROOM AUDITORIUM ST EXUPÉRY:

- 09:00-09:15 **Opening Allocations** - **Louis Claude Vrignaud**, Continental, France
Opening by high level representatives of organizing societies and local authorities
- 09:15-09:45 **Opening Session**
Joseph Sifakis, Verimag - France
- 09:45-11:15 **Plenary Session:**
09:45-10:15 **Industrial Co chair: Alexandre Corjon**, Alliance Renault-Nissan Global Vice President - France

- 10:15-10:45 **Keynote Address 1:** Airbus representative, France
- 10:45-11:15 **Moderated discussion**
- 11:15-11:45 **Exhibition visit & Refreshment break** (Room Concorde, level -1)
- 11:45-12:30 **Keynote Address 2: Raja Chatila**, Director of Institute of Intelligence Systems and Robotics, ISIR- UPMC, France
- 12:30-14:00 **Lunch** (Room Caravelle, level 0)

14:00-15:00

AUDITORIUM ST EXUPÉRY

Session We.1.A - Model Based System Engineering 1
Chair: Philippe Baufreton, Safran Electronics & Defense - France

We.1.A.1 - SCADE AADL

Thierry Le Sergent; Adnan Bouakaz - ANSYS, France
Guilherme Goretkin - ANSYS, United States

We.1.A.2 - Capella to SysML Bridge: a Toolled-up Methodology for MBSE Interoperability

Nesrine Badache - Artal Technologies, France
Pascal Roques - PRFC, France

ROOM GUILLAUMET

Session We.1.B - Agility for Certification
Chair: Mohamed Kaaniche, LAAS- CNRS-France

We.1.B.1 - Making Agile Development Processes fit for V-style Certification Procedures

Charlotte Pichot; Sergio Bezzecchi - Alstom Transportation Systems, France
Burkhard Wolff - Université Paris-Sud / LRI, France
Paolo Crisafulli, IRT SystemX, France

We.1.B.2 - ED-12C/DO-178C vs. Agile Manifesto - A Solution to Agile Development of Certifiable Avionics Systems

John Marsden; André Windisch - Airbus Defence and Space, Germany
Julien Villermin; Claire Aventini - Airbus, France
Robert Mayo; Jürgen Grossi - Airbus Helicopters, Germany
Louis Fabre - Airbus Helicopters, France

ROOM ARIANE 1

Session We.1.C - Lightweight Platforms
Chair: Stefan Voget, Continental Automotive, Germany

We.1.C.1 - The SEMAPHORO Haptic Interface: a real-time low-cost open-source implementation for dyadic teleoperation

Lucas Roche; Florian Richer; Ludovic Saint-Bauzel - ISIR - UPMC, France

We.1.C.2 - A Generic Virtual Machine Approach for Programming Microcontrollers: the OMicroB Project

Steven Varoumas - LIP6, France
Benoit Vaugon - ENSTA-ParisTech, France
Emmanuel Chailloux - LIP6 - University Pierre and Marie Curie - Paris 6, France

ROOM ARIANE 2

Session We.1.D - Smart Vehicles Simulation
Chair: Olivier Guetta, Renault - France

We.1.D.1 - Development Framework for the Longitudinal Automated Driving Functions with Off-board Information Integration

Eric Armengaud; Sebastian Frager; Stephen Jones; Alexander Massoner; Alejandro Ferreira Parrilla; Niklas Wikstroem; Georg Macher - AVL List GmbH, Austria

We.1.D.2 - Towards Simulation-Based Verification for Continuous Integration and Delivery

Henrik Lönn; Henrik Kaijser; Peter Thorngren - Volvo Group, Sweden
Johan Ekberg - Arccore AB, Sweden
Maria Henningson - Modelon AB, Sweden
Mats Larsson - Systemite AB, Sweden

WEDNESDAY 31 JANUARY

15:00-16:30

AUDITORIUM ST EXUPÉRY

Session We.2.A - Model Based System Engineering 2

Chair: Emmanuel Ledinot, Dassault Aviation - France

We.2.A.1 - Unifying safe hardware system design and implementation through UML-based architecture description languages

Shuai Li; **Yupanqui Munoz Julho**; **Nataliya Yakymets**; **Asma Charfi**; **Sébastien Gérard**; **Morayo Adedjouma**; **Chokri Mraidha**; **Ansgar Radermacher** - CEA LIST, France

We.2.A.2 - Calur: an Action Language for UML-RT

Nicolas Hili; **Juergen Dingel** - Queen's University, Canada
Ernesto Posse - Zeligsoft, Canada

We.2.A.3 - PhiSystem: a toolled methodology for design and validation of ADAS

Matteo Morelli; **Arnaud Cuccuru**; **Sébastien Gerard** - CEA LIST, Laboratory of Model driven engineering for embedded systems, France
Philippe Fiani - Sherpa Engineering, La Garenne Colombes, France

ROOM GUILLAUMET

Session We.2B. - Challenges of Certification

Chair: Gérard Ladier, Aerospace Valley - France

We.2.B.1 - Software safety - A journey across domains and safety standards

Jean-Paul Blanquart - Airbus Defence and Space, France - **Emmanuel Ledinot** - Dassault Aviation, France - **Jean Gassino** - IRSN, France - **Philippe Baufreton**; **Bertrand Ricque** - Safran, France - **Jean-Louis Boulanger** - CERTIFER, France - **Stéphane Brouste** - Groupe PSA, France - **Jean Louis Camus** - ANSYS - Esterel Technologies, France - **Cyrille Comar** - AdaCore, France - **Philippe Quééré** - Renault, France

We.2.B.2 - A consistent safety case argumentation for artificial intelligence in safety related automotive systems

Stefan Dr. Voget; **Alexander Dr. Rudolph** - Continental Automotive GmbH, Germany
Juergen Prof. Dr. Mottok - LaS³, OTH Regensburg, Germany

We.2.B.3 - Avionics Certification: Back to Fundamentals with Overarching Properties

James Chelini - Verocel, Inc, United States
Jean Louis Camus - ANSYS-Esterel Technologies, France - **Cyrille Comar** - AdaCore, France - **Duncan Brown** - Rolls-Royce, United Kingdom - **Anne-Perrine Porte** - ZODIAC Aerospace, France - **Miguel De Almeida** - APSYS, France - **Hervé Delseny** - Airbus, France

ROOM ARIANE 1

Session We.2.C - Distributed Real Time Platforms

Chair: Frédéric Pinot, Ansaldo STS - France

We.2.C.1 - A Multi-Core Basic Software as Key Enabler of Application Software Distribution

André Goebel - Continental Automotive GmbH, Germany
Denis Claraz - Continental Automotive SAS, France

We.2.C.2 - Radiation-Tolerant System-On-Chip (SOC) With Deterministic Ethernet Switching For Scalable Modular Launcher Avionics

Christian Fidi; **Ivan Masar**; **Jean-Francois Dufour**; **Mirko Jakovljevic** - TTTech, Austria

We.2.C.3 - METRICS: a Measurement Environment for Multi-Core Time Critical Systems

Sylvain Girbal; **Jimmy Le Rhun**; **Hadi Saoud** - Thales TRT, France

ROOM ARIANE 2

Session We.2.D - Smart Vehicles

Chair: Gilles Le Calvez, Valeo - France

We.2.D.1 - Enabling Tomorrow's Road Vehicles by Service-Oriented Platform Patterns

Rolf Johansson - Zenuity, Sweden
Rikard Andersson - SMSC, Sweden
Markus Dernevik - Volvo Cars, Sweden

We.2.D.2 - An SDN hybrid architecture for vehicular networks: Application to Intelligent Transport System

Soufian Toufga; **Philippe Owezarski**; **Slim Abdellatif**; **Thierry Villemur** - LAAS-CNRS, France

We.2.D.3 - How to Find a Minimum Viable Product in IoTA

Thirunavukkarasu Ramalingam; **Christophe Benaroya**; **Samuel Fosso-Wamba** - Toulouse Business School, France

16:30-17:00 **Exhibition visit & Refreshment break** (Room Concorde, level -1)

17:00-18:00 **Panel 1** (Auditorium St Exupéry)

Trends and challenges for autonomous vehicles

18:30

Welcome Reception - Exhibition Hall (Room Concorde, level -1)

THURSDAY 1 FEBRUARY

09:00-10:30

AUDITORIUM ST EXUPÉRY

Session Th.1.A - Model Based System Engineering 3

Chair: Uwe Kühne, Airbus Defence and Space, Germany

Th.1.A.1 - System Optimization: A Use Case in the Space Domain

Mihal Brumbulli; **Emmanuel Gaudin** - PragmaDev, France
Alexandre Cortier; **Alain Rossignol** - Airbus Defence & Space, France

Th.1.A.2 - Launcher Sequential Analysis

David Lesens; **Mathilde Ducamp**; **Julien Grand**; **Daniel Mercier** - Ariane Group, France

Th.1.A.3 - A Lightweight Meta-Model to Support Automotive Systems and Software Engineering

Georg Macher; **Eric Armengaud** - AVL List GmbH, Austria
Eugen Brenner; **Christian Kreiner** - Graz University of Technology, Austria

ROOM GUILLAUMET

Session Th.1.B - Safety and Security

Chair: Jürgen Mottok, LaS3 OTH Regensburg - Germany

Th.1.B.1 - Safe and Secure Autopilot Software for Drones

Amin El Mrabti; **Denis Gautherot** - Sogilis, France
Valentin Brossard - Hionos, France
Yannick Moy - AdaCore, France
Frédéric Pothon - ACG Solutions, France

Th.1.B.2 - Autonomous and connected vehicles: Collaboration of Aeronautic and Automotive industries to face the huge challenges for safe and secure embedded systems

Yves Dordet; **Gérard Ladier** - Aerospace Valley, France
Pascal Traverse; **Hervé Delseny** - Airbus, France
Christian Assier; **David Lopez** - NXP, France
Jean François Sencerin - Renault, France

Th.1.B.3 - Securing the Connected Car: Application Code Matters

Mark Pitchford - LDRA Ltd., United Kingdom

ROOM ARIANE 1

Session Th.1.C - Execution Platforms

Chair: Christoph Ainhauser, BMW CarIT - Germany

Th.1.C.1 - Evaluation of DREAMS resource management solutions on a mixed-critical demonstrator

Gerhard Fohler; **Gautam Gala** - Technische Universität Kaiserslautern, Germany
Daniel Gracia Perez - Thales, France
Claire Pagetti - ONERA, France

Th.1.C.2 - BB-RTE: a Budget-Based RunTime Engine for Mixed and Safety Critical Systems

Sylvain Girbal; **Jimmy Le Rhun** - Thales TRT, France

Th.1.C.3 - ESPRIT: Overview of the Vehicles Road-Train Real-Time Architecture

Nicolas Gobillot; **Eric Lucet** - CEA, France

ROOM ARIANE 2

Session Th.1D - Intelligent Systems

Chair: Jean-Luc Dormoy, EDF Group - France

Th.1.D.1 - Application of a Hybrid Navigation System for an Autonomous Space Air-Launched Vehicle

David Vallverdu; **Charles Pou**; **Mariona Badenas**; **Eduard Diez** - GTD, Spain

Th.1.D.2 - Autonomous Detect & Avoid

Jean-François Lamaudiere; **Nicolas Capdeville**; **Boubekour Begue**; **Nicolas Senequier** - AKKA Technologies group, France

Th.1.D.3 - 3D scanner positioning for aircraft surface inspection

Marie-Anne Bauda; **Stanislas Larnier**; **Alex Grenwelge** - AKKA Research, France

10:30-11:00 **Exhibition & Poster visit & Refreshment break** (Room Concorde, level -1)

11:00-11:45 **Keynote Address 3: Max Lemke**, DG Connect EU (Auditorium St Exupéry)

THURSDAY 1 FEBRUARY

11:45-12:45 **Poster Overview** (+ Poster exhibition in Foyer Concorde all the day)
AUDITORIUM ST EXUPÉRY : Chair: **Philippe Cuenot**, Continental Automotive - France

Th.PO.1 - Situation Awareness for Collaborative Robotics in Manufacturing Applications, Feasibility Study
Katleen Blanchet; Olivier Lebec; Christophe Leroux - CEA, France

Amel Bouzeghoub - Télécom SudParis, France

Th.PO.2 - Overview of the HEAA method defined by Airbus for Alarm design (Human Errors Analysis which concentrates on Alarm titles and their procedures)

Florence Beaujard - Airbus, France

Th.PO.3 - The Certification Challenges of Connected and Autonomous Vehicles

Hugues Bonnin - Continental, France

Th.PO.4 - SimfiaNeo, Complex Systems, yet Simple Safety
Mathilde Machin; Laurent Sagaspe; Xavier de Bossoreille - Apsys-Airbus, France

Th.PO.5 - Safety Analysis from System Design to System Simulation

Marc Born - ANSYS, Germany
Thierry Le Sergeant - ANSYS, France
Lee Johnson - ANSYS, United States

Th.PO.6 - Early Timing, Schedulability and Performance Analysis of Embedded Electronics Architectures
Franck Corbier - DASSAULT SYSTEMES, France
Pierre Dissaux - ELLIDISS, France

Th.PO.7 - Automatic Parallelization from Lustre Models in Avionics

Jean Souyris - Airbus Operations SAS, France

Keryan Didier; Dumitru Potop; Albert Cohen - INRIA, France

Timothy Bourke; Guillaume looss; Marc Pouzet - ENS, France

Th.PO.8 - SQUORE as a Software Quality solution at Continental PES

Flavien Huynh - Squoring Technologies, France

Mathias Lapeyre - Continental, France

Th.PO.9 - Software Quality Assurance Dashboard for Renault Software Robustness plan with SQUORE tool

Valérie Russo; Alexandre Oriou - RENAULT, France

Flavien Huynh - SQUORING Technologies, France

Claude Baron - LAAS, France

Th.PO.10 - From smartphones to automotive: Development of a generic SW framework to manage audio architecture scalability across embedded platforms

Sylvain Centelles - Groupe Renault, France

Th.PO.11 - Consumer Electronics Processors for Critical Real-Time Systems: a (Failed) Practical Experience

Gabriel Fernandez; Jaume Abella ; Francisco J Cazorla - Barcelona Supercomputing Center (BSC), Spain

Th.PO.12 - Exploring High-Level Synthesis Tools For Vehicle Perception Tasks

Mokhtar Bouain; Denis Berdjag; Rabie Ben Atitallah - University of Valenciennes, LAMIH, France

12:45-14:00 **Lunch** (Room Caravelle, level 0)

14:00-15:00 **Panel 2 - How Machine Learning could be used (or not) for safety-critical applications?** (Auditorium St Exupéry)

Summary

Artificial Intelligence based on technics like machine learning invades all and every domains including transport systems like aircraft, cars, rail, and all critical embedded systems.

In this field of safety critical systems it is more than necessary to demonstrate how to be confident in the results of such complex algorithms used for artificial intelligence.

Therefore we should be able to explain how machine learning works and why it gives results in which we can trust.

Then it would be possible to adapt the current rules and industrial standards used to

give confidence to the public and /or to the authorities in charge of approval, e.g. EASA in the avionics context.

Moderator

Hervé Delseny, Airbus - software aspects of certification, France

Panelists

Adrien Gauffriau, Airbus, Critical Software engineer and Data Analyst, France

Alexander Rudolph, Continental - safety manager «Chassis & Safety», Germany
Virginie Wiels, ONERA - head of the Information Processing and Systems Department, France

Xiaowei Huang, Lecturer at University of Liverpool - correctness (e.g., safety, trustworthiness, etc) of autonomous systems, UK

Guillaume Soudain, EASA - Software Senior Expert, Germany

THURSDAY 1 FEBRUARY

15:00-16:00

AUDITORIUM ST EXPÉRY

Session Th.2.A - Software Verification

Chair: Patrick Cormery, ArianeGroup, France

Th.2.A.1 - Lightweight Checkers in a New Light

Romain Béguet; Clément Fumex; Yannick Moy - AdaCore, France

Th.2.A.2 - Why Bother to Unit Test?

Pierre-Henri Stanek - QA Systems GmbH, France

ROOM GUILLAUMET

Session Th.2.B - Safety and Dependability Assessment

Chair: Agnes Lanusse, CEA LIST - France

Th.2.B.1 - Timed Formal Model and Verification of Satellite FDIR in Early Design Phase

Alexandre Albore - IRT Saint-Exupéry, France

Silvano Dal Zilio - LAAS - CNRS, France

Marie de Roquemaurel - Airbus Défense&Space, France

Christel Seguin - ONERA, France

Pierre Virelizier - Safran SA, France

Th.2.B.2 - Model-Based Safety Analysis for co-assessment of operation and system safety: application to specific operations of unmanned aircraft

Louis-Marie Séjeau - LURPA, ENS Cachan, France

Christel Seguin; Pierre Bieber; Jean-Loup Farges; Xavier Pucel - ONERA, France

ROOM ARIANE 1

Session Th.2.C - Manycore

Chair: Olivier Nadal, AKKA, Aeroconseil, France

Th.2.C.1 - Computing Routes and Delay Bounds for the Network-on-Chip of the Kalray MPPA2 Processor

Marc Boyer - ONERA, France

Benoît Dupont de Dinechin - Kalray, France

Amaury Graillat - Kalray / Verimag, France

Lionel Havet - RealTime-at-Work, France

Th.2.C.2 - Using execution graphs to model a prefetch and write buffers and its application to the Bostan MPPA

Wei-Tsun Sun; Hugues Cassé;

Christine Rochange - IRT - University of Toulouse, France

Hamza Rihani - Vérimag - University of Grenoble - Alpes, France

Claire Maïza - University of Grenoble - Alpes, France

ROOM ARIANE 2

Session Th.2.D - Virtual Engineering

Chair: Henrik Lönn, Volvo Technology - Sweden

Th.2.D.1 - Full Virtualization of Renault's Engine Management Software and Application to System Development

Dirk von Wissel; Yohan Jordan - Renault SA., France

Jakob Mauss - QTronic GmbH, Germany

Adrian Dolha - QTronic-Software SRL, Romania

Th.2.D.2 - Model Quality Objectives for embedded software development with MATLAB and Simulink

François Guérin; Patrick Munier - MathWorks, France

Jérôme Bouquet; Florian Levy - Renault, France

Florent Fève - Valeo, Germany

Stéphane Faure - Valeo, France

Mathieu Foucault; Thierry Hubert - PSA, France

Ursula Garcia; Stéphane Louvet - Bosch, France

Pierre-Nicolas Paton; Alain Spiewek - Delphi, France

16:00-16:30 **Exhibition & Poster visit & Refreshment break** (Room Concorde, level -1)

THURSDAY 1 FEBRUARY

16:30-18:00

AUDITORIUM ST EXPÉRY

Session Th.3.A - Model Based System Engineering 4

Chair: Thierry Seynaeve, E2-CAD - France

Th.3.A.1 - Interoperable Toolchain for Requirements-Driven Model-Based Development

Jan Steffen Becker; Thomas Peikenkamp - OFFIS e.V., Germany

Vincent Bertram - Daimler AG Group Research & MBC Development, Germany

Tom Bienmüller; Udo Brockmeyer;

Tino Teige - BTC Embedded Systems AG, Germany

Heiko Dörr - Model Engineering Solutions GmbH, Germany

Th.3.A.2 - Development and Verification of UML Architectures by Refinement and Extension Techniques

Thomas Lambolais; Anne-Lise Courbis - IMT mines Alès, LGI2P, France

Th.3.A.3 - Temporal Properties in Component-Based Cyber-Physical Systems

Tobias Sehnke; Matthias Schultalbers - IAV GmbH, Germany

Rolf Ernst - Technische Universität Braunschweig, Germany

ROOM GUILLAUMET

Session Th.3.B - Formal Requirements

Chair: Cyrille Comar, Adacore - France

Th.3.B.1 - Using Traffic Sequence Charts at the Development of HAVS

Werner Damm; Astrid Rakow - University of Oldenburg, Germany

Stephanie Kemper; Eike Möhlmann;

Thomas Peikenkamp - OFFIS - Institute for Information Technology, Germany

Th.3.B.2 - Pattern-based requirements development

Jean-Paul Bodeveix; Mamoun Filali-Amine - IRIT, France

Arnaud Dieumegard - IRT Saint-Exupéry, France

Th.3.B.3 - Formal architecture modeling for documenting and assessing Aeronautics Maintenance: A case study

Olivier Poitou; Pierre Bieber - ONERA, France

Ludovic Simon - Thales Avionics, France

Joël Ferreira - TAP, Portugal

ROOM ARIANE 1

Session Th.3.C - Design for Multicore

Chair: Eric Armengaud, AVL List - Austria

Th.3.C.1 - Model-Based Design, Analysis and Synthesis for TSP Multi-Core Space systems

Christophe Honvault - ESA, Netherlands

Jérôme Hugues - ISAE, France

Claire Pagetti - ONERA / IRIT-ENSEEIH, France

Th.3.C.2 - A Model Based Safety Critical Flow for the AURIX Multi-core Platform

Gunther Siegel; Cédric Pasteur - ANSYS SBU, France

Roman Knížek - HighTec EDV-Systeme GmbH, Czech Republic

Th.3.C.3 - A model based certification approach for multi/many-core embedded systems

Pierre Bieber; Frédéric Boniol; Youcef Bouchebaba ; Julien Brunel; Olivier Poitou; Thomas Polacek; Luca Santinelli; Nathanael Sensfelder - ONERA, France

Claire Pagetti - ONERA / IRIT-ENSEEIH, France

ROOM ARIANE 2

Session Th.3.D - Cyber Physical System Simulation

Chair: Eric Conquet, ESA - The Netherlands

Th.3.D.1 - Real time and interactive co-execution platform for the validation of embedded systems

Sara Sadvandi; Franck Corbier; Eric Mevel - DASSAULT SYSTEMES, France

Th.3.D.2 - Coincidence Problem in CPS Simulations: the R-ROSACE Case Study

Henrick Deschamps - ISAE Supaéro / Airbus Operation SAS, France

Gerlando Cappello - Airbus Operation SAS, France

Janette Cardoso; Pierre Siron - ISAE Supaéro, France

Th.3.D.3 - Integrating AADL and FMI to Extend Virtual Integration Capability

Jean-Marie Gauthier; Raphaël Faudou - Samares-Engineering, France

Jérôme Hugues - ISAE-Supaéro DISC, France

19:30-22:30 **Gala Evening** (Pierre Baudis Congress Center, Room Caravelle, Level 0) with **Best Paper Award Ceremony**

FRIDAY 2 FEBRUARY

09:00-10:30

AUDITORIUM ST EXUPÉRY

Session Fr.1.A - Software Development

Chair: Eric Jenn, Thales Avionics/IRT Saint Exupéry - France

Fr.1.A.1 - Breaking down silos with contract based design for industrial software development: illustrated through an aerospace case study

Vijay Bahadur Singh - Siemens PLM, India

Tuur Benoit - Siemens Industry Software, Belgium

Vincent Braibant - Siemens Industry Software, France

Fr.1.A.2 - Statecharts for Unified Model-Based Design - As simple as possible, as rich as needed

Jean-Louis Dufour - SAFRAN Electronics & Defense, France

Fr.1.A.3 - Renault Nissan new Software Strategy

Olivier Guetta; Emmanuel Coutenceau - Renault, France

Kazuhiro Ishigami - Nissan, Japan

ROOM GUILLAUMET

Session Fr.1.B - Formal Methods

Chair: Laurent Mangane, Airbus - France

Fr.1.B.1 - CompCert: Practical Experience on Integrating and Qualifying a Formally Verified Optimizing Compiler

Daniel Kästner; Michael Schmidt; Christian Ferdinand - AbsInt GmbH, Germany

Ulrich Wünsche; Jörg Barrho; Marc Schlickling - MTU Friedrichshafen GmbH, Germany

Bernhard Schommer - Saarland University, Germany

Xavier Leroy - INRIA, France

Sandrine Blazy - IRISA, France

Fr.1.B.2 - Formalise to automate: deployment of a safe and cost-efficient process for avionics software

Abdellatif Atki - Ausy, France

Abderrahmane Brahmi; David Delmas; Mohamed Habib Essoussi - Airbus Operations SAS, France

Thomas Marie - Ausy, France

Famantanantsoa Randimbivololona - CEPRESY Informatics, France

Fr.1.B.3 - Proving Properties of Reactive Programs -- From C to Lustre

Loïc Correnson; Benjamin Blanc; Zaynah Dargaye; Bruno Marre - CEALIST, France

Jean Gassino - IRSN, France

ROOM ARIANE 1

Session Fr.1.C - Networks

Chair: Marc Boyer, Onera - France

Fr.1.C.1 - Mixed-Criticality on the AFDX Network: Challenges and Potential Solutions

Anais Finzi; Ahlem Mifdaoui; Fabrice Frances; Emmanuel Lochin - ISAE-SUPAERO, France

Fr.1.C.2 - Towards Embedded Packet Processing Devices for Rapid Prototyping of Avionic Applications

Fabien Geyer; Max Winkel - Airbus Group Innovations, Germany

Fr.1.C.3 - Next-Gen Train Control / Management (TCMS) Architectures: "Drive-By-Data" System Integration Approach

Mirko Jakovljevic; Arjan Geven; Derya Mete Saatci; Natasa Simanic-John - TTTech, Austria

Bernd Loehr - Newtec, Germany

ROOM ARIANE 2

Session Fr.1.D - Digitalization

Chair: Louis-Claude Vrignaud, Continental Automotive - France

Fr.1.D.1 - Simulation-Based Fault Injection as a Verification Oracle for the Engineering of Time-Triggered Ethernet networks

Loïc Fejz - RealTime-at-Work, France

Bruno Regnier; Philippe Miramont - Centre National d'Etudes Spatiales, France

Nicolas Navet - DesignCPS/University of Luxembourg, Luxembourg

Fr.1.D.2 - A Deterministic Approach for Embedded Human-Machine Interfaces (HMI) Testing Automation

Francois-Xavier Dormoy; Vincent Rossignol - ANSYS, France

Fr.1.D.3 - Co-Engineering in aeronautics? The A320 forward section case study

François Bouissiere; Claude Cuiller; Pierre-Eric Dereux; Stephane Kersuzan - Airbus, France

Thomas Polacsek; Cédric Pralet; Stéphanie Roussel - ONERA, France

FRIDAY 2 FEBRUARY

10:30-11:00 **Exhibition visit & Refreshment break** (Room Concorde, level -1)

11:00-11:45 **Keynote Address 4** (Auditorium St Exupéry)
Xavier Leroy, Senior research scientist, INRIA

11:45-12:45

AUDITORIUM ST EXUPÉRY

Session Fr.2.A - Software Tools

Chair: Denis Claraz, Continental Automotive - France

Fr.2.A.1 - Increase avionics software development productivity using Micro-python and Jupyter notebooks
Nicolas Valot; Pierre Vidal; Louis Fabre
- Airbus Helicopters, France

Fr.2.A.2 - Interactive Parallelization of Embedded Real-Time Applications Starting from Open-Source Scilab & Xcos

Oliver Oey; Michael Rückauer; Timo Stripf; Juergen Becker - emmtrix Technologies GmbH, Germany
Clément David; Yann Debray - ESI Group, France
David Müller; Umut Durak - German Aerospace Center (DLR), Germany
Emin Koray Kasnakli; Marcus Bednara; Michael Schöberl - Fraunhofer, Germany

ROOM GUILLAUMET

Session Fr.2.B - Resilience

Chair: Jean-Paul Blanquart, Airbus - France

Fr.2.B.1 - How Resilient is your computer system?
William Excoffon; Jean-Charles Fabre
- LAAS-CNRS France
Michaël Lauer - Université de Toulouse/LAAS-CNRS, France

Fr.2.B.2 - Challenges and Opportunities with Multi-Core Embedded Platform - A Spotlight on Real-Time and Dependability Concepts
Lukas Osinski; Tobias Langer; Jürgen Mottok - Laboratory for Safe and Secure Systems - OTH Regensburg, Germany
Ralph Mader - Continental AG, Germany

ROOM ARIANE 1

Session Fr.2.C - Field Bus

Chair: Thierry Monteil, LAAS - France

Fr.2.C.1 - Insights on the Performance and Configuration of AVB and TSN in Automotive Ethernet Networks
Jörn Migge - RTaW, France
Marc Boyer - ONERA, France
Nicolas Navet - University of Luxembourg, Luxembourg
Josetxo Villanueva - Renault SAS, France

Fr.2.C.2 - Embedded Hybrid Anomaly Detection for Automotive CAN Communication

Marc Weber; Simon Klug; Eric Sax - Karlsruhe Institute of Technology, Germany
Bastian Zimmer - Vector Informatik GmbH, Germany

ROOM ARIANE 2

Session Fr.2.D - Multicore Implementation

Chair: Christophe Moreno, Thales Alenia Space - France

Fr.2.D.1 - Real-time on-Board Manycore Implementation of a Health Monitoring System: Lessons Learnt
Moustapha Lo; Nicolas Valot - Airbus Helicopters, France
Florence Maraninchi; Pascal Raymond - Verimag, France

Fr.2.D.2 - Quality of Service for Integrated Modular Avionics (IMA) on Multicore Processors using a Safety Net Architecture
Johannes Freitag; Sascha Uhrig - Airbus, Germany

12:45-14:00 **Lunch** (Room Caravelle, level 0) and **Closing Session**

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The Société des Ingénieurs de l'Automobile (the French Society of Automotive Engineers) is a society officially considered as serving the public interest. Its purpose is to represent technical excellence in the automobile industry through its expert and knowledge sharing networks. The SIA draws its members from the ranks of automobile engineers and technicians and all those active in promoting automotive engineering. SIA has 2 000 members and a network of over 18 000 engineers, technicians and research workers behind it.

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The **Aerospace Valley** World Competitiveness Cluster extends over the Occitanie & Aquitaine regions to constitute the Europe's leading pool of jobs in the aeronautics, space and embedded systems fields. The purpose of the Aerospace Valley cluster is to develop the global research and industrial ecosystem for competitiveness improvement in these fields and to grow jobs in its regions. With regard to embedded systems, the cluster's development priorities focus on:

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See Aerospace Valley web site for more information and contact : <http://www.aerospace-valley.com/en/>

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