9th European Congress

EMBEDDED REAL TIME SOFTWARE AND SYSTEMS

ERTS² 2018

FROM JANUARY 31st TO FEBRUARY 2nd / TOULOUSE, FRANCE

PIERRE BAUDIS CONGRESS CENTER

PROGRAMME

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

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 Allocutions** - **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 Tooled-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
Burkhart 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 Henningsson - 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 tooled methodology for design and validation of ADAS
Matteo Morelli; Arnaud Cuccuru; Sebastien Gerard - CEA LIST, Laboratory of Model driven engineering for embedded systems, France
Philippe Fiani - Sherpa Engineering, La Garenne Colombes, France

ROOM GUILLAUMET

Session We.2.B. - 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 Quéré** - 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

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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 Carlt - 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; Carles Pou; Mariona Badenas; Eduard Diez - GTD, Spain

Th.1.D.2 - Autonomous Detect & Avoid
Jean-François Lamaudiere; Nicolas Capdeville; Boubekeur 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

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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)

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
Thierrry Le Sergent - 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 Iooss; Marc Pouzet - ENS, France

Th.PO.8 - SQUORE as a Software Qualimetry 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

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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)

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, trustworthy, etc) of autonomous systems, UK
Guillaume Soudain, EASA - Software Senior Expert, Germany

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

THURSDAY 1 FEBRUARY

15:00-16:00

AUDITORIUM ST EXUPÉRY

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 Defense&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 - IRIT - 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
Matthieu 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)

16:30-18:00

AUDITORIUM ST EXUPÉRY

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-ENSEEIHT, 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 Polacsek; Luca Santinelli; Nathanael Sensfelder - ONERA, France
Claire Pagetti - ONERA / IRIT-ENSEEIHT, 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-Supaero 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 - CEA LIST, 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
Anaïs Finzi; Ahlem Mifdaoui; Fabrice Frances; Emmanuel Lochin - ISAE-SU-PAERO, 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 Fejoz - 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 Micropython 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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COMMITTEES

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Joseph SIFAKIS - Turing Award 2007, Verimag Laboratory, France
Louis Claude VRIGNAUD - SIA/Continental Automotive, France

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Valérie ALIDOR - SEE, France

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Xavier SICARD - Abe, France

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Alice TORGUE - 3AF Midi Pyrénées, France

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Marie-Josephe PAYRY
Joelle STELLA - 3AF Midi Pyrénées, France
Béatrice VALDAYRON - C2b Congress, France
Caroline ZAGO - C2b Congress, France

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Caroline ZAGO - C2b Congress, France

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Georges ZISSIS - Université Toulouse 3 Paul Sabatier - SEE Midi Pyrénées, France

Created in 1972, the 3AF is a French aerospace society. Its mission is to advance the aerospace profession, stimulate progress in the state of the art or aerospace science and technology and represent the profession in public policy discussions.

Unite, share, enlighten and advance: 3AF is a forum for knowledge exchange.

Unite a network of more than 1500 members, 60 companies from the scientific aerospace community.

Share 10 international conferences and symposiums per year, experts publications.

Enlighten A scientific society, an expert pool of knowledge consulted by decision makers and media.

Advance 20 technical commissions which contribute to advancing the aerospace industry.

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The SEE (the French Electrical, Electronics, and Information & Communication Technologies Society) is a non-profit-making scientific association, directed to the public benefit. The SEE groups its members into 22 Technical Committees and 12 Regional Groups, creating links between them through its Newsletter and website. SEE mission's is to promote French science and technology, as well as create within these two fields meeting opportunities for industrialists, research scientists, teachers, students and trainee engineers both from France and abroad. The SEE thereby organises and co-organises events in its particular fields of competence. These professional national colloquia deal with particular topics and prospects, as well as major international Conferences. Other events include technical visits, evening lectures and training courses.

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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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PARTNERS

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: - safety, dependability, reliability and certification at all levels (from systems to software and hardware); - performance, integration, modularity and quality of electronic, electrical, electro-mechanical systems and equipment; - IT parts and energy development; - systems diagnosis and prognosis; - new modes of human-system interaction, and intra and inter-systems communication; - smaller, less expensive and more powerful devices in conjunction with NanoInnov, a major program for Embedded systems; Aerospace Valley offers also, in the embedded systems field, numerous opportunities for diversification, particularly in the areas of health, agriculture, energy, connected and autonomous vehicles and home automation.

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

OTHER PARTNERS

GOLD SPONSOR

Founded in 1994, **AdaCore** supplies software development and verification tools for mission-critical, safety-critical, and security-critical systems. Four flagship products highlight the company's offerings: - The GNAT Pro development environment for Ada, a complete toolset for designing, implementing, and managing applications that demand high reliability and maintainability, - The CodePeer advanced static analysis tool, an automatic Ada code reviewer and validator that can detect and eliminate errors both during development and retrospectively on existing software, - The SPARK Pro verification environment, a toolset based on formal methods and oriented towards high-assurance systems, and - The QGen model-based development tool, a qualifiable and customizable code generator and verifier for Simulink® and Stateflow® models, intended for safety-critical control systems. Over the years customers have used AdaCore products to field and maintain a wide range of critical applications in domains such as space systems, commercial avionics, military systems, air traffic management/control, rail systems, medical devices, and financial services. AdaCore has an extensive and growing world-wide customer base; see www.adacore.com/customers/ for further information. AdaCore products are open source and come with expert on-line support provided by the developers themselves. The company has North American headquarters in New York and European headquarters in Paris.

SILVER SPONSORS

Airbus is a global leader in aeronautics, space and related services. In 2016 it generated revenues of €67 billion and employed a workforce of around 134,000. Airbus offers the most comprehensive range of passenger airliners from 100 to more than 600 seats and business aviation products. Airbus is also a European leader providing tanker, combat, transport and mission aircraft, as well as one of the world's leading space companies. In helicopters, Airbus provides the most efficient civil and military rotorcraft solutions worldwide.

ANSYS

Embedded Systems and Software Development

Embedded software is increasingly being used in smart devices, but imperfect code can be the cause of many product failures. Industry leaders estimate that every 1,000 lines of embedded software contain eight bugs. To manage this quality risk, as well as to meet higher standards for software certification, you need to leverage embedded software development tools and certified code generators.

ANSYS provides a model-based embedded software development and simulation environment with a built-in automatic code generator to accelerate embedded software development projects. System and software engineers use ANSYS SCADE solutions to graphically design, verify and automatically generate critical systems and software applications with high dependability requirements. SCADE solutions are highly interoperable and can be easily integrated, allowing for development optimization and increased communication among team members.

Certified code generation across industries

SCADE code generators have been qualified/certified at the highest level of safety across six market segments by more than ten safety authorities worldwide, including:

DO-178C up to Level A – Aerospace and Defense Applications by FAA, EASA, Transport Canada and ANAC

IEC 61508 up to SIL 3 – Transportation and Industrial Applications by TÜV SÜD

EN 50128 up to SIL 3/4 – Rail Transportation Applications by TÜV SÜD, EBA and Certifer

IEC 60880 demonstrated compliance – Nuclear Applications by nuclear safety authorities

ISO 26262 up to ASIL D – Automotive Applications by TÜV SÜD

SCADE speeds the embedded software development process

SCADE users report the following development and verification cost improvements:

alignment of the design process according to safety standard objectives

reduction of development costs by 50 percent, on average

acceleration of certification by a factor of two

More information on: http://www.ansys.com/products/embedded-software

Continental

Continental develops pioneering technologies and services for the sustainable and connected mobility of people and their goods. Founded in 1871, the technology company offers safe, efficient, intelligent and affordable solutions for vehicles, machines, traffic and transport. In 2016, Continental generated sales of €40.5 billion and currently employs more than 233,000 people in 56 countries.

The IRT Saint Exupéry has been launched by the French government within Investments for the Future Program to boost the maturation and transfer of state-of-the-art technologies in the field of Aeronautics, Space and Embedded Systems. Based in Bordeaux, Sophia Antipolis and Toulouse, this Institute of Technology combines resources from public and private partners to lead R&T activities in three strategic domains: High Performance Multifunctional Materials, More Electrical Aircraft & Embedded Systems.

The Embedded Systems domain is divided in 4 Competence Centres: Systems Engineering – Multidisciplinary Design Optimisation – Digital Signal Processing – Intelligent Systems & Data, with technology road maps focused on safety critical real time systems and intelligent & secure systems. Current research activities are related to safety analyses & certification, use of high performance COTS platforms, model-based collaborative methodologies and platform, dependable Artificial Intelligence.

SIEMENS - MENTOR GRAPHICS

Enable and Accelerate Innovation with Siemens

Industrial IoT is transforming industry for greener, smarter and safer world.

Digital Transformation fosters innovation that improves products and enables monetization related to Big Data processing. Today, 80% of this innovation is related to the Electronics and Software components.

With recent acquisitions of LMS, Polarion and Mentor Graphics, Siemens PLM Software is the de-facto "innovation enabler" and "acceleration player" for Industrial IoT (IIoT).

Mentor Embedded Solutions

The best-in-class Industrial IoT Systems run Mentor Embedded Solutions

· Scalable

· Secure

· Multicore

Simcenter Embedded Software Designer

The best-in-class Industrial IoT Systems are developed with Simcenter Embedded Software Designer

· Model & Architect Software

· Test Software

Polarion

The best-in-class Industrial IoT Systems are managed with Polarion ALM

· Collaboration

· Traceability

· Reuse

GROUPE RENAULT

QA Systems Company QA Systems' fundamental goals are to accelerate and improve software development. Operating on a global scale, QA Systems has over 350 blue-chip customers, spanning a range of industries, including aerospace & defence, automotive, healthcare and railways. The company supplies and supports its own dynamic testing tools, in addition to carefully selected products from strategic business partners, for static testing, requirements engineering, architectural analysis and software metrics. Cantata Tool Cantata dynamically proves code with intelligent unit and integration testing, in the most cost effective manner. It provides a complete test development environment, built on Eclipse, and it integrates easily with developer desktop compilers and embedded target platforms. Cantata has been successfully used by customers worldwide since the 1990s to meet the main international safety-related standards, including: ISO 26262, EN 50128, IEC 60880, DO 178B/C and IEC 62304.

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