
# FINAL PROGRAM

http://www.ada-europe.org/conference2023

In cooperation with

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Ada Resource ARA Association

Ciências ULisboa

# PRESENTATION

The 27th Ada-Europe International Conference on Reliable Software Technologies (AEiC 2023) returns to Lisbon from the 13th to the 16th of June, five years after the 2018 edition. After the hybrid-mode edition in Ghent, Belgium, last year, AEiC 2023 returns to in-presence only modality.
The conference is the latest in a series of annual international conferences started in the early 80's, under the auspices of Ada-Europe, the international organization that promotes knowledge and use of Ada and Reliable Software in general, into academic education and research, and industrial practice.
The conference is an established international forum for providers, practitioners and researchers in reliable software technologies. The conference presentations will illustrate current work in the theory and practice of developing, running and maintaining challenging long-lived, high-quality software systems for a variety of application domains including manufacturing, robotics, avionics, space, transportation.
The program features a keynote, a panel discussion, technical presentations and discussions, and social events. Participants include practitioners and researchers from industry, academia and government organizations active in the promotion and development of reliable software.

The conference program includes two core days with special sessions featuring presentations of invited experts, peer-reviewed academic papers, industrial presentations, and work-in-progress talks and posters. The conference program is bracketed by one day of tutorials, and one day with two satellite events: the 8th DeCPS workshop on "Challenges and new Approaches for Dependable and Cyber-Physical Systems Engineering" and the "2nd ADEPT: AADL by its practitioners" workshop. The event also includes social events: a welcome reception in the gardens of the National Museum of Science & Natural History on Tuesday 13th, at the end of the afternoon tutorials; and a dinner at the "Casa do Alentejo" restaurant, located in a XVII century building in downtown Lisbon, which served as a casino about a century ago and features several attractively decorated rooms.
Lisbon is the capital city of Portugal, and one of the prime touristic destinations in Europe. It is well-known for landmarks like the medieval São Jorge castle and the Belém tower, but most of all for the fine weather and great food. The 13th of June is the Lisbon city yearly holiday and there will be popular festivities in Alfama and Bairro Alto. A great time to visit the city!

# OVERVIEW OF THE CONFERENCE PROGRAM

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# INVITED SPEAKERS

## Wednesday, June 14th

### Keynote Talk

### *Applications of Liquid Types for More Reliable Software*

ALCIDES FONSECA
LASIGE, UNIVERSITY OF LISBON, PORTUGAL

Abstract

Type systems are the most popular form of static verification, even being mandatory in popular programming languages. Liquid types have been proposed to increase the expressive power of type systems, allowing to express types that only contain even numbers ({x:Int | x % 2 == 0}) or any other predicate taken from a decidable logic. The talk will cover a few applications of liquid types. First, we will see how we can extend the Java programming language with liquid types, and use it to statically detect bugs in state machine code. Then, we will see how liquid types can be helpful in the programming of cyber-physical systems, avoiding reaching invalid states in robotics programs. To show how liquid types can be applied to other domains, we will cover how machine learning pipelines can use liquid types to avoid having pipelines that have semantic errors, such as mixing the training and testing datasets, or using imbalanced data with models that require data to be balanced. Finally, we will see how liquid types can be used to automate the activity of programming, improving how program synthesis works.

Short Bio

Alcides Fonseca is an Assistant Professor at the University of Lisbon, where he leads the Reliable Software Systems research line of excellence at LASIGE. Alcides has a PhD in automatic optimization of parallel programs from the University of Coimbra, and has more recently focused on static verification techniques for program synthesis and machine learning systems, with a focus on usability. Alcides lead the LASIGE team in the CAMELOT project, a partnership between Feedzai — a fraud detection startup —, Carnegie Mellon University, University of Coimbra, IST and LASIGE that aimed to use static verification tools, such as Liquid Types, to help data scientists avoid common pitfalls in machine learning pipelines, as well as optimize their code. Now, he coordinates the Resource-Aware Programming (RAP) project, that helps developers understand the resource usage of their programs, such as energy consumption. Alcides is also the lead developer of GeneticEngine, a software synthesis software that used liquid types, and a contributor to LiquidJava, an extension to Java that adds Liquid Types.

## Thursday, June 15th

### Panel

### *Promises and Challenges of AI-enabled Software Development Tools for Safety-Critical Applications*

Short Bio of Invited Experts

DOUGLAS SCHMIDT
VANDERBILT UNIVERSITY, USA

Douglas C. Schmidt is the Cornelius Vanderbilt Professor of Engineering in the Electrical Engineering and Computer Science Department, the Associate Provost of Research Development and Technologies, the Co-Director of the Data Science Institute, and a Senior Researcher at the Institute for Software Integrated Systems, all at Vanderbilt University. He is also a Visiting Scientist at the Software Engineering Institute (SEI) at Carnegie Mellon University. Schmidt is an internationally renowned and widely cited (an h-index of 91, an i10-index of 392, and a citation count of 39,300+) researcher whose work focuses on patterns, optimization techniques, and empirical analyses of object-oriented and component-based frameworks and model-driven engineering tools that facilitate the development of distributed real-time and embedded (DRE) middleware frameworks and mobile cloud computing applications on parallel platforms running over wireless/wired networks and embedded system interconnects. Schmidt has co-authored several books in the Pattern-Oriented Software Architecture series for Wiley & Sons edited by Frank Buschmann of Siemens, including Patterns for Concurrent and Networked Objects, A Pattern Language for Distributed Computing, and Patterns and Pattern Languages. He has also co-authored two books for Addison-Wesley on the topic of C++ Network Programming edited by Bjarne Stroustrup of AT&T Labs.

JOCHEN QUANTE
ROBERT BOSCH GMBH, GERMANY

Jochen Quante is a senior expert for software analysis and design at Bosch Research. His focus in applied research is on how static code analysis and machine learning can improve and support embedded software development. He has worked on applications of these techniques for all phases of the software lifecycle, like software modelling, design, implementation, maintenance, and quality assurance. Jochen received his Ph.D. from University of Bremen (Germany) and his Diploma in Computer Science from University of Karlsruhe (now KIT). He is chair of the SIG on Software Reengineering within the German Informatics Society (GI).

JON PÉREZ CERROLAZA
IKERLAN, SPAIN

Jon Pérez Cerrolaza is head of the 'dependable embedded systems' department and 'principal researcher' in the field of 'dependable autonomous systems' combining dependability, artificial intelligence and cybersecurity technologies. He has worked for more than fifteen years in the development and certification of SIL2..SIL4 safety-critical systems for diverse domains such as railway signalling, wind turbines, lifts, crane control, semiconductors and automotive. He holds a PhD in Computer Science from TU Wien (2011) in the field of safety-critical systems.

BJÖRN ANDERSSON
SEI - CARNEGIE MELLON UNIVERSITY, USA

Björn Andersson is principal researcher at the Software Engineering Institute (SEI) at Carnegie Mellon University (CMU). His previous research includes: (i) transferring one of the foundational results in real-time systems "The utilization bound of rate-monotonic scheduling on a single processor is 69%" to multiprocessors, and (ii) inventing the wireless CAN bus (WiDom). His current research includes: the use Artificial Intelligence (AI) for real-time software. As part of this, he led a study for the US Federal Aviation Administration on the use of AI for Worst-Case Execution Time (WCET) analysis.

# TUTORIALS: TUESDAY, JUNE 13TH

## Morning, half day

## T1: The HAC Compiler

Gautier de Montmollin, Ada Switzerland

### Abstract

Sometimes, you would like to write a small program - typically, a text parser, a file converter, a shell script launching various applications, or maybe a numerical algorithm. You would like to use your preferred "full Ada" compiler in order apply the same know-how as for large-scale development and to keep doors open in case the small program/script/snippet develops into a large, resource- and performance-intensive applica-tion, or a new component of an existing large application. However, for a starter, you notice that your "full Ada" system is too heavy for the job. Perhaps it is because the compiler produces more intermediate files than your program itself would. Or, the build time is a bit too long for experimenting. Therefore, you actually miss an adequate tool. The goal of the HAC Ada Compiler project is to fill that gap. In the tutorial, we explore the present possibilities offered by HAC. Additionally, an important share of the tutorial is interactive and dedicated to brainstorming, trying small programs, discussing potential developments, saying what you like, do not like, or would like with HAC.

Level: *Basic knowledge of Ada.*

### Reasons for attending

- Discover a different way of programming Ada, for different purposes
- Seize the opportunity to influence the future development of HAC: bring your ideas, use-cases, examples, wishes...
- Discover the new features introduced since the 2022 tutorial
- Fun!

Presenter

Gautier de Montmollin is a software developer. He holds a PhD in mathematics from the University of Neuchâtel, Switzerland. His quest for both run time and development time efficiency has trapped him with the Ada language which he has the chance to use professionally (formerly in finance, now in robotics) and for private projects. He has presented professional and private projects at various Ada-Europe and FOSDEM conferences.

## Tuesday, June 13th, afternoon, half day

## T2: Controlling I/O Devices with Ada and the Linux Simple I/O Library

Philip Munts, Sweden

Abstract

This educational tutorial will teach attendees how to write Ada programs for a small embedded system, using the Linux Simple I/O Library. Attendees will gain hands-on experience with with a tutorial kit containing a Raspberry Pi Zero W and some peripheral devices. Tutorial hardware kits will be available, each kit consists of a Raspberry Pi Zero Wireless target computer (preloaded with MuntsOS Embedded Linux) attached to a MUNTS-0018 Raspberry Pi Tutorial I/O Board, and a small collection of Grove System compatible peripherals including a potentiometer, a miniature RC servo, and the like.

Level: *Intermediate*.

Attendees should have a basic familiarity with the Ada programming language and should be able to write simple Ada programs with Alire.

Reasons for attending

Attendees to this educational tutorial will learn how easy it is to develop Ada programs for an embedded Linux microcomputer, given high productivity frameworks like MuntsOS Embedded Linux and the Linux Simple I/O Library.

Presenter

Philip Munts has been an Ada practitioner since 1983. His career has concentrated on embedded systems development, ranging from single chip microcontrollers to a NASA satellite tracking station. He currently works as a software engineer consultant based in Malmoe, Sweden. He is particularly interested in running programs written in Ada for very small Linux-based computers such as the PocketBeagle and the Raspberry Pi. Philip will enjoy sharing his passion with tutorial attendees.

## Tuesday, June 13th, morning, half day

## T3: Everything you Always Wanted to Know About Characters and Strings

Jean-Pierre Rosen, Adalog, France

Abstract

Characters represent an incredibly difficult issue, in general and in programming languages. The extent of the problems is hard to appreciate, as seen from the English language which needs only simple characters, but becomes apparent when you consider accented letters, ideograms, and even music notes or emojis... This tutorial explains all the issues with characters, their encoding and representation, the various corresponding standards, collating sequences, etc. In addition, it addresses character strings in programming languages in general, and in Ada in particular, showing why various forms of strings are provided and how to use them.

Level: *Intermediate*.

Expected audience experience: Casual knowledge of Ada.

Reasons for attending

- Understand (at last!) all the issues with characters, and the precise meaning of confusing notions like code-points, encoding, character sets
- Learn how to account for character issues in your Ada programs
- Understand the differences between the various kinds of strings provided by Ada, and be able to choose the most appropriate one according to your needs

Presenter

JP Rosen is a professional teacher, teaching Ada (since 1979, it was preliminary Ada!), methods, and software engineering. He runs Adalog, a company specialized in providing training, consultancy, and services in all areas connected to the Ada language and software engineering. He is chairman of Ada-France. He participated in the design of the extension of the character set for Ada 95, and is the author of AI05-0137-2 that provided UTF support in Ada 2012. Adalog offers regularly on-site and off-site training sessions in Ada.

Tuesday, June 13th, afternoon, half day

## T4: Introduction to the Development of Safety Critical Software

Jean-Pierre Rosen, Adalog, France

Abstract

This tutorial presents the fundamental notions that make the development of safety critical software different from the development of more casual software. It presents the context, the applicable standards, and the techniques used for achieving high reliability. It explains why Ada and Spark are especially suited for writing safety critical software. Although required for demanding applications, the general principles tha tailed can be applied to, and help improve, all kinds of software development.

Level: *Intermediate*.

Expected audience experience: Casual knowledge of Ada.

Reasons for attending

- Understand the stakes of the development of safety critical software
- Learn the various rules governing the development of safe software, and understand their motivation
- Consider the tools that are available to improve quality and safety of software
- Apply some principles to more casual software for higher reliability

Presenter

See presenter of Tutorial 3

Tuesday, June 13th, morning, half day

## T5: Rust Fundamentals

Luis Miguel Pinho and Tiago Carvalho, ISEP, Portugal

Abstract

This tutorial will provide attendees with the basics of programming in the small in Rust, covering data types, control-flow constructs, statements, expressions and functions, as well as some aspects of object- oriented programming and generics. The tutorial will then focus on the (somehow) complex mechanisms of Rust for mutability and ownership of variables, showing how Rust tracks the lifetime and scope of all references in a program during compilation, enforcing memory safety and preventing concurrent data races, providing flexibility without requiring the use of a garbage collector. The tutorial will also present two of the most relevant concepts used for functional style of programming in Rust: closures and iterators, showing how these concepts can be used together to implement programs in a declarative style.

Level: *Intermediate*.

Attendees should be familiar with programming languages in general.

Reasons for attending

- Understand the main concepts behind the Rust programming language
- Learn how Rust addresses memory safety and programming in the small
- Learn the most relevant concepts used for functional style of programming in Rust

Presenters

Luis Miguel Pinho is a Professor at the Department of Computer Engineering - School of Engineering of the Polytechnic Institute of Porto, and Senior Researcher at the INESC TEC Associated Laboratory. He promotes and leads activities in, among others, real-time parallel programming models, reliable software, and edge computing. He has published more than 150 papers in international conferences and journals in the area of real-time embedded systems, and has been general/program chair of several international conferences. He is a member of ISO/IEC JTC1/SC22/WG9, and senior member of ACM and IEEE. He was Editor-in-Chief of the Ada User Journal, and is currently Technical Editor of ACM SIGAda Ada Letters.

Tiago Carvalho is a researcher and invited professor at the School of Engineering of the Polytechnic Institute of Porto, where he works in activities related to real-time parallel programming and timing analysis. He has a PhD in Compilers and a MSc degree in Computer Engineering from the Faculty of Engineering of the University of Porto (FEUP), where he is an invited assistant professor. Tiago has experience in compiler-related topics such as domain-specific languages and compiler optimizations.

Tuesday, June 13th, afternoon, half day

## T6: Concurrency and Parallelism in Rust

Luis Miguel Pinho and Tiago Carvalho, ISEP, Portugal

Abstract

This tutorial will provide attendees with some of the available mechanisms and libraries of Rust to program concurrent and parallel applications. The tutorial will start with the basic concurrency mechanisms provided in the Rust language and its standard library: threads, channels, shared data support with the Atomically Reference Counted type, and thread synchronization. The Rust language provides by itself a limited set of mechanisms for concurrency, giving preference to the implementation of more advanced mechanisms through libraries. Therefore, the tutorial will briefly present some of the common libraries for concurrency (such as parking_lot or crossbeam), focusing after-wards in more advanced libraries for concurrent and parallel applications: the Threadpool library, which provides a simple thread pool approach to execute lightweight tasks and Rayon, a data-parallelism library that makes it easy to convert sequential computations into parallel by using iterators.

Level: *Advanced.*

Attendees should be familiar with the Rust programming language (possibly by attending the morning tutorial).

Reasons for attending

- Learn the main features provided by the Rust language to support safe concurrency
- Learn some of the main libraries available for concurrent and parallel programming in Rust

Presenters

See presenters of Tutorial 5

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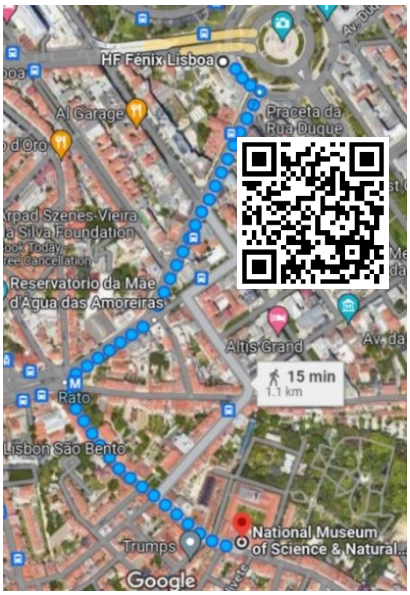
Belém Tower

# Social Events

The program includes 1-hour long coffee breaks, providing the opportunity for participants to discuss their work, to view the WiP posters, and to socialise. Lunches will be served at the hotel restaurant, from Tuesday to Friday, providing further interaction opportunities.

Tuesday, June 13th

The first social event is a Welcome Reception, which will take place on from 18:00 to 20:00, in the gardens of the National Museum of Science & Natural History. During these two hours a selection of drinks and appetizers will be served. Participants will have the opportunity to taste port wine while walking in the gardens.

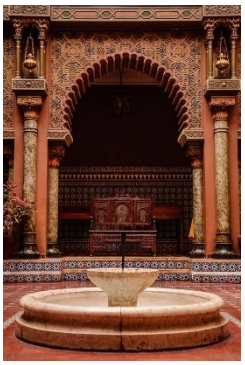



The museum is about 1.1 Km far from the conference hotel, and to get there it is a slight uphill wal. It will take about 20 minutes walking to reach the museum.

Entrance is through the gates on the right side of the museum building, which also lead to the Botanical Garden entrance. The welcome reception will be on the back side of the building.

Wednesday, June 14th

The Conference Banquet will be at 20:00, at the "Casa do Alentejo" restaurant, downtown Lisbon. Participants will have the opportunity to taste cod fish baked in olive oil, which is a very typical Portuguese dish. Hopefully, they will also be surprised by the building itself, which looks rather conventional, but hides several exquisite rooms.
The restaurant is reached by a 20 minute stroll along the Avenida da Liberdade.

# Additional Tickets

Additional tickets can be purchased for accompanying persons for any of the social events featured in the program.

| Extra Tickets | Unit Fee |
|---|---|
| Welcome Reception (Tue 13th) | 20 € |
| Conference Banquet (Wed 14th) | 50 € |
| Extra Lunch, per day (Tue to Fri) | 30 € |

# Conference Venue

The conference takes place at Fénix Lisboa, a four-star hotel located in the centre of Lisbon, just across the "Marquês de Pombal" metro station. All the meetings, tutorials, workshops and conference sessions will take place in the hotel meeting area. The hotel restaurant is also in the same area, where participants will be served their buffet lunch. Coffee breaks will be either in the atrium outside the meeting rooms, or in a room where WiP posters will be displayed during the two core days.


From Praça Marquês de Pombal, where the hotel is located, an easy walk down Avenida da Liberdade takes you towards Baixa (downtown), perhaps via the nearby Parque Eduardo VII, where you may visit Estufa Fria (botanic gardens in a large greenhouse) at its upper side.

As Lisbon is now a very touristic venue, there are plenty of restaurants near the hotel and downtown. The city center also features many historical places, landmarks and museums that you may want to visit, like the Lisbon medieval Castle (Castelo de São Jorge), the Santa Justa elevator, the National Museum of Contemporary Art at Chiado, or the Roman Theatre near the castle. Simply walking the streets is most enjoyable, going to the old neighbourhoods of Alfama and Bairro Alto, or along the river front.




# CORE CONFERENCE COMPOSITION

The core conference program features four distinct types of technical presentations, plus a panel session, all with different duration, all followed by various manners of discussion time. In the visual synopsis of the program schedule shown ahead, each distinct presentation type is denoted by a specific colour code.

| Technical Contribution Type | Colour Code | Duration |
|---|---|---|
| Keynote talk | | 45 minutes |
| Panel | | 90 minutes |
| Journal-track talk | | Long, 30 minutes |
| Industrial-track talk | | Medium, 20 minutes |
| Work-in-progress-track talk | | Short, 10 minutes plus poster |

All papers presented at the conference in the journal track, the industrial track and the work-in-progress track have undergone peer review. All track chairs took it on themselves to assure that the review process was strictly free of conflict of interests between authors and reviewers.
It is a characterizing trait of the AEiC conference series that the presentations of such diverse contributions are combined into by-theme and not by-track presentation sessions, in order that authors and participants alike all enjoy all flavours of the program in a mixed as opposed to segregated combination.

# CORE CONFERENCE SCHEDULE

| | Wednesday, 14th June | Thursday, 15th June |
|---|---|---|
| 9:00 – 10:30 | Welcome and opening (conference chair) | Panel<br>Chair: Tullio Vardanega |
| | Keynote Talk<br>Chair: António Casimiro | *Promises and Challenges of AI-enabled Software Development Tools for Safety-Critical Applications*<br>Douglas Schmidt, Vanderbilt University, USA<br>Jochen Quante, Robert Bosch GmbH, Germany<br>Jon Pérez Cerrolaza, IKERLAN, Spain<br>Björn Andersson, SEI-CMU, USA |
| | *Applications of Liquid Types for more Reliable Software*<br>Alcides Fonseca, FCUL, Portugal | |
| | Extended Q&A and early start of break | |
| 10:30 - 11:30 | Refreshment break & Posters | Refreshment break & Posters |
| 11:30 - 12:30 | Session 1: *Verification and Validation 1*<br>Chair: Elena Troubitsyna | Session 4: *Verification and Validation 2*<br>Chair: Luis Miguel Pinho |
| | *Systematic Review on Contract-based Safety Assurance and Guidance for Future Research*<br>S. Kanwala, F. Ul Muramb, M. Atif Javedc | *Symbolic Assurance Refinement for CPS*<br>D. de Niz, L. Wrage |
| | | *Towards a Methodology to Design Provably Secure Cyber-Physical Systems*<br>F. Lisboa Malaquias, G. Giantamidis, S. Basagiannis, S. F. Rolllini, I. Amundson |
| | *Compositional Verification of Embedded Real-Time Systems*<br>M. Aristide Foughali, P.-E. Hladik, A. Zuepke | *Safety of the Intended Functionality Concept Integration into a Validation Tool Suite*<br>V. J. Expósito Jiménez, H. Martin, B. Winkler, J. M. Castella Triginer, H. Scharke, H. Schneider |
| | | *Application of a Method for Evaluation of Software used in Naval Nuclear Means*<br>E. Bezerra |
| 12:30 - 14:00 | Lunch | Lunch |

| | Wednesday, 14th June | Thursday, 15th June |
|---|---|---|
| 14:00 - 15:30 | Session 2: *Advanced Systems*<br>Chair: Frank Singhoff | Session 5: *Reliable Programming*<br>Chair: Alejandro R. Mosteo |
| | *VR-based Teleoperation of Autonomous Ground Vehicles for Operation Recovery*<br>G. Jäger, G. Licht, N. Seyffer, S. Reitmann | *Automatic Test Value Generation for Ada*<br>L. Creuse, M. Eyraud, V. Garèse |
| | *Denoising Autoencoder-based Defensive Distillation as an Adversarial Robustness Algorithm*<br>B. Badjie, J. Cecílio, A. Casimiro | *Mechanization of the Ravenscar Profile in Coq*<br>J. Hugues |
| | *Software-based Security Approach for Networked Embedded Devices*<br>J. Ferreira, A. Oliveira, A. Souto, J. Cecílio | *A Real-Time Parallel Programming Approach for Rust*<br>H. Silva, T. Carvalho, L. M. Pinho |
| | *Cooperative Autonomous Driving in Simulation*<br>G. Costa, J. Cecílio, A. Casimiro | *Security Hardening Ada Programs through Innovative Fuzz Testing*<br>P. Butcher |
| | *Exploring Trade-offs in Explainable AI*<br>D. Brown, G. Hawe | |
| | *Cataloging Prompt Patterns to Enhance the Discipline of Prompt Engineering*<br>D. C. Schmidt, J. Spencer-Smith, Q. Fu, J. White | *An Update on the Tasking Profiles in Ada 2022*<br>P. Rogers |
| | *Achieving Crash Fault Tolerance in Autonomous Vehicle Autopilot Software Stacks through Safety-Critical Module Rejuvenation*<br>F. Lucchetti | |
| | *Safety-critical Software in the EROSS+ On-orbit Servicing Project*<br>K. N. Gregertsen, V. Dubanchet, C. Serra, J. Romero | *Ada on a New Embedded Target*<br>D. Eskew |
| 15:30 - 16:30 | Refreshment break & Posters | Refreshment break & Posters |
| 16:30-18:00 | Session 3: *Reliability and Performance*<br>Chair: Björn Andersson | Session 6: *Real-Time Systems*<br>Chair: José Cecílio |
| | *Exploiting Container-based Microservices for Reliable Smart Mobility Applications*<br>P. Ferrari, E. Sisinni, M. Gaffurini | *Worst Case Execution Time Estimation of Multicore and GPU Software: A Pedestrian Detection Use Case*<br>I. Rodiguez-Ferrandez, A. Jover-Alvarez, M. M. Trompouki, L. Kosmidis, F. J. Cazorla |
| | *Towards Reliable Distributed Edge-Cloud Applications*<br>M. Pressler, D. Ziegenbein, A. Hamann | *A POSIX/RTEMS Monitoring Tool and a Benchmark to Detect Real-Time Scheduling Anomalies*<br>B. Djika Mezatio, G. Kouamou, F. Singhoff, A. Plantec |
| | *Monintainer: An Orchestration-independent Extensible Container-based Monitoring Solution for Large Clusters*<br>M. Correia, W. Oliveira, J. Cecílio | *Time-Predictable Task-to-Thread Mapping in Multi-Core Processors*<br>M. Samadi, S. Royuela, L. M. Pinho, T. Carvalho, E. Quiñones |
| | *Analyzing the performance of persistent storage for fault-tolerant stateful fog applications*<br>Z. Bakhshi, G. Rodriguez-Navas, H. Hansson | *Leveraging OpenMP for Automotive Systems*<br>A. Munera, S. Royuela, M. Pressler, H. Mackamul, D. Ziegenbein |
| | | Best Presentation Award & Future events<br>Closing of Core Program |

# CO-LOCATED EVENTS: FRIDAY, JUNE 16TH

## 8th International Workshop: *Challenges and new Approaches for Dependable and Cyber-Physical Systems Engineering (DeCPS 2023)*

http://www.ada-europe.org/conference2023/decps.html

### Organizers

- Alessandra Bagnato, SOFTEAM, France
- Barbara Gallina, Mälardalen University (MDU), Sweden
- Daniela Cancila, CEA LIST, France
- Laurent Rioux, Thales, France
- Luis Miguel Pinho, ISEP, Portugal
- Silvia Mazzini, INTECS Italy

### Synopsis

In recent years, the Internet of Things (IoT) has experienced an extraordinary development with large impact on society; however, there is still a gap between the physical and the cyber worlds. Cyber Physical Systems (CPS) constitute a new class of engineering systems, which integrate software control and autonomous decision making with signals from an uncertain and dynamic environment. In the context of cyber systems, Artificial Intelligence (AI) technologies can contribute to manage a huge amount of heterogeneous data that come from different sources without human intervention. CPS technology transformed the way people interact with engineering systems, in a very wide spectrum of applications: smart mobility, autonomous driving, digital healthcare, smart grids and buildings, mobile co-operating autonomous robotic systems, digital consumer products and services, etc.

For this type of systems, it is necessary not only ensuring the safety and security of physical devices but also other factors (such as information about customers, suppliers, and organizational strategies) need to be secured. To deliver certification, standards for machine safety are highly recommended as they give confidence to the regulatory. The generic standard for safety-related hardware and software might be applicable, however, due to increasing autonomy of systems there is still a potential for evolution of such regulations or standards. The proper combination of AI, CPS and IoT is therefore fundamental.

The DeCPS workshop is a collaboration event, providing a platform to industrial practitioners, researchers, and engineers in academia to exchange of their ideas, research results, experiences in the field of dependable and cyber physical systems engineering, from a theoretical as well as a practical perspective.

Following the workshop tradition, the 2023 edition will consist of presentations of applied research in the area, as well as a discussion session on future challenges and potential collaborations.

### Proceedings

The DeCPS organizers will produce post-event proceedings, with all presented papers and summary of the discussions, to appear in due course in the Ada User Journal.

### Program

| | | |
|---|---|---|
| 08:50 - 09:00 | Welcome & Opening | |
| 09:00 - 10:30 | Session 1: *Adaptive systems*<br>Chair: Luis Miguel Pinho | The MORPHEMIC Project on the Data Intensive E-Brain Science Case Study, *A. Moussaoui, A. Bagnato* |
| | | The ADMORPH approach for Adaptively Morphling Embedded Systems, *A. Casimiro, J. Cecílio, A. Pimentel, C. Grelck, L. Miedema, D. Sapra, M. Völp, F. Lucchetti, A. Matovic, M. Maggio, N. Vreman, S. Altmeyer, F. Haas, G. Jäger, A. Espindola, S. Skalistis, J. Kouwer, G. de Lange, J. Almeida, H. Blasum, M. Brotz, S. Wagner, P. Novobílský* |
| | | Mode change management for adaptive cyber-physical systems, *M. García-Gordillo, J. J. Valls, S. Sáez, J. Coronel* |

| | | |
|---|---|---|
| 10:30 - 11:00 | Refreshment break | |
| 11:00 - 12:30 | Session 2: *Non-functional properties*<br>Chair: Sergio Saez | Performance Study of Object Tracking with Multiple Kalman Filters in Autonomous Driving Systems, *A. Medaglini, S. Bartolini* |
| | | Multi-criteria analysis and optimisation in the AMPERE ecosystem, *S. Royuela, E. Quiñones, A. Munera, T. Carvalho, L. M. Pinho, M. Samadi, T. Cucinotta, G. Ara, F. Paladino, S. Mazzola, T. Benz* |
| | | Attack Scenarios Generation Algorithm Based on Discrete Event System Formalism, *A. Raynaud, E. Serru, N. Nguyen* |
| 12:30 - 14:00 | Lunch | |
| 14:00 – 15:00 | Discussion: future challenges and potential collaborations | |
| 15:00 - 15:15 | Workshop closing | |

## 2nd International Workshop: *AADL by its practitioners (ADEPT)*

https://adept.univ-brest.fr/2023

Organizers

- Jérôme Hugues, Software Engineering Institute, Carnegie Mellon University, USA
- Frank Singhoff, Lab-STICC/Univ. of Brest, France
- Hai Nam Tran, Lab-STICC/Univ. of Brest, France

Event sponsor

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Synopsis

The Architecture Analysis and Design Language (AADL) is an SAE International Standard dedicated to the precise modeling of complex embedded systems, covering both hardware and software concerns. Its definition relies on a precise set of concepts inherited from industry and academic best practices: clear separation of concerns among layers, rich set of properties to document system metrics, and support for many kinds of analysis: scheduling, safety and reliability, performance, and also code generation. The AADL standard is now a mature standard for the modeling of critical embedded real-time systems. AADL defines a language and supporting tools for the precise modeling and analysis of systems. AADL is today employed by numerous stakeholders in the domain of critical embedded real-time systems to address a large set of concerns: performance (latency, schedulability), safety, or security. One key strength of AADL as a language is the set of tools that provide analysis capabilities. The ADEPT workshop aims to present and report on current projects in the field of design, implementation, and verification of critical systems where AADL is a first-citizen technology. The ADEPT workshop is also an opportunity for AADL beginners to meet experienced AADL practitioners.
ADEPT23 is the second workshop edition. It is a full-day workshop. The workshop is dedicated to the presentation of research around ADDL, AADL new technologies, and success stories. A return of experience in the form of a discussion with the attendees will close the workshop. It is open to anyone interested in AADL and in the design and verification of software architecture for critical systems.

Proceedings

A post-workshop proceeding will be published in the Ada User Journal that summarizes the workshop talks and also the workshop discussions co-authored by all participants.

Program

| | | |
|---|---|---|
| 08:45 - 09:00 | Welcome & Opening | *B. Lewis* |
| 09:00 - 10:30 | Session 1: Formal *methods*<br>Chair: Laurent Pautet | Formal Model Engineering of Synchronous CPS Designs in AADL. *K. Bae, P. Ölveczky* |
| | | BLESS Behavior Correctness Proof as Convincing Verification Artifact. B. R. Larson, E. Ahmad |
| | | From AADL standard textual semantics to AADL standard mechanized semantics. *J. Hugues* |
| 10:30 - 11:00 | Refreshment break | |
| 11:00 - 12:00 | Session 2: *TASTE*<br>Chair: Pierre Dissaux | Extension of the TASTE toolset to support publisher-subscriber communication. *H Valente, M A. de Miguel, A. G. Pérez, A. Alonso, J. Zamorano, J. A. de la Puente* |
| | | METASAT's Model Based Design Solutions. *L. Kosmidis* |
| 12:00 - 12:30 | Session 3: *MDE*<br>Chair: Jérôme Hugues | Facilitating AADL Model Processing and Analysis with OSATE-DIM. *R. Mittal, D. Blouin* |
| 12:30 - 14:00 | Lunch | |
| 14:00 - 16:00 | Session 2 (continued): *MDE* | LAMP: to shed light on AADL models. *P. Dissaux* |
| | | Challenges in Model Synchronization for Information Preservation Illustrated with the FACE and AADL Standards. *D. Blouin, A. Bhobe, L. Pautet* |
| | | Bidirectional Translation of SysML V1 to AADL. *H. Shackleton* |
| | | Formalizing AADL in the Unifying Theories of Programming. *J. Kiniry, F. Zeyda* |
| 16:00 - 16:15 | Workshop closing | |

Rossio square

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# Proceedings

The papers presented at the conference are channelled into distinct proceedings.

The journal-track papers that will successfully complete their cycle of peer-review and revisions, will appear in a dedicated, Open Access, Special Issue of Elsevier's Journal of Systems Architecture. In order to speed the publication cycle, the papers assigned to that Special Issue will appear asynchronously, as soon as ready individually. Their individual availability in Open Access for everyone will be announced on the Ada-Europe website dedicated to AEiC 2023. Expectedly, such papers will begin to appear as of September 2023.

ELSEVIER

The papers presented in the industrial track, the work-in-progress track, and the two collocated workshops, DeCPS 2023 and 2nd ADEPT, will all appear in subsequent issues of the Ada User Journal, expectedly from June 2023 right after the end of the conference.


# Transportation and Accommodation in Lisbon

The conference hotel is located right outside the *Marquês de Pombal* metro station.
When arriving at the Lisbon airport, the better options to reach the hotel are by metro (subway), which will take about 30 minutes, or by Taxi/Uber, taking about 20 minutes. At the airport, the metro station is right outside the arrival area. The red line will take you from the Airport station (which is a terminal station) to the *Saldanha* station (10 stops). Then you must change to the yellow line, from *Saldanha* to *Marquês de Pombal* (2 stops). The cost will be 50 cents for the metro card (which you must purchase in a ticketing machine and fill up with enough money for a single ride, or for multiple rides) and a single ride will cost 1.65€.
We note that the city tax is 2€ per night (up to 7 nights), which must be paid directly at the hotel.

S. Jorge Castle

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