ECRTS

34th Euromicro Conference on Real-Time Systems
5-8 July 2022 | Modena, Italy

Program

	Wednesday 6th	**Thursday 7th**	Friday 8th
8:30-9:00	Opening remarks		
9:00-10:00	Keynote #1 Miroslav Pajic	Keynote #2 Matteo Andreozzi	
10:00-10:30		Coffee break	
10:30-12:00	Session #1: network and real-time calculus	Session #3: scheduling and response-time analysis	Session #6: cache coherence (starting at 11:00)
12:00-13:30		Lunch break	
13:30-15:00	Session #2: machine learning for real-time systems	Session #4: applications	Session #7: outstanding papers
15:00-15:30		Coffee break	
15:30-17:00	Industrial challenge session	Session #5: mixed-criticality scheduling	Retrospective on ECRTS Gerhard Fohler & Closing remarks

17:00-19:00	Real-time pitches & reception	Social event

Keynotes

Securing Cyber-Physical Systems with Varying Levels of Autonomy: Can we Win, or at Least Not Lose?

Miroslav Pajic is the Dickinson Family Associate Professor in the Department of Electrical and Computer Engineering at Duke University. He also holds a secondary appointment in the Computer Science Department. His research interests focus on the design and analysis of high-assurance cyber-physical systems with varying levels of autonomy and human interaction, at the intersection of (more traditional) areas of embedded systems, AI, learning and controls, formal methods and robotics. He received various awards including the NSF CAREER Award, ONR Young Investigator Program Award, ACM SIGBED Early-Career Researcher Award, IEEE TCCPS Early-Career Award, IBM Faculty Award, ACM SIGBED Frank Anger Memorial Award, the Joseph and Rosaline Wolf Dissertation Award from Penn Engineering, as well as seven Best Paper and Runner-up Awards. He is an associate editor in the ACM Transactions on Cyber-Physical Systems and ACM Transactions Computing for Healthcare (ACM HEALTH), and was a co-Chair of the 2019 ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS'19).

Real-Time High Performance Applications: the ARM approach

Matteo Andreozzi contributes at ARM to the design of future architectures for mobile, automotive, embedded and robotic systems. He looks after themes such as QoS, realtime and performance of ARM based systems. Matteo leads a team that is responsible for designing architectural solutions for high-performance real-time systems, covering all major ARM market segments: mobile and IoT devices, infrastructure, automotive and industrial. His team's activities are varied and span from research to prototyping, partner engagement, technology transfer and ARM architecture design and deployment. His experience with topics such as event-driven simulation, QoS, RealTime , goes back almost 15 year ago, when he started his academic researches and Ph.D. and developed into industrial roles first at Nvidia, and now ARM. He has been an invited lecturer at both the University of Pisa and at the University of Cambridge where he gave talks about the topics above.

Program Details

Session #1: network and real-time calculus

Unikernel-Based Real-Time Virtualization under Deferrable Servers: Analysis and Realization

Kuan-Hsun Chen (University of Twente); Mario Günzel (TU Dortmund University), Boguslaw Jablkowski, Markus Buschhoff (EMVICORE GmbH), Jian-Jia Chen (TU Dortmund University)

A Mathematical Comparison Between Response-Time Analysis and Real-Time Calculus for Fixed-Priority Preemptive Scheduling

Victor Pollex (INCHRON AG), Frank Slomka (Ulm University)

A Formal Link between Response Time Analysis and Network Calculus

Marc Boyer (ONERA), Sophie Quinton (INRIA Grenoble), Pierre Roux (ONERA)

Session #2: machine learning for real-time systems

RTScale: Sensitivity-aware Adaptive Image Scaling for Real-time Object Detection

Seonyeong Heo (ETH Zurich), Shinnung Jeong, Hanjun Kim (Yonsei University)

Predictable programming framework for machine learning applications in safety-critical systems

Iryna De Albuquerque Silva (ANITI/ONERA), Thomas Carle (IRIT – Univ Toulouse 3 – CNRS), Adrien Gauffriau (Airbus); Claire Pagetti (ONERA)

Using Quantile Regression in Neural Networks for Contention Prediction in Multicore Processors

Axel Brado, Isabel Serra, Enrico Mezzetti, Jaume Abella, Francisco J Cazorla (Barcelona Supercomputing Center and Maspatechnologies)

Session #3: scheduling and response-time analysis

Scheduling offset-free systems under FIFO priority protocol

Matheus Ladeira, Emmanuel Grolleau, Fabien Bonneval, Gautier Hattenberger (ENAC, Université de Toulouse – Toulouse, France), Yassine Ouhammou, Yuri Hérouard (ISAE-ENSMA, Université de Poitiers – Poitiers, France)

Response-Time Analysis for Non-Preemptive Periodic Moldable Gang Tasks

Geoffrey Nelissen, Joan Marcè I Igual, Mitra Nasri (Eindhoven University of Technology)

Response-Time Analysis for Self-Suspending Tasks Under EDF Scheduling

Federico Aromolo, Alessandro Biondi (Scuola Superiore Sant'Anna), Geoffrey Nelissen (Eindhoven University of Technology)

Session #4: applications

General framework for Routing, Scheduling and Formal Timing Analysis in Deterministic Time-aware Networks

*Anais Finzi, Ramon Serna Oliver (TTTech Computertechni*k AG)

Correctness and Efficiency Criteria for the Multi-Phase Task Model

Rémi Meunier (AUSY – IRIT – INSA), Thomas Carle (IRIT – Université Toulouse 3 – CNRS), Thierry Monteil (IRIT – CNRS – INSA)

Overrun-Resilient Multiprocessor Real-Time Locking

Zelin Tong, Shareef Ahmed, Jim Anderson (UNC Chapel Hill)

Session #5: mixed-criticality scheduling

An Approach to Formally Specifying the Behaviour of Mixed-Criticality Systems

Alan Burns (University of York), Cliff Jones (University of Newcastle)

Achieving Isolation in Mixed-Criticality Industrial Edge Systems with Real-Time Containers

Marco Barletta, Marcello Cinque, Luigi De Simone, Raffaele Della Corte (Università degli Studi di Napoli Federico II)

Session #6: cache coherence

Parallelism-Aware High-Performance Cache Coherence with Tight Latency Bounds

Reza Mirosanlou (University of Waterloo), Mohamed Hassan (McMaster University), Rodolfo Pellizzoni (University of Waterloo)

Predictably and Efficiently Integrating COTS Cache Coherence in Real-Time Systems

Mohamed Hassan (McMaster University)

Session #7: outstanding papers

RT-DFI: Optimizing Data-Flow Integrity for Real-Time Systems

Nicolas Bellec (Univ Rennes, Inria, CNRS, IRISA), Guillaume Hiet (CentraleSupélec), Simon Rokicki (Univ Rennes, Inria, CNRS, IRISA), Frédéric Tronel (CentraleSupélec), Isabelle Puaut (Univ Rennes, Inria, CNRS, IRISA)

Foundational Response-Time Analysis as Explainable Evidence of Timeliness

Marco Maida, Sergey Bozhko, Björn Brandenburg (Max Planck Institute for Software Systems MPI-SWS)

Using Markov's Inequality with Power-of-k Function for Probabilistic WCET Estimation

Sergi Vilardell (Barcelona Supercomputer Center and Universitat Politècnica de Catalunya), Isabel Serra (Centre de Recerca Matemàtica), Enrico Mezzetti (Barcelona Supercomputing Center and Maspatechnologies), Jaume Abella, (Barcelona Supercomputing Center and Maspatechnologies), Joan del Castillo (Universitat Autònoma de Barcelona), Francisco J. Cazorla (Barcelona Supercomputing Center and Maspatechnologies)

Workshops

OSPERT

Keynote

Mixed Criticality on RISC-V: Experiences from Porting a Partitioning Hypervisor

RISC-V is an emerging open-source and greenfield ISA designed to be minimalistic and modular, yet scalable from embedded to data center. One of the first extensions added to the base architecture is support for hypervisors.

Jailhouse is a small hypervisor designed to statically partition embedded multi-core systems to enable consolidation of mixed-criticality systems onto a single hardware platform.

In this talk, I describe my experiences with porting Jailhouse, originally designed for x86 and later to ARM, to RISC-V. This proved to be surprisingly long-winded; some of the traps and pitfalls will be discussed, as well as some of the shortcomings of the current hardware state of the art and how RISC-V plans to address these in future.

Konrad Schwarz has degrees in Computer Science and Mathematics from the Technical University of Vienna. After short stints at Accenture and Motorola, he has been at Siemens Corporate Technology for over 20 years, working with business units such as Semiconductors (now Infineon), Automotive (now Continental), Mobility (train control systems), and industrial automation and motion control.

Program

8:00-8:30	Registration
8:30-10:00	Welcome **Keynote** Mixed Criticality on RISC-V: Experiences from Porting a Partitioning Hypervisor *Konrad Schwarz, Siemens Coprporate Technology*
10:00-10:30	Coffee Break
10:30-12:00	**Session II: Broadening RTOS Understanding** RTOS-Independent Interaction Analysis in ARA *G. Entrup, J. Neugebauer, D. Lohmann* Supporting Multiprocessor Resource Synchronization Protocols in RTEMS *J. Shi, J. Pham, M. Münch, J. Hafemeister, J. Chen, K. Chen* Cabas: Real-Time for the Masses *T. Smejkal, J. Bierbaum, M. von Oltersdorff-Kalettka, M. Roitzsch* On the Interplay of Computation and Memory *Regulation in Multicore Real-Time Systems* *D. Hoornaert, G. Ghaemi, A. Bastoni, R. Mancuso, M. Caccamo, G. Corradi*

12:00-13:30	Lunch break
13:30-15:00	**Session III: Use Your Data, Trust Your System** Can we trust our energy measurements? A study on the Odroid-XU4i *J. Roeder, S. Altmeyer, C. Grelck* Revisiting Migration Overheads in Real-Time Systems: One Look at Not-So-Uniform Platforms *P. Raffeck, W. Schröder-Preikschat, P. Ulbrich* X-RIPE: A Modern, Cross-Platform Runtime Intrusion Prevention Evaluator *G Serra, S. Di Leonardi, A. Biondi* Work in Progress: Real-Time GRB Localization for the Advanced Particle-astrophysics Telescope *M. Sudvarg, J. Buhler, R. Chamberlain, C. Gill, J. Buckley* Closing
15:00-17:00	Coffee Break
17:00-19:00	First-timer reception

WCET, RTSOPS, RT-Cloud

This year, the 20th International Workshop on Worst-Case Execution Time Analysis (WCET), the 11th International Real-Time Scheduling Open Problems Seminar (RTSOPS) and the 2nd International Real-Time workshop abouut Cloud services – (RT-Cloud) workshops have a common program, organized as follows:

8:00-8:30	Registration
8:30 – 8:45	Opening
8:45 – 9:30	WCET Invited talk: From Timing Prediction to Predictable Timing *Peter Puschner (Technische Universitaet Wien)*
9:30 – 10:00	WCET paper #1: StAMP: Static Analysis of Memory access Profiles for real-time tasks *Théo Degioanni and Isabelle Puaut*
10:00 - 10:30	Coffee break
10:30 – 11:00	WCET paper #2: LLVMTA: An LLVM-based WCET Analysis Tool

	Sebastian Hahn, Michael Jacobs, Nils Hölscher, Kuan-Hsun Chen, Jian-Jia Chen and Jan Reineke
11:00 - 11:30	WCET paper #3: DELOOP: Automatic Flow Facts Computation using Dynamic Symbolic Execution *Hazem Abaza, Zain A. H. Hammadeh and Daniel Lüdtke*
11:30 – 12:00	Extensions for Shared Resource Orchestration in Kubernetes to Support RT-Cloud Containers *Gabriele Monaco, Gautam Gala and Gerhard Fohler*
13:30 – 14:10	RT-Cloud Invited talk
14:10 – 14:35	Building Reliable Distributed Edge-Cloud Applications with WebAssembly *Franz-Josef Grosch, Dakshina Dasari, Nuno Pereira and Anthony Rowe*
14:35 – 15:00	Introducing k4.0s: a Model for Mixed-Criticality Container Orchestration in Industry 4.0 *Marco Barletta, Marcello Cinque, Luigi De Simone and Raffaele Della Corte*
15:30 – 17:00	RTSOPS and closing remarks
17:00-19:00	First-timer reception

Local Information

ECRTS 2022 is finally held as a physical conference in Modena, Italy. Modena is the city of **slow food** and **fast cars**.

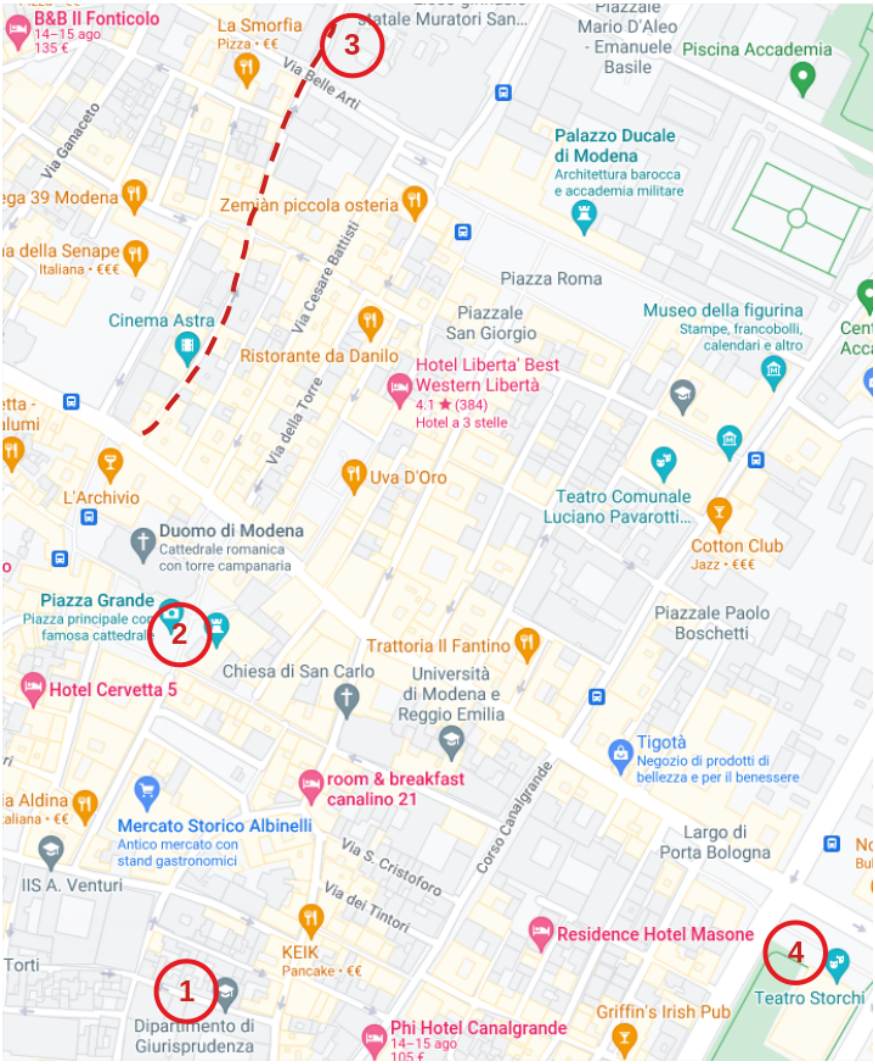
The city is known for its automotive industry. In fact, the famous Italian sport car makers (Ferrari, Lamborghini, Maserati) are (or were) located in the surroundings of the city. Currently, all except for Lamborghini, have headquarters in Modena, or not too far from it. The famous Ferrari museum is situated in the nearby village of Maranello.

Modena is also a great gastronomic center, renowned for its balsamic vinegar, stuffed tortellini, and sparkling Lambrusco wine. It is – not by coincidence – home of the number one restaurant in the world, Osteria Francescana.

As for arts, Modena is famous for its Romanesque cathedral and as the birthplace of the late Italian opera singer Pavarotti.

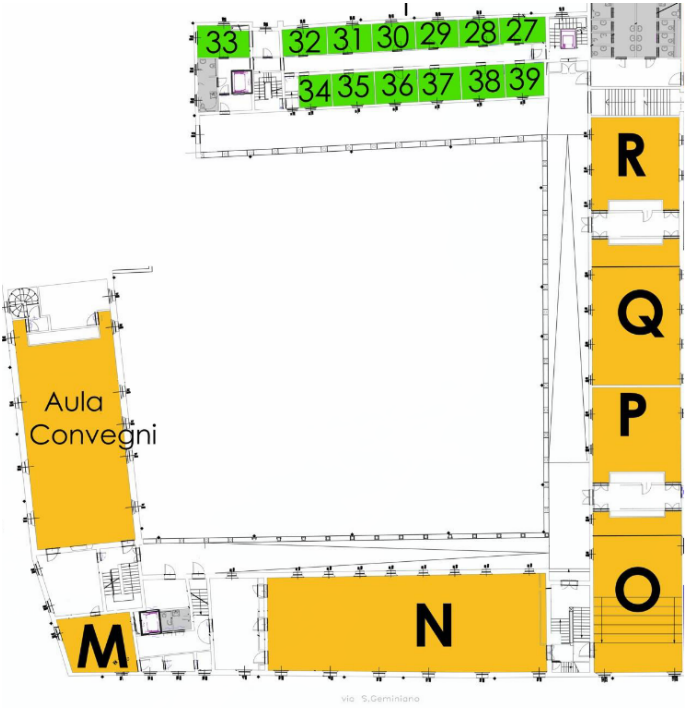
Logistics and details

1. Conference Location, Dipartemento della Giurizprudenza via San Gemeniano.
2. Lunch, Caffè Concerto, Piazza Grande.
3. Towards the train station, 3 min on foot from via Sgarzeria.
4. Assembly point for Social Event, Teatro Storchi, meeting at 17:15 sharp!


B&B Il Fonticolo
14–15 ago
135 €
La Smorfia
Pizza · €€
3
Via Belle Arti
Via Ganaceto
Piazzale Mario D'Aleo - Emanuele Basile
Piscina Accademia
Palazzo Ducale di Modena
Architettura barocca e accademia militare
Zemàn piccola osteria
Via Cesare Battisti
Piazza Roma
Piazzale San Giorgio
Museo della figurina
Stampe, francobolli, calendari e altro
Cinema Astra
Ristorante da Danilo
Hotel Liberta' Best Western Libertà
4.1 ★ (384)
Hotel a 3 stelle
Via della Torre
Uva D'Oro
L'Archivio
Teatro Comunale Luciano Pavarotti...
Cotton Club
Jazz · €€€
Duomo di Modena
Cattedrale romanica con torre campanaria
Piazza Grande
2
Piazzale Paolo Boschetti
Trattoria Il Fantino
Chiesa di San Carlo
Università di Modena e Reggio Emilia
Hotel Cervetta 5
Tigotà
Negozio di prodotti di bellezza e per il benessere
room & breakfast canalino 21
Mercato Storico Albinelli
Antico mercato con stand gastronomici
Via S. Cristoforo
Corso Canalgrande
Largo di Porta Bologna
IIS A. Venturi
Via dei Tintori
KEIK
Pancake · €€
Residence Hotel Masone
4
Teatro Storchi
Torti
1
Griffin's Irish Pub
Dipartimento di Giurisprudenza
Phi Hotel Canalgrande
14–15 ago

San Geminiano

We are on the 1st floor of the Department of Giurisprudenza, via San Geminiano 3.



- Room N: main conference room
- Room P: WCET/RTSOPS/RT-cloud workshop room
- Room O: OSPERT workshop
- Room Convegni & R & Q: co-working places
- Room P & O: co-working places if rooms available
- Room M: luggage room for the last day

Wifi connection

The wifi connection at the conference is available via the university network eduroam. For the non-academic without eduroam access, please inquire for a guest account to connect to the Unimore university network when registering.

Lunches

A buffet of amazing different dishes will be served at the Caffé Concerto on the piazza grande, where the duomo is. Don't miss the pastries, they are made by a marvellous french chef!

Receptions

On Tuesday 5th, there will be a social event for those who attend ECRTS for the first time in person, to introduce them to the conference and meet a few "old timers". The first-timer reception will start at 5pm.
On Wednesday 6th, during the interactive session, there will be an *aperitivo* with some food and drinks.
Both the 5th and 6th reception will be held at San Geminiano on the 1st floor under the covered passage (same location as the registration desk).

Social Event

Meeting is at 17:15 sharp, we are short in time as the museum closes at 19:00 and we are 90 people.

We will take the bus at the Teatro Storchi (point 4 on the above map), this bus will bring us to Maranello for the visit of a museum.

After the visit, we will return to the bus that will drive us to the restaurant which is in the periphery of Modena. Finally, we will return to the city center of Modena using the same bus, where some of us can enjoy the nightlife of the city.

Museum

By bus we will reach the Ferrari museum in the small city of Maranello. There, you will be able to admire the evolution of the design of cars from this enigmatic manufacturer. And, maybe you will find yourself a new car, which can be bought straight at the shop at the end of the museum.

Dinner

The dinner will also be held in the periphery of Modena therefore we will use the same bus as for going to the museum. We are warmly welcomed by the restaurant La Quercia di Rosa in which you will be able to taste what the modenese cuisine has the best to offer. In addition during the *aperitivo* time, you will be able to have a tour in their particular cellar where all the secrets of the famous modenese vinegar will be revealed to you.

Other useful information about Modena

During the summer there is a series of events in the city, concerts, theatre, exhibitions, … . You can find all the information at the two links below. The first one focuses on places in the city, while the other one focuses only on the park Ducale.

- https://www.comune.modena.it/estate2022/programma-estate-2022.pdf/@@download/file
- https://www.comune.modena.it/estate2022/programma-giardini-ducali/@@download/file

All the organization committee wishes you a pleasant conference.