Filip Marković, PhD

Curriculum Vitae

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Academic Appointments

July 2022 – *present* — **Max Planck Institute for Software Systems** (Kaiserslautern, Germany 🇩🇪)
Postdoctoral Fellow

July 2020 – June 2022 — **Mälardalen University** (Västerås, Sweden 🇸🇪)
Postdoctoral Fellow

Education

2015 – 2020 — **Mälardalen University** (Västerås, Sweden 🇸🇪)
PhD in Computer Science

2015 – 2018 — **Mälardalen University** (Västerås, Sweden 🇸🇪)
Licentiate in Computer Science

2014 – 2015 — **Mälardalen University** (Västerås, Sweden 🇸🇪)
MSc in Computer Science

2013 – 2014 — **Mediterranean University** (Podgorica, Montenegro 🇲🇪)
Specialist in Information Technologies

2010 – 2013 — **Mediterranean University** (Podgorica, Montenegro 🇲🇪)
BSc in Information Technologies

Awards

2022 — **Best Presentation Award**
IEEE Real-Time Systems Symposium (RTSS)

2021 — **Outstanding Paper Award**
Euromicro Conference on Real-Time Systems (ECRTS)

2015 — **PhD Scholarship**
Awarded by Erasmus Mundus+ (European Commission) following a competitive selection process. My PhD proposal was selected to be funded with approximately €85000 *from* 2015 *to* 2018.

2014 — **MSc Scholarship**
Awarded by Erasmus Mundus (European Commission) following a competitive selection process. The MSc studies were funded with approximately €10000.

2013 — **Atlas Alumni Scholarship for the Best Student in Montenegro**
Awarded by the Atlas Foundation

Award for the Best Students of Municipality of Podgorica
Awarded by the Municipality of Podgorica in a selective process, recognizing the top individual in each discipline, including mathematics, computer science, economics, etc., Montenegro.

Scholarship for Talented Students
Awarded by the Ministry of Science and Education of Montenegro

2012 — **Scholarship for Talented Students**
Awarded by the Ministry of Science and Education of Montenegro

2011 — **Scholarship for Talented Students**
Awarded by the Ministry of Science and Education of Montenegro

Research Experience

2022 – *present* **Max Planck Institute for Software Systems**, *Postdoctoral Fellow*
Advisor: *Björn B. Brandenburg*
Research in probabilistic scheduling analysis of real-time and embedded systems. Work conducted as part of the project *A Theory-Oriented Real-Time Operating System for Temporally Sound Cyber-Physical Systems* (TOROS). For more info see https://cordis.europa.eu/project/id/803111.

2020 – 2022 **Mälardalen University**, *Postdoctoral Fellow*
School of Innovation, Design and Technology (IDT)
Division of Networked and Embedded Systems (NES)
Advisor: *Thomas Nolte*
Research in efficient probabilistic analysis of real-time and embedded systems. Work conducted as part of the project *Practical Probabilistic Timing Analysis of Real-Time Systems* (PARIS), https://www.mdu.se/forskning/forskningsprojekt/inbyggda-system/paris—practical-probabilistic-timing-analysis-of-real-time-systems.

2015 – 2020 **Mälardalen University**, *PhD student*
School of Innovation, Design and Technology (IDT)
Division of Computer Science and Engineering (CSE)
Thesis: *"Preemption-Delay Aware Schedulability Analysis of Real-Time Systems"*
Advisors: *Jan Carlson*, *Radu Dobrin*, and *Björn Lisper*
Conducted doctoral research in the field of real-time scheduling and cache-aware timing analysis, focusing on limited-preemptive scheduling strategies, i.e., the study of algorithms that manage the interruption of threads at designated preemption points.

2015 – 2018 **Mälardalen University**, *Licentiate**
School of Innovation, Design and Technology (IDT)
Division of Computer Science and Engineering (CSE)
Thesis: *"Improving the Schedulability of Real-Time Systems under Fixed Preemption Point" Scheduling*
Advisors: *Jan Carlson*, *Radu Dobrin*, and *Björn Lisper*
Investigated timing analysis concerning cache-related preemption delay in both unicore and multicore systems, employing limited-preemptive scheduling strategies. The Licentiate thesis also included initial investigations on the probabilistic analysis of such algorithms.

2014 – 2015 **Mälardalen University**, *MSc student*
School of Innovation, Design and Technology (IDT)
Division of Computer Science and Engineering (CSE)
Thesis: *"Automated Test Generation for Structured Text Language Using UPPAAL Model Checker"*
Advisors: *Adnan Čaušević* and *Eduard Paul Enoiu*
Conducted MSc research focused on creating a test case generation framework for Structured Text (ST) language, used in PLC programming, employing the UPPAAL model checker to improve the logic coverage. This work was conducted in collaboration with *Bombardier*, and it led to improvements in test generation efficiency and resource utilization, providing a viable approach for industry adoption.

* The licentiate degree is a post-graduate, research degree, situated above the MSc degree and below the PhD degree. It is an intermediate academic qualification awarded in Sweden during PhD studies.

Teaching Experience

2018 – 2022 **Mälardalen University**, *Instructor, Teaching, and Lab Assistant*
School of Innovation, Design and Technology (IDT)
Division of Computer Science and Engineering (CSE)
Course: Software Architecture
Responsibilities: Developed course materials and lectures, graded student work, and supervised lab sessions.

Mälardalen University, *Teaching and Lab Assistant*
School of Innovation, Design and Technology (IDT)
Division of Computer Science and Engineering (CSE)
Course: Software Development for Real-Time Systems
Responsibilities: Created lab materials, assessed student performance, and office hours.

2021 – 2022 **Mälardalen University**, *Co-Instructor*
School of Innovation, Design and Technology (IDT)
Division of Computer Science and Engineering (CSE)
PhD-level Course: Introduction to graduate education
Responsibilities: Prepared and delivered lectures, assessed student performance.

2020 – 2021 **Mediterranean University**, *Course Instructor*
Faculty for Information Technology
Course: Software Testing
Responsibilities: Managed course content, delivered lectures, and assessed student performance. Additional duties included developing and updating the course syllabus and creating lab exercises that complemented lecture material.

Mediterranean University, *Course Instructor*
Faculty for Information Technology
Course: Data Structures and Algorithms
Responsibilities: Managed course content, delivered lectures, and assessed student performance.

2018 – 2019 **Mälardalen University**, *Teaching and Lab Assistant*
School of Innovation, Design and Technology (IDT)
Division of Computer Science and Engineering (CSE)
Course: Component-Based Technologies
Responsibilities: Designed lab materials and graded assignments and projects. Conducted lab sessions to support student learning.

2021 – 2022 **Mälardalen University**, *Supervisor of student projects*
School of Business Society and Engineering
Division of Organization and Management
Course: Teknikbaserat Socialt Entreprenörskap (translated: Technology-based Social Entrepreneurship)
Responsibilities: Supervision of student projects and assistance with technology-related issues.

Research Publications

All publications are presented in **reverse chronological order**.

Disclaimer: In the field of Computer Science, specifically within Real-time and Embedded Systems, high-quality conference publications are valued more than journal articles.

Note on the provided rankings: Conference rankings are reported according to the CORE rankings as of the date of publication for each entry. These rankings categorize conferences as follows:

- **A*** – flagship conference and a leading venue within a discipline,
- **A** – excellent conference and highly respected within a discipline,
- **B** – good to very good conference and well-regarded within a discipline,
- **C** – other recognized conferences that meet minimum standards.

Table I: *Summary of high-quality conference publications over time*

Time frame	Conference ranks and awards
Postdoctoral research	A* A* A* A A B **Outstanding paper award** **Best presentation award**
Doctoral research	A A B

Peer-reviewed conference contributions

1
Authors: **F. Marković**, P. Roux, S. Bozhko, A. V. Papadopoulos, and B. B. Brandenburg
Title: *"CTA: A Correlation-Tolerant Analysis of the Deadline-Failure Probability of Dependent Tasks"*
Venue: The 44th IEEE Real-Time Systems Symposium (RTSS)
Year: 2023
CORE rank: A*
Accept. rate: 25%
Notes: **Resolved a longstanding open problem from 1995**

2
Authors: S. Bozhko, **F. Marković**, G. von der Brüggen, and B. B. Brandenburg
Title: *"What Really is pWCET? A Rigorous Axiomatic Proposal"*
Venue: The 44th IEEE Real-Time Systems Symposium (RTSS)
Year: 2023
CORE rank: A*
Accept. rate: 25%

3
Authors: A. Friebe, **F. Marković**, A. V. Papadopoulos, and T. Nolte
Title: *"Continuous-Emission Markov Models for RT Applications: Bounding Deadline Miss Probabilities"*
Venue: The 29th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)
Year: 2023
CORE rank: A
Accept. rate: 27%

4
Authors: **F. Marković**, A. V. Papadopolous, and T. Nolte
Title: *"Analytical Approximations in Probabilistic Analysis of Real-Time Systems"*
Venue: The 43rd IEEE Conference on Real-Time Systems Symposium (RTSS)
Year: 2022
CORE rank: A*
Accept. rate: 29%
Notes: **Best presentation award**

5
Authors: A. Friebe, **F. Marković**, A. V. Papadopoulos, and T. Nolte
Title: *"Adaptive Runtime Estimate of Task Execution Times using Bayesian Modeling"*
Venue: Int. Conf. on Embedded and Real-Time Computing Systems and Applications (RTCSA)
Year: 2021
CORE rank: B
Accept. rate: 42%

6
Authors: **F. Marković**, A. V. Papadopolous, and T. Nolte
Title: *"On the Convolution Efficiency for Probabilistic Analysis of Real-Time Systems"*
Venue: The 33rd Euromicro Conference on Real-Time Systems (ECRTS)
Year: 2021
CORE rank: A
Accept. rate: 19%
Notes: **Outstanding paper award**

7
Authors: S. M. Salman, S. Mubeen, **F. Marković**, A. V. Papadopolous, and T. Nolte
Title: *"Scheduling Elastic Applications in Compositional Real-Time Systems"*
Venue: The 26th IEEE Conference on Emerging Technologies and Factory Automation (ETFA)
Year: 2021
CORE rank: Not available
Accept. rate: 66%

8
Authors: **F. Marković**, J. Carlson, and R. Dobrin
Title: *"Cache-Aware Response Time Analysis for Real-Time Tasks with Fixed Preemption Points"*
Venue: The 26th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)
Year: 2020
CORE rank: A
Accept. rate: 27%
Notes: *Part of PhD thesis*

9
Authors: **F. Marković**, J. Carlson, R. Dobrin, and S. Altmeyer
Title: *"Improving the Accuracy of Cache-Aware Response Time Analysis using Preemption Partitioning"*
Venue: The 32nd Euromicro Conference on Real-Time Systems (ECRTS)
Year: 2020
CORE rank: A
Accept. rate: 34%
Notes: *Part of PhD thesis*

10
Authors: **F. Marković**, J. Carlson, and R. Dobrin
Title: *"Improved Cache-Related Preemption Delay Estimation for Fixed Preemption Point Scheduling"*
Venue: The 23rd International Conference on Reliable Software Technologies (Ada-Europe)
Year: 2018
CORE rank: B
Accept. rate: 37%
Notes: *Part of PhD thesis*

11
Authors: **F. Marković**, J. Carlson, R. Dobrin, B. Lisper, and A. Thekkilakattil
Title: *"Probabilistic Response Time Analysis for Fixed Preemption Point Selection"*
Venue: The 13th IEEE International Symposium on Industrial Embedded Systems (SIES)
Year: 2018
CORE rank: Not available
Accept. rate: Not available

Peer-reviewed original articles

1

Authors:	**F. Marković**, J. Carlson, and R. Dobrin
Title:	*"A Comparison of Partitioning Strategies for Fixed Points Based Limited Preemptive Scheduling"*
Journal:	IEEE Transactions on Industrial Informatics
Year:	2019
Volume:	vol. 15 / no. 2
Impact Fac.:	10.215
Notes:	*Part of PhD thesis*

Peer-reviewed workshop contributions

1

Authors:	**F. Marković**, J. Carlson, and R. Dobrin
Title:	*"Tightening the Bounds on Cache-Related Preemption Delay in Fixed Preemption Point Scheduling"*
Venue:	The 17th International Workshop on Worst-Case Execution Time Analysis (WCET)
Year:	2017
CORE rank:	Not available
Accept. rate:	71%
Notes:	*Part of PhD thesis*

Peer-reviewed research artifacts

1

Authors:	**F. Marković**, A. V. Papadopoulos, and T. Nolte
Title:	*"On the Convolution Efficiency for Probabilistic Analysis of Real-Time Systems (Artifact)"*
Journal:	Dagstuhl Artifacts Series
Year:	2021
Volume:	vol. 7 / 1
Impact Fac.:	Not available

Theses

1

Author:	**F. Marković**
Title:	*"Preemption-Delay Aware Schedulability Analysis of Real-Time Systems"*
School:	Mälardalen University
Year:	2020
Type:	**PhD thesis**
Series:	Mälardalen University Press Dissertations
ISBN:	ISBN: 978-91-7485-467-1

2

Author:	**F. Marković**
Title:	*"Improving the Schedulability of Real Time Systems under Fixed Preemption Point Scheduling"*
School:	Mälardalen University
Year:	2018
Type:	**Licentiate thesis**
Series:	Mälardalen University Press Licentiate Theses
ISBN:	ISBN: 978-91-7485-390-2

3

Author:	**F. Marković**
Title:	*"Automated Test Generation for Structured Text Language Using UPPAAL Model Checker"*
School:	Mälardalen University
Year:	2015
Type:	**MSc thesis**

Academic Service

Organising Committees

2024
- **ACM SIGBED International Conference on Embedded Software (EMSOFT)**
  Publicity Chair
- **International Real-Time Scheduling Open Problems Seminar RTSOPS**, collocated with the Euromicro Conference on Real-Time Systems (ECRTS)
  Co-Chair

2021
- **RTNS**, Session 5 Chair: Design and Verification.

Technical Program Committees

2024
- **IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)**, Brief Presentations Track
  Program Committee Member

2023
- **IEEE Real-Time Systems Symposium (RTSS)**, Brief Presentations Track
  Program Committee Member
- **Euromicro Conference on Real-Time Systems (ECRTS)**
  Program Committee Member
- **IEEE International Conference on Real-Time Networks and Systems (RTNS)**
  Program Committee Member

2022
- **IEEE International Symposium On Real-Time Distributed Computing(ISORC)**
  Program Committee Member
- **Workshop on Next Generation Real-Time Embedded Systems (NG-RES)**
  Program Committee Member
- **Euromicro Conference on Real-Time Systems (ECRTS)**
  Artifact Evaluation Committee
- **Euromicro Conference on Real-Time Systems (ECRTS)**
  External Reviewer
- **IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)**, Brief Presentations Track
  Program Committee Member

2021
- **IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)**
  Artifact Evaluation Committee Member
- **IEEE International Conference on Real-Time Networks and Systems (RTNS)**
  Program Committee Member

2019
- **IEEE International Conference on Industrial Technology (ICIT)**, Special Session on Advanced Solutions for Communication in Cooperative Cyber-Physical Systems
  Program Committee Member

Reviewing

- **IEEE Transactions on Computers**
- **ACM Transactions on Embedded Computing Systems**
- **Journal of Systems Architecture**

Academic Service (continued)

University administration

2019 – 2022 — **Erasmus+ Project Application: Higher Education Student and Staff Mobility**. I contributed to the development of an Erasmus+ grant application focused on student and staff mobility. The project was successfully funded, receiving €675,745 over three years to support exchanges between Sweden and non-EU countries. I also served as the local student support for the Erasmus+ project from 2016 to 2022, enhancing the exchange experience for the visiting students.

Student Advising

September 2020 – *present* — **Co-supervisor** of **Anna Friebe**, *PhD student at* Mälardalen University Licentiate* Thesis defended in 2022, available here.
"Timing and schedulability analysis of real-time systems using hidden Markov models"

January 2021 – July 2022 — **Co-supervisor** of **Shaik Salman**, *PhD student* at Mälardalen University Licentiate Thesis defended in 2022, available here.
"Integrating Elastic Real-Time Applications on Fog Computing Platforms"

July 2022 – *present* — **Co-advisor** of **Sergey Bozhko**, *PhD student* at the Max Planck Institute for Software Systems (MPI-SWS)

January 2023 – *present* — **Co-advisor** of **Matteo Zini**, *Intern* at the Max Planck Institute for Software Systems (MPI-SWS), January – July 2023, *PhD student* at the TeCIP Institute, Scuola Superiore Sant'Anna, Pisa, Italy

January 2023 – July 2023 — **Co-advisor** of **Meenal Gupta**, *Intern* at the Max Planck Institute for Software Systems (MPI-SWS), *MSc student* at the Birla Institute of Technology and Science, Pilani, Pilani Campus, India

Miscellaneous Experience

Public engagement and outreach

2019 — **Montenegrin Science Promotion Foundation (PRONA)**. I was one of the lecturers at PRONA's Science Summer School in Lovćen, Montenegro, engaging with elementary and high-school students during a three-day course.

Academic Visits and Summer Schools

13 February – 17 February 2024 — **Technical University Dortmund** (**TUD**), Dortmund, Germany. Visited Professor Jian-Jia Chen and his research group.

14 June – 16 June 2016 — **Uppsala Programming for Multicore Architectures Research Center** (**UPMARC**) Summer School. Uppsala University, Uppsala, Sweden.

27 June – 1 July, 2016 — **Timing Analysis on Code Level** (**TACLe**) Summer School. Ysper-tal, Austria.

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