

PREDRAG FILIPOVIKJ

CURRICULUM VITAE , APRIL 7, 2023

Born in Kumanovo, North Macedonia, 1989-01-16

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SHORT SUMMARY

Computer scientist and software engineer/technology lead. Areas of expertise: software engineering, automated reasoning, formal verification of safety-critical systems, software testing. I am very passionate about both the engineering and the science of building complex, correct and robust software systems. Broad areas of interest (to mention a few): systems design and architecture, programming languages and compilers, requirements engineering, model-based development. ISTQB certified Test Analyst.

CURRENT POSITION

Feb 2023 – Present Scania Group, Stockholm, Sweden

*Product Owner
and Technology
Lead*

I am the Product Owner, Principal Architect and Technology Lead for the Scania Advanced Global-reasoning Engine (SAGE) - an in-house solution for product data management based on automated-reasoning technology. The tool is written in Python, and it is cloud-native running in AWS. At its core it relies on the Z3 tool.

EDUCATION

2014–June 2019 MÄLARDALEN UNIVERSITY, VÄSTERÅS, SWEDEN

*PhD (Teknologie
Doktor)*

PhD student in Computer Science, with specialization in formal modeling and analysis of embedded systems. I did my thesis work in the VeriSpec project, which was a project between Mälardalen University, Scania AB CV and Volvo Group Trucks Technology. The aim of the project is to bridge the gap between the state-of-the-art formal modeling and analysis methods and tools and the industrial state-of-the-practice for verification and analysis of systems requirements specifications and design-time behavioral models. My research interest is on formal verification of safety-critical industrial software artifacts, including the systems specifications and Simulink models. Areas of expertise: temporal logic for formal systems specification, model checking, statistical model checking, bounded model checking, SAT/SMT-solving, theorem proving.

Graduation date: 2019-06-17. Thesis title: “Automated Approaches for Formal Verification of Embedded Systems Artifacts” [Link to DiVA](#).¹

Advisors: Assoc. Prof. Cristina SECELEANU, Dr. Guillermo RODRIGUEZ-NAVAS (until the end of 2018), & Prof. Mattias NYBERG
Examiner: Prof. Jim WOODCOCK. Grading Committee: Prof. Kim LARSEN, Assoc. Prof. Christian BERGER, and Assoc. Prof. Luigia PETRE.

2014–2017 Mälardalen University, Västerås, Sweden

*Licentiate in
Technology*

School: Academy for Innovation, Design and Technology
Thesis: “Pattern-based Specification and Formal Analysis of Embedded Systems

¹ <http://bit.ly/filipovikj-phd-thesis-diva>

Requirements and Behavioral Models"

Description: [Link to DiVA²](#).

Advisors: Assoc. Prof. Cristina SECELEANU, Dr. Guillermo RODRIGUEZ-NAVAS, & Prof. Mattias NYBERG.

Grading committee: Prof. Stefania GNESI (examiner), Prof. Jan CARLSON, Assoc. Prof. Patrizio PELLICCIONE

*Master of Science
in Software
Engineering*

2012-2013 Mälardalen University, Västerås, Sweden

GPA: 5.0 of 5.0 · School: Academy for Innovation, Design and Technology
Thesis: "Connecting a Design Framework for Service-oriented Systems with UPPAAL model-checker"

Description: The thesis proposes an approach for automatic transformation of REMES SOS models into timed automata framework. The automation of the approach integrated into the REMES SOS IDE. Thesis available on the following [Link to DiVA³](#).

Advisor: Dr. Aida CAUSEVIC

Examiner: Assoc. Prof. Cristina SECELEANU

*Master of Science
in Computer
Networks and
e-Technologies*

2012-2014 Ss. Cyril and Methodius University, Skopje,
North Macedonia

GPA: 9.8 of 10.0 · School: Faculty of Computer Science and Engineering
Thesis⁴: "Connecting a Design Framework for Service-oriented Systems with UPPAAL model-checker"

Description: The thesis proposes an approach for automatic transformation of REMES SOS models into timed automata framework. The automation of the approach integrated into the REMES SOS IDE. Thesis available on the following [Link to DiVA⁵](#).

Advisor: Dr. Aida CAUSEVIC

Examiner: Assoc. Prof. Cristina SECELEANU

*Bachelor of Science
in Informatics and
Computer
Engineering*

2007-2011 Ss. Cyril and Methodius University, Skopje,
North Macedonia

GPA: 8.9 of 10.0 · School: Faculty of Electrical Engineering and Information
Technology

Thesis: "Indexing semi-structured data using Lucene framework"

Description: The goal of the thesis is to explore different techniques for indexing semi-structured data to optimize storage and time for retrieval.

Advisors: Prof. Dimitar TRAJANOV

PREVIOUS WORK EXPERIENCE

01.2021–
02.2023 Method Developer, SCANIA CV AB, Stockholm,
Sweden

02.2014–
12.2020 PostDoctoral Researcher, KTH ROYAL INSTITUTE
OF TECHNOLOGY, Stockholm, Sweden

02.2014–
07.2019 Researcher, Doctoral Student, MÄLARDALEN
UNIVERSITY, Västerås, Sweden

10.2013–
02.2014 Research Assistant, MÄLARDALEN UNIVERSITY,
Västerås, Sweden

² <http://bit.ly/filipovikj-lic-thesis-diva>

³ <http://bit.ly/filipovikj-msc-thesis-diva>

⁴ Double-degree thesis project within the EUROWEB Erasmus Mundus Program

⁵ <http://bit.ly/filipovikj-msc-thesis-diva>

06.2011–
08.2012 Full Stack Software Developer, NEXTSENSE, LTD.,
Skopje, North Macedonia

06.2011–
08.2012 Software Developer Intern, NEXTSENSE, LTD.,
Skopje, North Macedonia

RESEARCH VISITS

cancelled Visiting Researcher, RSE GROUP, NASA AMES
RESEARCH CENTER, MOUNTAIN VIEW, CALIFORNIA

I was invited as a visiting researcher in the Rigorous Software Engineering (RSE) research group at the NASA Ames Research center. The intended goal of the research visit was to work on methods for formal analysis of Simulink models. (**cancelled due to the COVID-19 pandemic**)

09.2017–
11.2017 Visiting Researcher, MOVES GROUP, RWTH
AACHEN UNIVERSITY, GERMANY

During the fall of 2017, I was a visiting researcher in the MOVES research group led by Prof. Joost-Pieter Katoen, at the Aachen University, Germany. The purpose of my visit there was to explore the possibilities of using the STORM probabilistic model checker as an analysis engine for the SIMPPAAL tool. The research visit was partially funded by the Ericsson Research Foundation.

AREAS OF EXPERTISE

*Automated
Reasoning for
Software
Verification*

My primary area of interest is quality assurance of software systems using formal techniques. My expertise covers all aspects of the formal system verification, including: formal system specification using temporal logic, formal system modeling (automata-based models, SMT-LIB, etc.) and formal system verification and analysis (model checking, statistical model checking, bounded model checking, theorem proving, SAT/SMT solving).

Specification and Modeling: LTL, (T)CTL, PWMTL, (Stochastic) Timed Automata, SMT-Lib2.

Verification and Analysis Tools: UPPAAL, UPPAAL SMC, Z3, Dafny.

*Software
Architecture and
Development*

I am passionate about developing robust and dependable software using state-of-the-art technologies.

Selected projects:

SESF <https://github.com/predragf/sesf>,

PROPAS <https://github.com/predragf/propas>,

SIMPPAAL <https://github.com/predragf/simppaal>,

SYMC <https://github.com/predragf/symc>.

Programming languages: C, C++, C#, Java, JavaScript, Python

PROFESSIONAL CERTIFICATIONS

2022, **ISTQB** Certified Tester Advanced Level Test Analyst (**CTAL**)

2021, **ISTQB** Certified Tester Foundation Level (**CTFL**)

TEACHING

DVA420 – Formal Languages and Automata Theory, Advanced Level, joint course between Mälardalen University, Sweden and University of Osijek, Croatia, course responsible Prof. Ivica CRNKOVIC.

DVA332 – Software Engineering 1, Mälardalen University, Västerås, Sweden, Basic Level, course responsible Prof. Jan CARLSON.

CDT501 – Advanced Component-Based Software Engineering, Mälardalen University, Västerås, Sweden, Advanced Level, course responsible Dr. Sverine SENTILLES.

SELECTED PUBLICATIONS

Bounded Invariance Checking of Simulink Models, (Apr 2019).

Predrag Filipovikj, Guillermo Rodriguez-Navas, Cristina Seceleanu. The 34th ACM/SIGAPP Symposium On Applied Computing (SAC'19).

SMT-based Consistency Analysis of Industrial Systems Requirements

(Apr 2017). –**Best Paper Award**– Predrag Filipovikj, Guillermo Rodriguez-Navas, Mattias Nyberg, Cristina Seceleanu. 32nd ACM SIGAPP Symposium On Applied Computing (SAC2017).

Simulink to UPPAAL Statistical Model Checker: Analyzing

Automotive Industrial Systems (Nov 2016). Predrag Filipovikj, Nesredin Mahmud, Raluca Marinescu, Cristina Seceleanu, Oscar Ljungkrantz, Henrik Lönn. 21st International Symposium on Formal Methods (FM2016).

Reassessing the Pattern-Based Approach for Formalizing

Requirements in the Automotive Domain (Aug 2014). Predrag Filipovikj, Mattias Nyberg, Guillermo Rodriguez-Navas. 22nd IEEE International Requirements Engineering Conference (RE'14).

For complete list of publications, please visit my Google Scholar profile:

<http://bit.ly/filipovikj-scholar>.

SCIENTIFIC COMMUNITY SERVICE

IEEE Access Journal, Reviewer

Science of Computer Programming, Reviewer

Conference on the Engineering of Computer Based Systems, PC Member

17th International Colloquium on Theoretical Aspects of Computing (ICTAC 2020), Reviewer

International Conference on integrated Formal Methods (iFM 2019, iFM 2020), Reviewer

Annual NASA Formal Methods Symposium (NFM 2019, NFM 2020),

Reviewer

IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), Work-in-progress session, 2015, Reviewer

IEEE Computer Society Signature Conference on Computers, Software, and Applications (COMPSAC), 2015, 2016, Reviewer

International Workshop on Formal Techniques for Safety-Critical Systems (FTSCS), 2015, Reviewer

International Conference on Engineering of Complex Computer Systems (ICECCS), 2015, Reviewer

IEEE Journal of Transactions on Industrial Informatics, 2015, Reviewer

ICT INNOVATIONS Conference, Program Committee Member (2017, 2018, 2019).

36th Symposium on Reliable Distributed Systems (SRDS 2017), Reviewer.

SELECTED INVITED TALKS AND PRESENTATIONS (EXCLUDING CONFERENCES)

"Formal Approaches for Analyzing Industrial Simulink Models", Technical University of Berlin, Berlin, 2019-11-27

"Verification of Automotive Safety-critical Software", Castor Software Days, KTH, Stockholm, 2019-10-15

"Structured Specification and Automated Verification of Requirements", Knightech, Västerås, 2015-08-28

"Formal specification and verification of requirements", ICES workshop, Royal Institute of Technology (KTH), Stockholm, 2014-10-22

"Engineer-friendly Formal Requirements Specification and Analysis", SIREN SIGNAL MEETING 2015, May 26-27, 2016, Stockholm University, Stockholm, Sweden

"Analyzing Simulink Models Using Statistical Model Checking", ICES workshop (organized jointly between Royal Institute of Technology (KTH) and Scania AB CV), Scania, Södertälje, 2017-05-19.

HONORS AND AWARDS

Ericsson Research Grant. A research grant given by the Ericsson Research Foundation intended to partially cover the expenses for my research visit at RWTH Aachen University. Research grant was approved in May 2017, and used in the period between September and November 2017.

Best Paper Award. Best research paper award at the 32nd ACM SIGAPP Symposium On Applied Computing (SAC 2017). April, 2017. The price was awarded for the research paper titled: *"SMT-based Consistency Analysis of Industrial Systems Requirements"*.

Best Student Paper and Presentation Award. Award for the best student research proposal paper and best student presentation at the

SOFSEM 2017 student research forum. January, 2017. The price was awarded for the research proposal titled: *"Increasing Embedded Systems Quality through Automated Specification and Analysis of Requirements and Behavioral Models"*.

RE Living Scholarship. A living scholarship that covers accommodation expenses for Ph.D. students and junior faculty members attending the Requirements Engineering (RE'14) conference. August, 2014.

Student Grant. A grant awarded by the Marktoberdorf 2014 Summer School organizers that covers the participation fee for attending the summer school. July, 2014

EUROWEB - Erasmus Mundus scholarship. A fully funded scholarship (tuition fee + living costs) for attending the Master program in Software Engineering at the Mälardalen University. 2012.

MEMBERSHIP IN ORGANIZATIONS

2013–Present, Association of Computing Machinery (ACM), Member

2014–Present, Institute of Electrical and Electronics Engineers (IEEE), Member

2015–2019, Swedish Requirements Engineering Research Network (SiREN), Member

VOLUNTEERING

Local arrangements team coordinator, ICST conference, Västerås, Sweden, 2018.

Local arrangements team member, COMPSAC conference, Västerås, Sweden, 2014.

Local arrangements team member, ASE conference, Västerås, Sweden, 2014.

OTHER INFORMATION

Languages

ENGLISH · · Professional Working Proficiency

SWEDISH · · Intermediate

MACEDONIAN · Native

April 7, 2023