

# PREDRAG FILIPOVIKJ

RESUME, FEBRUARY 7, 2021

*Born in Kumanovo, N. Macedonia, 1989-01-16*

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## SHORT SUMMARY

Experienced researcher in the area of formal software verification. My narrow field of active research is model-checking-based software verification using various techniques such as symbolic model checking for real time systems (Timed Automata and UPPAAL), SAT/SMT-based model-checking (predominantly invariance checking using Z3) as well as symbolic execution and bounded model checking. Beside research, I am passionate about software development in general. As a graduate student, I have developed several proof-of-concept tools for formal verification of Simulink models based on various model checking techniques. Before graduate studies, worked as a full-stack web developer for more than a year.

## CURRENT POSITION

*January 2020*  
— Scania AB CV, Stockholm,  
Sweden

*Test Method  
Engineer*

Currently, I am employed as method/process developer in the Complete Vehicle System Integration Team. My role in the team is to improve the current verification process, and also work on the next-generation testing platform for the autonomous vehicles. Beside the main responsibility of working on improving the verification process, my role is to be an interface of the group for future collaboration with other companies, and research institutions.

## 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. Topics of interest: temporal logic for formal systems specification, model checking, statistical model checking, bounded model checking, SAT-solving, theorem proving.

Graduation date: 2019-06-17. Thesis title: “Automated Approaches for Formal Verification of Embedded Systems Artifacts” [Link to DiVA](http://bit.ly/filipovikj-phd-thesis-diva).<sup>1</sup>

Advisors: Assoc. Prof. Cristina SECELEANU, Dr. Guillermo

RODRIGUEZ-NAVAS (until the end of 2018), & Prof. Mattias NYBERG (until Lic.)

Examiner: Prof. Jim WOODCOCK. Grading Committee: Prof. Kim LARSEN,

Assoc. Prof. Christian BERGER, and Assoc. Prof. Luigia PETRE.

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

<i>Licentiate in Technology</i>	2014-2017	Mälardalen University, Västerås, Sweden
	School: Academy for Innovation, Design and Technology Thesis: "Pattern-based Specification and Formal Analysis of Embedded Systems Requirements and Behavioral Models" Description: <a href="#">Link to DiVA<sup>2</sup></a> . Advisors: Assoc. Prof. Cristina SECELEANU, Dr. Guillermo RODRIGUEZ-NAVAS, & Prof. Mattias NYBERG. Grading committee: Prof. Stefania GNESI (examiner), Prof. Jan CARLSON, Assoc. Prof. Patrizio PELLICIONE	
<i>Master of Science in Software Engineering</i>	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 <a href="#">Link to DiVA<sup>3</sup></a> . Advisor: Dr. Aida CAUSEVIC Examiner: Assoc. Prof. Cristina SECELEANU	
<i>Bachelor of Science in Informatics and Computer Engineering</i>	2007-2011	Ss. Cyril and Methodius University, Skopje, N. 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

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

#### RESEARCH VISITS

<i>cancelled</i>	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 to work on formal verification of Simulink models. The intended goal of the research was to work	

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

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

on methods for formal analysis of Simulink models. (cancelled due to 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

##### *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, PWTML, (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:

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

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

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

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

**Tools/IDEs:** Visual Studio, Eclipse, NetBeans

#### 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 Secleanu.

The 34<sup>th</sup> 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 Secleanu. 32<sup>nd</sup> 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 Secleanu, Oscar

Ljungkrantz, Henrik Lönn. 21<sup>st</sup> 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. 22<sup>nd</sup> 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 32<sup>nd</sup> 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	·	·	Basic/Intermediate
MACEDONIAN	·		Native

*Citizenship*

Citizen of Republic of North Macedonia.  
Permanent residence and working permit in Sweden (since June 2018).

February 7, 2021