PREDRAG FILIPOVIKJ

CURRICULUM VITAE , JULY 24, 2022

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

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SHORT SUMMARY

Experienced and passionate researcher in the area of automated reasoning for 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 (bounded) model-checking. Other research interests include, but are not limited to: formal specification using temporal logic, SAT/SMT solving, theorem proving, etc.
Beside conducting research, I am passionate about software development in general. I have developed several tools for formal verification of Simulink models based on various model checking techniques.

CURRENT POSITION

January 2020 – Present — Scania Group, Stockholm, Sweden

Test Method Engineer

I am a method developer in the Complete Vehicle System Integration Team, where my role 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.[1]
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.

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

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 Requirements and Behavioral Models"*
Description: Link to DiVA[2].
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

2012-2013 Mälardalen University, Västerås, Sweden

Master of Science in Software Engineering

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 DiVA[3].
Advisor: Dr. Aida Causevic
Examiner: Assoc. Prof. Cristina Seceleanu

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

Master of Science in Computer Networks and e-Technologies

GPA: 9.8 of 10.0 · School: Faculty of Computer Science and Engineering
Thesis[4]: *"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 DiVA[5].
Advisor: Dr. Aida Causevic
Examiner: Assoc. Prof. Cristina Seceleanu

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

Bachelor of Science in Informatics and Computer Engineering

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 Institure 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, N. Macedonia

06.2011–08.2012 Software Developer Intern, Nextsense, Ltd., Skopje, N. 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 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/simpppaal,
SyMC https://github.com/predragf/symc.
Programming languages: Python, C#, Java, 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 Sofware 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 (EXCLUING 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^{nd} 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.

PROFESSIONAL CERTIFICATIONS

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

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

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

July 24, 2022