

Curriculum Vitae - Erika Ábrahám

Contact information

Name Erika Ábrahám
Title Prof. Dr.
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Personal details

Date and place of birth November 9, 1970, Szeged, Hungary
Nationality Hungarian
Sex female
Family status unmarried, two children

Education

Jan 2005 Ph.D. received from the University of Leiden, The Netherlands
Promotors: Prof. W.-P. de Roever and Prof. J. N. Kok
Co-Promotors: Prof. F. S. de Boer and Prof. M. Steffen
Feb 1999 Diploma received from the Christian-Albrechts-University of Kiel, Germany
Major/Minor: Computer Science / Physics
Average mark: 1.0 (distinguishing award)

Positions

2013-today Full professor, RWTH Aachen University, Germany
Head of the research group “Theory of Hybrid Systems”
Research topics: SMT solving, formal methods for probabilistic and hybrid systems
2008-2013 Junior professor, RWTH Aachen University, Germany
Head of the junior research group “Theory of Hybrid Systems”
Research topics: SMT solving, formal methods for probabilistic and hybrid systems
2007-2008 Postdoctoral researcher, Jülich Research Centre, Germany
Research topics: parallel and high-performance computing, performance analysis
2005-2007 Postdoctoral researcher, Albert-Ludwigs-University Freiburg, Germany
Research topics: Verification of hybrid systems, bounded model checking, SAT and SMT solving
1999-2005 Ph.D. student, Christian-Albrechts-University Kiel, Germany
Research topics: Deductive proof systems for multithreaded object-oriented languages

Project acquisition – running projects

SC ² 07/2016-08/2018	<i>Satisfiability Checking and Symbolic Computation – Uniting Two Communities to Solve Real Problems</i> H2020 FETOPEN CSA
Industrial project 07/2016-06/2018	<i>Simulink Formal Verification</i> Research project with Ford
SMT4ROB 10/2016-09/2017	<i>Optimizing the Performance of Robot Fleets in Production Logistics Scenarios Using SMT</i> RWTH ICT Funds
HyPro 03/2013-08/2016 01/2017-12/2018	<i>A Toolbox for the Reachability Analysis of Hybrid Systems using Geometric Approximations</i> (project coordinator) DFG project, AB 461/4-1

Project acquisition – completed projects

CAP 01/2015-12/2016	<i>Composition, Abstraction, and Parametrization for the Verification of Probabilistic and Hybrid Systems</i> CDZ Sino-German cooperation project, GZ 947
SMT4ABS 01/2015-12/2016)	<i>Combining SMT-Solving with Type Checking for Real-Time ABS Programs</i> (German project coordinator) Norwegian-German DAAD ppp project, ID 57160526
OASys 10/2012-06/2016	<i>Online Algorithms for Optimal Control of Hybrid Propulsion Systems</i> (project coordinator) DFG project, AB 461/2-1
AlgoSyn 01/2011-06/2015	<i>Algorithmic Synthesis of Reactive and Discrete-Continuous Systems</i> DFG Research Training Group 1298
	<i>Modeling and Optimisation of Offshore Wind Farms</i> RWTH Seed Funds
ROCKS 2009-2013	<i>Rigorous Dependability Analysis using Model Checking Techniques for Stochastic Systems</i> (German site coordinator) Dutch-German NWO-DFG bilateral cooperation program
CeBUG 2010-2013	<i>Counterexample Generation for Stochastic Systems using Bounded Model Checking</i> (project coordinator) DFG project, AB 461/1-1
HySmart 2010-2011	<i>Hybrid Systems Modeling and Analysis with Rewriting Techniques</i> (German project coordinator) Norwegian-German DAAD ppp project, ID 50727668

Awards

Best paper award	CSI Int. Symp. on Computer Science and Software Engineering (CSSE'11)
Best presentation award	Int. Conf. on Engineering of Complex Computer Systems (ICECCS'01)
Distinguishing award	for Diploma thesis, Christian-Albrechts-University of Kiel, 1999

Invited talks

1. *TBA*, Evening Seminar of the London Mathematical Society and the British Computer Society, London, UK, 11/2017.
2. *SMT Solving for Real Algebra*, International Conference on Mathematics and Informatics (Math-Info'17), Târgu Mureş/Marosvásárhely, Romania, 09/2017.
3. *TBA*, 19th Int. Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC'17), Timisoara, Romania, 09/2017.
4. *TBA*, Int. Workshop on Formal Methods for Rigorous Systems Engineering of Cyber-Physical Systems (RISE4CPS), Heidelberg, Germany, 07/2017.
5. *TBA*, 15th Int. Workshop on Quantitative Aspects of Programming Languages and Systems (QAPL'17), Uppsala, Sweden, 04/2017.
6. *Exploiting Symbolic Computation Techniques in SAT-Modulo-Theories Solving*, University of Waterloo, Waterloo, Canada, 03/2017.
7. *Symbolic Computation Techniques in Satisfiability Checking*, Johannes Kepler University, RISC, Linz, Austria, 11/2016
8. *Combining Static and Runtime Methods to Achieve Safe Standing-Up for Humanoid Robots*, 6th Int. Symp. on Leveraging Applications of Formal Methods, Verification and Validation (ISoLA'16), Track: Static and Runtime Verification: Competitors or Friends?, Crete, Greece, 10/2016
9. *The Power of Satisfiability Checking*, European Computer Science Summit (ECSS'16), Budapest, Hungary, 10/2016
10. *Computation Techniques in SAT-Modulo-Theories Solving*, University of Kassel, Kassel, Germany, 10/2016
11. *Symbolic Computation Techniques in Satisfiability Checking*, 18th Symp. of Symbolic and Numeric Algorithms for Scientific Computing (SYNASC'16), Timisoara, Romania, 09/2016
12. *Satisfiability Checking: Theory and Applications*, 14th Int. Conf. on Software Engineering and Formal Methods (SEFM'16), Vienna, Austria, 07/2016
13. *SMT Solving for Non-Linear Arithmetic Theories*, IST Austria, Vienna, Austria, 05/2016.
14. *Building Bridges between Symbolic Computation and Satisfiability Checking*, Int. Symp. of Symbolic and Algebraic Computation (ISSAC'15), Bath, UK, 07/2015
15. *A Greedy Approach for the Efficient Repair of Stochastic Controller Models*, Abstraction and Synthesis of Correct-by-Construction Robotics Software: Reuniting Formal Methods with Model-Driven Software Engineering (AbSynth'15), Workshop at Robotics Science and Systems (RSS'15), Rome, Italy, 07/2015
16. *Model Repair for Probabilistic Controller*, NII Shonan Meeting "Static Analysis meets Runtime Verification", Shonan Village Center, Japan, 03/2015
17. *Current Challenges in the Verification of Hybrid Systems*, 5th Int. Workshop on Cyber Physical Systems (CyPhy'16), Amsterdam, The Netherlands, 10/2015
18. *Modeling and Verification of Hybrid Systems*, University of Genoa, Genoa, Italy, 10/2015

19. *Some Thoughts about Formal Methods in Robotics*, University of Genoa, Genoa, Italy, 10/2015
20. *SMT Solving for Real Arithmetic: What are the Challenges?*, CDZ Workshop “Computation and Reasoning with Constraints”, Beijing, China, 11/2014
21. *Probabilistic Model Checking and Counterexample Generation*, IFIP WG2.2 Meeting on “Formal Description of Programming Concepts”, Munich, Germany, 09/2014
22. *Reachability Analysis of Hybrid Systems*, INRIA, France, 06/2014
23. *Modeling and Analyzing Probabilistic Systems*, NVTI Theory Day, Utrecht, The Netherlands, 05/2014
24. *Reachability Analysis for Hybrid Systems*, Workshop on Computable Analysis and Rigorous Numerics, Maastricht, The Netherlands, 12/2013
25. *Formal Methods for Hybrid Systems*, University of Passau, Passau, Germany, 11/2013
26. *Modeling and Analysis of Hybrid Systems*, Formal Description of Programming Concepts (IFIP Working Group 2.2), Lisbon, Portugal, 09/2013
27. *Reachability Analysis for Hybrid Systems*, CDZ Workshop on “Probabilistic and Hybrid System Verification”, Beijing, China, 09/2013
28. *Computing Counterexamples for Discrete-Time Probabilistic Systems*, ROCKS Autumn School “Rigorous Dependability Analysis for Stochastic Systems”, Vahrn, Italy, 10/2012
29. *Hybrid Systems*, University of Twente, Enschede, The Netherlands, 08/2012
30. *SMT Solving Mechanisms for Non-Linear Real Arithmetic*, Albert-Ludwigs-University, Freiburg, Germany, 05/2012
31. *Heap-abstraction for a Multi-Threaded Object-Oriented Calculus*, Workshop on Automata and Logic for Data Manipulating Programs (LIAFA’10), Paris, France, 12/2010
32. *SMT-Solving for the Reals*, University of Karlsruhe, Germany, 09/2010
33. *SMT-Solving in the Verification and Synthesis of Hybrid Systems*, University of Freiburg, Germany, 07/2010
A Lazy SMT-Solver for a Non-Linear Subset of Real Algebra, Dagstuhl Seminar “Verification over Discrete-Continuous Boundaries”, Dagstuhl, Germany, 07/2010
34. *SMT-Solving for the First-Order Theory of the Reals*, Dagstuhl Seminar “Algorithms and Applications for the Next Generation of SAT Solvers”, Dagstuhl, Germany, 11/2009
35. *SAT-Modulo-Theories Solving in the Context of Bounded Model Checking*, CWI Amsterdam, Amsterdam, The Netherlands, 06/2009
36. *SMT-solving in the Context of Bounded Model Checking*, University of Oslo, Oslo, Norway, 04/2009
37. *Heap-Abstraction for an Object-Oriented Calculus with Thread Classes*, Computability in Europe (CiE’06), Swansea, Great Britain, 07/2006
38. *A Proof System for Exception Handling in Multithreaded Java*, Christian-Albrechts-University, Kiel, Germany, 05/2004
39. *A Hoare Logic for Monitors in Java*, ICASE - NASA LaRC, 11/2002
40. *Verification for Java’s Monitor Concept*, Int. Symp. on Formal Methods for Components and Objects (FMCO’02), Leiden, The Netherlands, 11/2002

Organisation of scientific events (since 2014)

- **Co-organiser** Summer School *Satisfiability Checking and Symbolic Computation*, Saarbrücken, Germany, 07-08/2017
- **Co-Organiser** Dagstuhl Seminar *Computer-Assisted Engineering for Robotics and Autonomous Systems*, Dagstuhl, 02/2017
- **Co-Organiser** *Festschrift and Celebration Event for Frank de Boer's 60th Birthday*, Eindhoven, 04/2016
- **Co-organiser** GI-Dagstuhl Seminar *Formal Evaluation of Critical Infrastructures*, Dagstuhl, 12/2015
- **Co-organiser** Dagstuhl Seminar *Symbolic Computation and Satisfiability Checking*, Dagstuhl, 11/2015
- **Co-organiser** Dagstuhl Seminar *Randomized Timed and Hybrid Models for Critical Infrastructures*, Dagstuhl, 01/2014 (41 participants)
- **Organiser** of several workshops (see section *Program Committee co-chair* below)
- **Editor** of journal special issues (LMCS, STTT)

Scientific society memberships

- Since 2009: Member of the *German Association of University Professors and Lecturers (DHV)*
- Since 2009: Member of the *German Informatics Society (GI)*
- Since 2013: Member of the *Computability in Europe (CiE) Association*

Steering Committee memberships

- **SNR** (since 2017): International Workshop on Symbolic and Numerical Methods for Reachability Analysis
- **iFM** (since 2016): International Conference on integrated Formal Methods
- **FORTE** (2014-2017): IFIP International Conference on Formal Techniques for Distributed Objects, Components and Systems
- **ETAPS** (2013-2014): European Joint Conferences on Theory and Practice of Software

Program Committee co-chair

1. PhD Symposium at iFM'17 on Formal Methods: Algorithms, Tools and Applications (**PhD-iFM'17**)
2. Int. Workshop on Symbolic and Numerical Methods for Reachability Analysis (**SNR'17**)
3. Int. Conf. on integrated Formal Methods (**iFM'16**)
4. Int. Workshop on Satisfiability Checking and Symbolic Computation (**SC²'16**)
5. Int. Workshop on Symbolic and Numerical Methods for Reachability Analysis (**SNR'16**)
6. IFIP Int. Conf. on Formal Techniques for Distributed Objects, Components and Systems (**FORTE'14**)
7. Int. Conf. on Tools and Algorithms for the Construction and Analysis of Systems (**TACAS'14**)

Program Committee member

1. IEEE Int. Workshop on Formal Methods Integration (**FMi'17**)
2. Int. Conf. on Formal Modeling and Analysis of Timed Systems (**FORMATS'17**)
3. Int. Conf. on Fundamentals of Software Engineering (**FSEN'17**)
4. Int. Conf. on Hybrid Systems: Computation & Control (**HSCC'17**)
5. Int. Conf. on integrated Formal Methods (**iFM'17**)
6. Methoden und Beschreibungssprachen zur Modellierung und Verifikation von Schaltungen und Systemen (**MBMV'17**)
7. Int. Symp. on Practical Aspects of Declarative Languages (**PADL'17**)
8. Int. Conf. on Quantitative Evaluation of Systems (**QEST'17**)
9. Int. Workshop on Satisfiability Checking and Symbolic Computation (**SC²'17**)
10. Symp. on Dependable Software Engineering: Theories, Tools and Applications (**SETTA'17**)
11. Int. Conf. on Simulation and Modeling Methodologies, Technologies and Applications (**SIMULTECH'17**)
12. Int. Conf. on Current Trends in Theory and Practice of Computer Science (**SOFSEM'17**)
13. Int. SPIN Symp. on Model Checking of Software (**SPIN'17**)
14. Int. Symp. on Theoretical Aspects of Software Engineering (**TASE'17**)
15. Int. Conf. on Tools and Methods of Program Analysis (**TMPA'17**)
16. Int. Conf. on Verification, Model Checking, and Abstract Interpretation (**VMCAI'17**)

17. Int. Workshop on Exascale Multi/many Core Computing Systems (**E-MuCoCoS'16**)
18. Int. Symp. on Formal Methods (**FM'16**)
19. IEEE Int. Workshop on Formal Methods Integration (**FMi'16**)
20. Int. Conf. on Formal Techniques for Distributed Objects, Components and Systems (**FORTE'16**)
21. Int. Workshop Methoden und Beschreibungssprachen zur Modellierung und Verifikation von Schaltungen und Systemen (**MBMV'16**)
22. PhD Symposium at iFM'16 on Formal Methods: Algorithms, Tools and Applications (**PhD-iFM'16**)
23. Int. Conf. on Runtime Verification (**RV'16**)
24. Symp. on Dependable Software Engineering: Theories, Tools and Applications (**SETTA'16**)
25. Int. Workshop on Satisfiability Modulo Theories (**SMT'16**)
26. Int. SPIN Symp. on Model Checking Software (**SPIN'16**)
27. Int. Symp. on Theoretical Aspects of Software Engineering (**TASE'16**)

28. IFAC Conf. on Analysis and Design of Hybrid Systems (**ADHS'15**)
29. Int. Symp. on Automated Technology for Verification and Analysis (**ATVA'15**)
30. Int. Workshop on Design and Implementation of Formal Tools and Systems (**DIFTS'15**)
31. Int. Workshop on Exascale Multi/many Core Computing Systems (**E-MuCoCoS'15**)
32. Young Researchers' Conf. Frontiers of Formal Methods (**FFM'15**)
33. Int. Symp. on Formal Methods (**FM'15**)
34. IEEE Int. Workshop on Formal Methods Integration (**FMi'15**)

35. Int. Conf. on Formal Techniques for Distributed Objects, Components and Systems (**FORTE'15**)
36. IARCS Annual Conf. on Foundations of Software Technology and Theoretical Computer Science (**FSTTCS'15**)
37. Int. Conf. on Hybrid Systems: Computation and Control (**HSCC'15**)
(Additionally, **chair** of the HSCC'15 commission for the **Best Student Paper Award**)
38. Int. Symp. on NASA Formal Methods (**NFM'15**)
39. Int. Conf. Quantitative Evaluation of SysTems (**QEST'15**)
40. Summer Computer Simulation Conf. (**SCSC'15**)
41. Int. Conf. on Advances in System Simulation (**SIMUL'15**)
42. Int. Conf. on Tools and Algorithms for the Construction and Analysis of Systems (**TACAS'15**)
43. Int. Conf. on Verification, Model checking, and Abstract Interpretation (**VMCAI'15**)

44. Int. Workshop on Design and Implementation of Formal Tools and Systems (**DIFTS'14**)
45. IEEE Int. Workshop on Formal Methods Integration (**FMi'14**)
46. Int. Conf. on Formal Modeling and Analysis of Timed Systems (**FORMATS'14**)
47. Int. Workshop on Formal Techniques for Safety-Critical Systems (**FTSCS'14**)
48. Workshop on Hybrid Autonomous Systems (**HAS'14**)
49. Int. Conf. on Hybrid Systems: Computation and Control (**HSCC'14**)
50. Int. Conf. on integrated Formal Methods (**iFM'14**)
51. Summer Computer Simulation Conf. (**SCSC'14**)
52. Int. Conf. on Advances in System Simulation (**SIMUL'14**)
53. Int. Conf. on Simulation and Modeling Methodologies, Technologies and Applications (**SIMULTECH'14**)
54. Int. Workshop on Harnessing Theories for Tool Support in Software (**TTSS'14**)

55. IEEE Int. Workshop on Formal Methods Integration (**FMi'13**)
56. Int. Conf. on Formal Modeling and Analysis of Timed Systems (**FORMATS'13**)
57. Int. Workshop on Formal Techniques for Safety-Critical Systems (**FTSCS'13**)
58. Int. Conf. on Hybrid Systems: Computation and Control (**HSCC'13**)
59. Int. Conf. on integrated Formal Methods (**iFM'13**)
60. Int. Conf. on Advances in System Simulation (**SIMUL'13**)
61. Int. Conf. on Simulation and Modeling Methodologies, Technologies and Applications (**SIMULTECH'13**)
62. Int. Conf. on Tools and Algorithms for the Construction and Analysis of Systems (**TACAS'13**)

63. Int. Symp. on Formal Aspects of Component Software (**FACS'12**)
64. Int. Workshop on Formal Techniques for Safety-Critical Systems (**FTSCS'12**)
65. Int. Conf. on Hybrid Systems: Computation and Control (**HSCC'12**)
66. Int. Workshop on Numerical Software Verification (**NSV'12**)
67. Int. Conf. on Quantitative Evaluation of Systems (**QEST'12**)
68. Int. Conf. on Simulation and Modeling Methodologies, Technologies and Applications (**SIMULTECH'12**)

- 69. Int. Symp. on Formal Aspects of Component Software (**FACS'11**)
- 70. Int. Symp. on Fundamentals of Computation Theory (**FCT'11**)
- 71. Int. Conf. on Simulation and Modeling Methodologies, Technologies and Applications (**SIMULTECH'11**)
- 72. Int. Workshop on Rewriting Techniques for Real-Time Systems (**RTRTS'10**)
- 73. Int. Symp. on Theoretical Aspects of Software Engineering (**TASE'10**)

Further reviewing activities

- Project reviewer: Israel Science Foundation; Stadt Wien, Austria; FWF, Austria; Linz Institute of Technology, Austria; FEMtech, Austria; City University of Hong Kong, China
- Book reviewer for Springer International Publishing
- Reviewer for numerous journals (computer science, mathematics)

Commission work

Since 2017	Representative of the German Informatics Society at the Fachgruppe Computeralgebra
Since 2017	Member of the Informatics Europe Working Group <i>Women in Informatics Research and Education</i>
2016	Jury member for the <i>2016 Minerva Informatics Equality Award</i>
Since 2012	Deputy equal opportunity commissioner of the RWTH Aachen University
2010-2011	Speaker of the young scientists at RWTH Aachen University
Since 2008	Member of different commissions at RWTH Aachen University

Supervision of Ph.D. students

Current supervision:	Gereon Kremer, Francesco Leofante, Ulrich Loup, Stefan Schupp (RWTH Aachen University, Aachen, Germany)
Graduated 12/2016:	Johanna Nellen (RWTH Aachen University, Aachen, Germany) <i>Analysis and Synthesis of Hybrid Systems in Control Engineering</i>
Graduated 10/2016:	Florian Corzilius (RWTH Aachen University, Aachen, Germany) <i>Integrating Virtual Substitution into Strategic SMT Solving</i>
Graduated 04/2015:	Daniela Lepri (University of Oslo, Oslo, Norway) <i>Timed Temporal Logic Model Checking of Real-Time Systems – A Rewriting-Logic-Based Approach</i>
Graduated 03/2015:	Xin Chen (RWTH Aachen University, Aachen, Germany) <i>Reachability Analysis of Non-Linear Hybrid Systems Using Taylor Models</i>
Graduated 03/2015:	Nils Jansen (RWTH Aachen University, Aachen, Germany) <i>Counterexamples in Probabilistic Verification</i>
Graduated 09/2014:	Muhammad Fadlisyah (University of Oslo, Oslo, Norway) <i>A Rewriting-Logic-Based Approach for the Formal Modeling and Analysis of Interacting Hybrid Systems</i>

Evaluation commissions

Ph.D. reviews:	Ayman Aljarbough, INRIA Rennes / IRISA, France, 2017 Haniel Barbose, INRIA Nancy, France, 2017 Curtis Bright, University of Waterloo, Canada, 2017 Christian Meirich, RWTH Aachen University, Germany, 2017 Yuliia Romenska, VERIMAG Grenoble, France, 2017 Niloofar Safiran, RWTH Aachen University, Germany, 2017 Souha Ben-Rayana, VERIMAG Grenoble, France, 2016 Crystal Din, University of Oslo, Norway, 2014 Georgeta Igna, University of Nijmegen, The Netherlands, 2013 Melanie Winkler, RWTH Aachen University, Germany, 2013 Romain Testylier, VERIMAG Grenoble, France, 2013
External advisor:	PhD program committee of the University of Genoa
Appointment committees:	RWTH Aachen University, Germany (since 2008); Aarhus University, Denmark (2013-2014); University of Oslo, Norway; University of Twente, The Netherlands (2015-2016); Radboud University Nijmegen, The Netherlands (2016)

Teaching since 2008

Bachelor/Master at RWTH Aachen University:

Summer term 2014:	<i>Data structures and algorithms</i> (~400 students) Average evaluation: 1.7 (scale 1-5 with 1 being the best)
Each winter term:	Lecture on <i>Satisfiability checking</i> Average evaluation: 1.5 (scale 1-5 with 1 being the best)
Each sommer term:	Lecture on <i>Modeling and analysis of hybrid systems</i> Average evaluation: 1.6 (scale 1-5 with 1 being the best)
Each semester:	<i>Seminars</i> and <i>practical courses</i> related to the above areas

Doctoral studies:

09-10/2017:	Doctoral course on the <i>Modeling and analysis of hybrid systems</i> at the University of Szeged, Hungary
10/2015:	Doctoral course on <i>Formal methods for hybrid systems</i> at the University of Genoa, Italy
06/2014:	Half-day tutorial <i>Probabilistic Modeling and Model Checking</i> at the Int. School on Formal Methods for the Design of Computer, Communication and Software Systems: Executable Software Models (SFM-14:ESM), Bertinoro, Italy

High-school activities:

Organization of annual events for high-school students: Lecture series “What is Computer Science?”, Summer University, Aachen Computer Science Days
Contribution to different events for pupils and high-school students: Girls’ Day, Helle Köpfe, Cybermentor

October 5, 2017