

André Platzer

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Contact Information

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Research Interests

- Logical foundations of cyber-physical systems
- Logic in computer science, programming languages & formal methods
- Logic of multi-dynamical systems: hybrid systems, distributed hybrid systems, stochastic hybrid systems, hybrid games
- Proof theory
- Automated theorem proving & model checking
- Computer algebra & symbolic computation

Academic Appointments

Carnegie Mellon University, Pittsburgh, PA
Associate Professor of Computer Science 7/2014-present
Assistant Professor of Computer Science 10/2008-6/2014
Courtesy appointment in Electrical and Computer Engineering
Courtesy appointment in the Robotics Institute

Visiting Positions

Technical University Munich
Visiting Professor of Computer Science 1/2019-08/2019
Cornell University, Ithaca, NY
Visiting Associate Professor of Computer Science 5/2015-08/2015

Education

- **Ph.D. Computer Science, University of Oldenburg**, Germany, 12/2008
Title: “Differential Dynamic Logics: Automated Theorem Proving for Hybrid Systems”
Advisor: Professor Ernst-Rüdiger Olderog
Referee: Professor George J. Pappas, University of Pennsylvania, Philadelphia, PA
Referee: Professor Tobias Nipkow, Technical University of Munich, Germany
Grade: *summa cum laude*
Award: ACM Doctoral Dissertation Honorable Mention Award
- **M.Sc. Computer Science, University of Karlsruhe (TH)**, Germany, 09/2004
Thesis: “An Object-oriented Dynamic Logic with Updates”
Advisor: Professor Peter H. Schmitt
Advisor: Professor Bernhard Beckert, University of Koblenz-Landau, Germany
Grade: *summa cum laude, with distinction*
- Studied Mathematics at Fernuni Hagen, Germany, during social service, 1998-1999

Awards and Honours

1. *Humboldt Research Fellowship* for Experienced Researchers, 2019 *Carl Friedrich von Siemens Research Fellowship*, 2019, DFG Mercator Fellow
2. *NSF CAREER* Award, 2011
3. IEEE Intelligent Systems’ *AI’s 10 to Watch* Award, 2010
4. *ACM Doctoral Dissertation Honorable Mention* Award, 2009
5. *Brilliant 10* Award of Popular Science Magazine, 2009
6. Best Paper Awards at FM’09 and TABLEAUX’07
7. Award of the Floyd und Lili Biava Stiftung, 09/2006
8. Graduation with distinction, University of Karlsruhe (TH), Germany, 2004

9. Support by the William-Stern-Gesellschaft Mathematical Talent Program for Gifted Pupils, Hamburg, 1991-1998

Teaching Experience

- 15-414/15-614 Bug Catching: Automated Program Verification (Undergraduate course in the Computer Science Department, Fall 2017, co-developed with Matt Fredrikson)
- 15-317/15-357 Constructive Logic (Undergraduate course in the Computer Science Department, Carnegie Mellon University, Fall 2015, Fall 2016)
- 15-824 Programming Language Semantics (Graduate course in the Computer Science Department, Carnegie Mellon University, Spring 2015, Spring 2018)
- 15-424/15-624/15-824 (Logical) Foundations of Cyber-Physical Systems (Undergraduate course in the Computer Science Department, Carnegie Mellon University, Fall 2013, ENS Lyon Spring 2014, MAP-i Braga Portugal Summer 2014, CMU Fall 2014, CMU Spring 2016, CMU Spring 2017, CMU Fall 2018)
- 15-122 Principles of Imperative Computation (Introductory course in the Computer Science Department at Carnegie Mellon University, Spring 2012, Spring 2013, Spring 2014)
- 15-411 Compiler Design (Undergraduate course in the Computer Science Department, Carnegie Mellon University, Fall 2010, Fall 2011, Fall 2012)
- 15-816 Modal Logic (Graduate course in the Computer Science Department, Carnegie Mellon University, co-taught with Frank Pfenning, Spring 2010)
- 15-819M Data, Code, Decisions (Graduate course in the Computer Science Department, Carnegie Mellon University, Fall 2009)
- 15-819N/18-879L Logical Analysis of Hybrid Systems (Graduate course in the Computer Science Department and the Electrical Engineering Department, Carnegie Mellon University, Spring 2009 and Spring 2011)

Ph.D. Student & Postdoc Advising

- Jonathan Laurent, Ph.D., since 11/2018
- Fabian Immler, postdoc, since SU'18
- Katherine Cordwell, Ph.D., since F'17
- Andrew Sogokon, postdoc, S'17-S'19
- Yong Kiam Tan, Ph.D., since F'16
- Brandon Bohrer, Ph.D., since F'15, Alan J. Perlis Graduate Student Teaching Award
- Ran Ji, postdoc, F'14-S'16
- Nathan Fulton, "Verifiably Safe Autonomy for Cyber-Physical Systems", Ph.D., F'13-11/2018,
- Marcus Völp, postdoc F'13-S'14,
- Jean-Baptiste Jeannin, postdoc F'13-S'15,
- Jan-David Quesel, postdoc F'13-S'14,
- Stefan Mitsch, postdoc F'12-S'15,
- Khalil Ghorbal, postdoc F'12-S'15,
- Grant Olney Passmore, visiting postdoc F'12,
- David Henriques, graduated at CMU|Portugal partner IST Superiore,
- João Guerra Martins, Ph.D., since F'10
- Ping Hou, postdoc, S'11-S'12,
- Erik Peter Zawadzki, Ph.D., since S'10, co-advised with Geoff Gordon

- Sarah Michelle Loos, “Differential Refinement Logic”, Ph.D., S’10–11/2015, Teaching Award, CMU SCS Thesis Award Honorable Mention,

Undergraduate & Masters Advising

- David Bayani, “Implementing Invariant Generation in the KeYmaera X Prover for Hybrid Systems Verification”, F’15–S’16
- Catarina Lobo do Souto Ferreira, internship F’15, “Applying Dynamic Doxastic Differential Dynamic Logic to the AF-447 Incident”, University of Porto, Portugal
- Annika Peterson, senior thesis, S’15, “Formal Verification of a Controlled Flight Between Two Robots: A Case Study”, Allen Newell Award for Excellence in Undergraduate Research and Second place in the Boeing Blue Skies Competition with special mention for “Most Creative” project.
- Annika Peterson, independent study, S’14, “Formal Verification of a Controlled Flight Between Two Robots: A Case Study”, Second place in the SRC-URO Poster Competition.
- Jordan Williams, independent study, S’14, “Variable Dependence in Hybrid Programs”
- Bill Zorn, independent study, S’14, “Execution-based Debugging for Hybrid Programs”
- David Vogelbacher, bachelor’s thesis, Karlsruhe Institute of Technology, Karlsruhe, Germany, S’14.
- Il Suk Lyu, undergraduate project, S’13, “Simulating Hybrid Programs in Mathematica”
- Matt McKay, independent study, S’13, “Static Verification of C0 Programs Using the Z3 Theorem Prover”
- Jean-Bastien Grill, internship, S’12, “Extending Logic for Stochastic Hybrid Programs” from École Normale Supérieure, Paris, France
- Alex Crichton and Robbie McElrath, independent study, “Joule – a JIT for Lua”, S’12
- Romuald Brillout, M.Sc., Karlsruhe Institute of Technology, 04/2012, “Using Theorem Provers as Preprocessors for Hybrid Systems Model Checking” from Karlsruhe Institute of Technology, Germany
- Jingyi Ni, undergraduate project, “Search-based Bug Finding in Hybrid Programs”
- Lesley Linné, independent study, S’10, co-advised with Edmund M. Clarke, “Logic and Model Checking”
- Jan-David Quesel, “A theorem prover for differential dynamic logic”, M.Sc., 04/2007
- Stephanie Kemper, “SAT-based verification for abstraction-refinement”, M.Sc., 01/2006

Longer-term Visitors

- Luis Garcia, Rutgers University, SU’17–F’17
- Lorenz Sahlmann, École Polytechnique, Paris, France, S’16–SU’16
- Andreas Müller, Johannes Kepler University, Linz, Austria, F’13, S’15.
- Yanni Kouskoulas, Johns Hopkins University Applied Physics Lab, S’12, F’12, S’14, F’16
- Stefan Mitsch, Johannes Kepler University, Linz, Austria
- Romuald Brillout, Karlsruhe Institute of Technology, Karlsruhe, Germany, F’11–S’12

**Ph.D.
Committees**

- Cláudio Gomes, Ph.D., “Property Preservation in Co-simulation”, Universiteit Antwerpen, Belgium, S’19.
- Sarah Grebing, Ph.D., “User Interaction in Deductive Interactive Program Verification”, Karlsruhe Institute of Technology, S’19.
- Ivan Ruchkin, Ph.D., “Integration of Modeling Methods for Cyber-Physical Systems”, F’18
- Andreas Müller, Ph.D., “Component-based Deductive Verification of Cyber-physical Systems”, Johannes Kepler University, Linz, F’17
- Xian Li, Ph.D., “Induction-based Verification of Synchronous and Hybrid Programs”, Technical University of Kaiserslautern, F’17
- Richard Bubel, Habilitation, “Deductive Verification: From Theory to Practice”, Technical University of Darmstadt, S’17
- Jiaqi Tan, Ph.D., “Provable, Preventative Control-Flow Integrity for Open and Connected Embedded Software”, F’16
- Henry DeYoung, present
- Chris Martens, Ph.D., “Programming Interactive Worlds with Linear Logic”, S’15
- Nikos Aréchiga, Ph.D., “Controller Verification and Design with Logical Analysis Support”, S’15
- Aaron Kane, Ph.D., “Runtime Monitoring for Safety-Critical Embedded Systems”, S’15
- Thanassis Avgerinos, Ph.D., “Exploiting Trade-offs in Symbolic Execution for Identifying Security Bugs”, S’14
- Akshay Rajhans, Ph.D., “Multi-model heterogeneous verification of cyber-physical systems”, S’13
- Pongsin Poosankam, Ph.D., “Scaling Concolic Execution of Binary Programs for Security Applications”, F’13
- Robert Simmons, Ph.D., “Substructural logical specifications”, F’12

**Undergraduate
& Masters
Committee**

- Seulkee Baek, “Reflected Decision Procedures in Lean”, Masters, 12/2018
- Jason Koenig, “Program Analysis for Introductory Education: Leveraging Programmer Specifications”, Masters, 08/2014
- Sicun Gao, “Counting zeros over finite fields with Gröbner Bases”, Masters, 05/2009
- Johannes Rieken, “Design by contract for Java - revised”, M.Sc.,04/2007
- Martin Schnaidt, “Runtime-checking of JML-specifications with Jass”, M.Sc., 02/2006

**Software
Development**

KeYmaera X: An aXiomatic tactical theorem prover for hybrid systems	2014-
KeYmaeraD: Distributed hybrid theorem prover for distributed hybrid systems	2009
KeYmaera: A hybrid theorem prover for hybrid systems	2006-
AMC: Approximation refinement model checker for hybrid systems	2006
SAAAtRe: SAT-based abstraction refinement model checker, real-time systems	2005
Orbital library: Computer algebra and theorem proving	1996-

Professional Service

Editorial Board: Acta Informatica since 2014

Grant proposal reviewing: National Science Foundation NSF CPS CNS CCF CAREER SHF, Natural Sciences and Engineering Research Council of Canada (NSERC), Advanced Research Projects Agency - Energy (ARPA-E), German Research Council (DFG), Exzellenzcluster

PC member: Numerical Software Verification workshop 2009, HSCC 2010, IJCAR 2010, FORMATS 2010, HSCC 2011, TABLEAUX 2011, FMOODS/FORTE 2011, FTP 2011, HSCC 2012, FM 2012, SVARM-VERIFY 2012, HSCC 2013, ICALP 2013 Track B, SCSS 2013, Statistical Model Checking workshop 2013, Analytic Virtual Integration of Cyber-Physical Systems workshop AVICPS 2013, FM 2014, Nasa Formal Methods NFM 2014, GandALF 2014, Applied Verification for Continuous and Hybrid Systems ARCH 2014, JELIA 2014, HSCC 2015, CAV 2015, CADE 2015, HotSOS 2016, Applied Verification for Continuous and Hybrid Systems ARCH 2015+2016, Workshop on Embedded and Cyber-Physical Systems Education 2016, HSCC 2017, Workshop DaLí - Dynamic Logic 2017, MEMOCODE 2017, HSCC 2018, ITP 2018, IJCAI-ECAI 2018, ARCH 2018, CICM 2018, FASE 2019, CPP 2019, CADE 2019, FM 2019, Doctoral Symposium @ FM 2019, LICS 2020

Journal referee: Journal of Automated Reasoning, Formal Methods in System Design, Discrete Event Dynamic Systems, ACM Transactions on Embedded Computing Systems, Journal of Symbolic Computation, ACM Transactions on Software Engineering and Methodology, IEEE Transactions on Software Engineering, Autonomous Robots, Theoretical Computer Science, Journal of the ACM, ACM Transactions on Computational Logic, Communications of the ACM

Book referee: Springer

Community service: NSF Young Professional Workshop on Exploring New Frontiers in Cyber-physical Systems 2014, NSF Workshop for Aspiring PIs in Cyber-Physical Systems 2014, IEEE CSS Technical Committee on Hybrid Systems 2014–

Reviewing service: ACM Reviewer for Computing Reviews, Reviewer for AMS Mathematical Reviews

Educational service: Education Co-director for the NSF EXPEDITION CMACS

University service: Committee for restructuring undergraduate education at CMU, Speakers Club, Ph.D. Admissions Committee, Faculty Search Committee, Microsoft Fellowship Nomination Committee, Sandia Fellowship Nomination Committee, IBM Fellowship Nomination Committee, Open House 2014 & 2015

Memberships

ACM'05 SM'17 SIGLOG & SIGACT & SIGBED & SIGPLAN, IEEE'06 SM'17 Computer Systems Society & Control Society & Intelligent Transportation Systems Society, Association for Symbolic Logic'06, Association for Automated Reasoning'06, American Association for the Advancement of Science'17

Languages

English, German, basics in French

Invited Talks, Tutorials, Courses & Lectures

1. “Modular Formal Verification of Cyber-Physical Systems”, Contributed tutorial at Formal Methods Symposium, Porto, Portugal, 10/2019.
2. “The Logical Path to Autonomous Cyber-Physical Systems”, invited talk, International Conference on Quantitative Evaluation of SysTems QEST, Glasgow, UK, 09/2019.
3. “Logical Foundations of Cyber-Physical Systems”, Marktoberdorf Summer School, Marktoberdorf, Germany, 08/2019.
4. “Programming Cyber-Physical Systems with Logic”, Contributed tutorial at Symposium on Principles of Programming Languages POPL, Lisbon, Portugal, 01/2019.
5. “Safe AI in CPS”, International Test Conference ITC, Phoenix, AZ, USA, 10/2018.

6. “Safe Reinforcement Learning via Formal Methods”, Summit on Machine Learning Meets Formal Methods, Oxford, UK, 07/2018.
7. “Logic of Distributed Hybrid Games”, International Workshop on Methods and Tools for Distributed Hybrid Systems, Ecole polytechnique, Paris, France, 07/2018.
8. “Wie gut sind selbstfahrende Autos?”, William-Stern-Gesellschaft und Mathematische Gesellschaft in Hamburg, Germany, 06/2018.
9. “Logical Foundations of Cyber-Physical Systems”, invited talk, Logical Foundations of Computer Science LFCS, Nerode 85 Session, Dearfield Beach, FL, 01/2018.
10. “Logic & Proofs for Cyber-Physical Systems with KeYmaera X”, invited talk, Integrated Formal Methods iFM, Turin, Italy, 09/2017.
11. “Dynamic Logic for Dynamical Systems”, Marktoberdorf Summer School on Logical Methods for Safety and Security of Software Systems, Marktoberdorf, Germany, 08/2017.
12. “Logical Foundations of Cyber-Physical Systems”, Summer School on Cyber-Physical Systems, Halmstad, Sweden, 07/2017.
13. “Lessons from the Formal Verification of the Next-generation Airborne Collision Avoidance System ACAS X”, invited talk, Verification vs. Certification for Software Intense Systems, 4th AIAA SciTech Software Challenges in Aerospace symposium, Grapevine, TX, 01/2017.
14. “How to Prove Hybrid Systems”, keynote talk, MEMOCODE, IIT Kanpur, India, 11/2016.
15. Stefan Mitsch, Nathan Fulton, André Platzer. “KeYmaera X Tutorial: Tactics and Proofs for Cyber-Physical Systems”, Contributed tutorial at Formal Methods FM 2016, Cyprus, 11/2016.
16. “Logic & Proofs for Cyber-Physical Systems”, International Joint Conference on Automated Reasoning (IJCAR), Coimbra, Portugal, 06/2016.
17. Nathan Fulton, Stefan Mitsch, André Platzer. “From Idea to Provably Safe Implementation: Modeling, Proving, Simulation, and Synthesis in KeYmaera X”, Contributed tutorial at CPSWEEK 2016, Vienna, Austria, 04/2016.
18. “How to Prove Hybrid Systems and Why that Matters”, International Conference on Complex Systems Engineering (ICCSE), Storrs, Connecticut, 11/2015.
19. “Logical Foundations of Cyber-Physical Systems”, Invited lecture at AVACS Autumn School, Oldenburg, Germany, 10/2015.
20. “Differential Game Logic”, Invited presentation at AVACS Concluding Colloquium, Oldenburg, Germany, 09/2015.
21. “Proving Hybrid Systems”, Invited tutorial at FMCAD, Austin, TX, 09/2015.
22. “Logical Foundations of Cyber-Physical Systems: The Basis for Correctness”, Invited talk at NITRD HCSS, NSF, Arlington, VA, 04/2015.
23. “Logical Foundations of Cyber-Physical Systems”, Invited talk at QuantLA Workshop, Dresden, Germany, 10/2014.
24. “Logical Foundations of Cyber-Physical Systems”, Invited talk at HCSS’14, Annapolis, MD, USA, 05/2014.
25. “Foundations of Cyber-Physical Systems”, Invited course at MAP-i, Universities of Minho, Braga, Porto and Aveiro, Portugal, 03/2014.
26. “Logical Foundations of Cyber-Physical Systems” and “Developing a Successful NSF Proposal”, NSF Workshop for Aspiring PIs in Cyber-Physical Systems, 02/2014.

27. “Logic of Dynamical Systems”, Invited Research School at École Normale Supérieure (ENS) de Lyon, France, 01/2014.
28. “Hybrid Systems Verification”, Invited talk at Formal Methods for Robotics and Automation, Berlin, Germany, 06/2013.
29. “How to Explain Cyber-Physical Systems to Your Verifier”, invited talk at VSTTE’13, Atherton, CA, USA, 05/2013.
30. “Logic of Hybrid Games”, invited talk at LCCC Focus Period and Workshop on Formal Verification of Embedded Control Systems, Lund, Sweden, 04/2013.
31. “Logic of Dynamical Systems”, invited course at European PhD Program in Computational Logic, Basic Training Camp, Dresden, Germany, 12/2012.
32. “Logical Analysis of Hybrid Systems: The KeYmaera Approach”, invited course at Verified Software Summer School at 2nd Verified Software Workshop by East China Normal University and Microsoft Research Asia, Shanghai, 08/2012.
33. “Differential Dynamic Logic and Differential Invariants for Hybrid Systems”, Invited talk at ITP’12, Princeton, NJ, 08/2012.
34. “Logical Analysis of Hybrid Systems: A Completeness Answer to a Complexity Challenge”, Keynote speaker at Descriptive Complexity of Formal Systems (DCFS), Braga, Portugal, 07/2012.
35. “Logics of dynamical systems”, Invited tutorial at LICS’12, Dubrovnik, Croatia, 06/2012.
36. “Logical Analysis of Hybrid Systems: The KeYmaera Approach”, Invited tutorial at FroCoS’11, Saarbrücken, Germany, 10/2011.
37. “The Correct Future of Intelligent Transportation Systems”, Invited talk at Intelligent Transportation Society Tri-Chapter Annual Meeting, Hagerstown, MD, 09/2011.
38. “Logic and Compositional Verification of Hybrid Systems”, Invited tutorial at CAV’11, Snowbird, UT, 07/2011.
39. “Logical Analysis of Hybrid Systems: How Logic and Computer Algebra Help Save the World”, Invited talk at Applications of Computer Algebra ACA’11, Houston, TX, 06/2011.
40. “Logical Analysis of Hybrid Systems”, Verification of Control Systems at CDC, 12/2010.
41. “Real Analysis for Complex Systems”, Keynote speaker at VERIFY’10, Edinburgh, 07/2010.
42. “Proof Systems for Hybrid System Logics”, Invited talk at Proof Systems for Program Logics PSPL’10, Edinburgh, 07/2010.
43. “Hybrid Logical Verification for Hybrid Systems”, Caltech Workshop on Verification and Validation, Pasadena, CA, 09/2009.
44. “Differential Dynamic Logics: Automated Theorem Proving for Hybrid Systems”, GI-Kolloquium, Dagstuhl, Germany, 5/2009.
45. “Symbolic Computations in Hybrid Systems Verification: Why symbolic computations are required for hybrid systems analysis”, NSF Workshop on Symbolic Computation for Constraint Satisfaction Problems, Arlington, VA, 11/2008
46. “Differential dynamic logic for verifying parametric hybrid systems”, German Verification Day at Conference on Computer Aided Verification, CAV 2007, Berlin, 07/2007
47. “Differential dynamic logic for hybrid systems”, 6th KeY Symposium 2007, Eisenbachthal, Germany, 06/2007
48. “Abstraction refinement for hybrid systems”, 4th KeY Symposium, Gothenburg, Sweden, 06/2005

**Colloquia &
Seminar Talks**

1. TBA, University of Aarhus, 06/2019.
2. TBA, University of Aalborg, 06/2019.
3. “Safe AI & Cyber-Physical Systems”, University of Oldenburg, Kolloquium, 04/2019.
4. “Differential Equation Axiomatization”, IST Austria, 04/2019.
5. “Uniform Substitution for Differential Dynamic Logic”, TU Munich, 01/2019.
6. “Logic & Proofs for Cyber-Physical Systems with KeYmaera X”, Universidade Nova Lisboa, Lisbon, Portugal, 01/2019.
7. “Differential Equation Axiomatization”, University of California, Berkeley, 11/2018.
8. “Differential Equation Axiomatization”, University of Pennsylvania, Mathematics Colloquium, 11/2018.
9. “Differential Equation Axiomatization”, Cornell University, 10/2018.
10. “Differential Equation Axiomatization”, Karlsruhe Institute of Technology, 08/2018.
11. “Differential Equation Axiomatization”, Kolchin Seminar, Courant Institute, New York University, 04/2018.
12. “Logic & Proofs for Cyber-Physical Systems”, Symbolic-Numeric Computing Seminar, City University New York, 04/2018.
13. “Logic of Dynamical Systems”, CMU Center for Nonlinear Analysis, 02/2018.
14. “Logic & Proofs for Cyber-Physical Systems with KeYmaera X”, Cornell University, 11/2017.
15. “Logic & Proofs for Cyber-Physical Systems” Technical University Darmstadt, 06/2017.
16. “Logic & Proofs for Cyber-Physical Systems” Karlsruhe Institute of Technology, 11/2016.
17. “Logic & Proofs for Cyber-Physical Systems” Technical University Darmstadt, 11/2016.
18. “A Uniform Substitution Calculus for Differential Dynamic Logic. or: How I Learned to Stop Instantiating and Love the Substitution”, University of Oldenburg, 07/2016.
19. “Logic of Hybrid Games”, TU Berlin, 07/2016.
20. “Logic of Hybrid Games”, TU Munich, 04/2016.
21. “Logical Foundations of Cyber-Physical Systems and How They Help Prove Aircraft”, MIT, 11/2015.
22. “A Uniform Substitution Calculus for Differential Dynamic Logic. or: How I Learned to Stop Instantiating and Love the Substitution”, Cornell, 05/2015.
23. “Logical Foundations of Cyber-Physical Systems”, École Polytechnique, 10/2014.
24. “Logic of Hybrid Games”, École Polytechnique, 10/2014.
25. “Logic of Hybrid Games”, Cornell University, 08/2014.
26. “Proving Cyber-Physical Systems with KeYmaera”, Safe and Secure Systems and Software Symposium (S5), Dayton, OH, 06/2014.
27. “Logic of Hybrid Games”, Dagstuhl Seminar on Cyber-Physical Systems, 03/2014.
28. “Logic of Hybrid Games”, Dagstuhl Seminar on Deduction & Arithmetic, 10/2013.
29. “Logic of Hybrid Games”, University of Cambridge, 10/2013.
30. “Logic of Hybrid Games”, University of California, Berkeley, 05/2013.
31. “Logic of Hybrid Games”, IST, Austria, 04/2013.
32. “How to Prove Your Robot Safe”, TU Wien, Austria, 04/2013.
33. “Toward a Driver’s License Test for Robotic Cars: How to Prove Your Car Correct”, Invited talk at McMaster University department seminar, 03/2012.

34. “Logical Analysis of Hybrid Systems: Proving Theorems for Complex Dynamics”, Invited talk at MsSCert Seminar, McMaster University, 03/2012.
35. “Logical Analysis of Hybrid Systems”, Distinguished lecture, Model Based Systems Engineering Colloquium, University of Maryland, College Park, MD, 09/2011.
36. “Logical Analysis of Hybrid Systems”, Mathematics Colloquium, University of Pittsburgh, PA, 09/2011.
37. “Logical Analysis of Hybrid Systems”, SRI, 06/2010.
38. “Logical Analysis of Hybrid Systems”, RI Seminar, CMU, 02/2011.
39. “Logical Analysis of Hybrid Systems”, University of California, Berkeley, 12/2009.
40. “Automated Deduction for Hybrid Systems”, Interaction versus Automation - The Two Faces of Deduction, Dagstuhl, 10/2009.
41. “Hybrid Systems Verification and Collision Avoidance for Aircraft”, NIA + NASA, Hampton, VA, 06/2009.
42. “Saturation-based Scaling Techniques for Symbolic Verification of Hybrid Systems”, University of California, Berkeley, 10/2008
43. “Hybrid-differential logic for parametric verification”, University of Koblenz-Landau, Germany, 03/2006

**Textbook
Publications**

1. **André Platzer.** *Logical Foundations of Cyber-Physical Systems.* Springer, Cham, 2018. 659 pages.
Lecture Videos: <http://video.lfcps.org/>

**Book
Publications**

1. **André Platzer.** *Logical Analysis of Hybrid Systems: Proving Theorems for Complex Dynamics.* Springer, Heidelberg, 2010. 426 pages.

**Refereed
Book
Chapters**

1. Laurent Doyen, Goran Frehse, George J. Pappas and **André Platzer.** *Verification of hybrid systems.* In Edmund M. Clarke, Thomas A. Henzinger, Helmut Veith and Roderick Bloem, editors, *Handbook of Model Checking*, pp. 1047–1110. Springer, 2018.

**Refereed
Journal
Publications**

1. Andreas Müller, Stefan Mitsch, Werner Retschitzegger, Wieland Schwinger and **André Platzer.** *Tactical contract composition for hybrid system component verification.* *STTT*, **20**(6), pp. 615–643. Special issue for selected papers from FASE’17.
2. Stefan Mitsch, Khalil Ghorbal, David Vogelbacher and **André Platzer.** *Formal verification of obstacle avoidance and navigation of ground robots.* *International Journal of Robotics Research.* **36**(12), pp. 1312-1340, 2017.
3. **André Platzer.** *Differential hybrid games.* *ACM Trans. Comput. Log.*, **18**(3), pp. 19:1–19:44, 2017.
4. Jean-Baptiste Jeannin, Khalil Ghorbal, Yanni Kouskoulas, Aurora Schmidt, Ryan Gardner, Stefan Mitsch and **André Platzer.** *A formally verified hybrid system for safe advisories in the next-generation airborne collision avoidance system.* *STTT*, **19**(6), pp. 717-741, 2017. Special issue for selected papers from TACAS’15.
5. **André Platzer.** *A complete uniform substitution calculus for differential dynamic logic.* *Journal of Automated Reasoning*, **59**(2), pp. 219-265, 2017.
6. Stefan Mitsch and **André Platzer.** *ModelPlex: Verified runtime validation of verified cyber-physical system models.* *Formal Methods in System Design*, **49**(1), pp. 33-74, 2016. Special issue for selected papers from RV’14.

7. Khalil Ghorbal, Andrew Sogokon and **André Platzer**. [A hierarchy of proof rules for checking positive invariance of algebraic and semi-algebraic sets](#). *Computer Languages, Systems & Structures*, **47**(1), pp. 19-43, 2017. Special issue for selected papers from VMCAI'15.
8. Jan-David Quesel, Stefan Mitsch, Sarah Loos, Nikos Aréchiga, and **André Platzer**. [How to model and prove hybrid systems with KeYmaera: A tutorial on safety](#). *Software Tools for Technology Transfer*, **18**(1), pp. 67–91, 2016.
9. **André Platzer**. [Differential game logic](#). *ACM Trans. Comput. Log.*, **17**(1), pp. 1:1–1:52, 2015.
10. Stefan Mitsch, **André Platzer**, Werner Retschitzegger and Wieland Schwinger. [Logic-based modeling approaches for qualitative and hybrid reasoning in dynamic spatial systems](#). *ACM Computing Surveys*, **48**(1), pp. 3:1–3:40, 2015.
11. Khalil Ghorbal, Jean-Baptiste Jeannin, Erik P. Zawadzki, **André Platzer**, Geoffrey J. Gordon, and Peter Capell. [Hybrid theorem proving of aerospace systems: Applications and challenges](#). *Journal of Aerospace Information Systems*, **11**(10), pp. 702–713, 2014. Special issue on Software Challenges in Aerospace.
12. Akshay Rajhans, Ajinkya Bhave, Ivan Ruchkin, Bruce H. Krogh, David Garlan, **André Platzer** and Bradley Schmerl. [Supporting heterogeneity in cyber-physical systems architectures](#). *IEEE Transactions on Automatic Control*. **59**(12), pp. 3178–3193, 2014. Special issue on Control of Cyber-Physical Systems.
13. Stefan Mitsch, Grant Olney Passmore and **André Platzer**. [Collaborative verification-driven engineering of hybrid systems](#). *Mathematics in Computer Science*, **8**(1), pp. 71–97, 2014. Special issue on Enabling Domain Experts to use Formalized Reasoning.
14. Paolo Zuliani, **André Platzer** and Edmund M. Clarke. [Bayesian statistical model checking with application to Stateflow/Simulink verification](#). *Formal Methods in System Design*, **43**(2), pp. 338-367, 2013. Special issue on Probabilistic Model Checking.
15. **André Platzer**. [A complete axiomatization of quantified differential dynamic logic for distributed hybrid systems](#). *Logical Methods in Computer Science*, **8**(4), pp. 1-44, 2012. Special issue for selected papers from CSL'10.
16. **André Platzer**. [The structure of differential cuts and differential cut elimination](#). *Logical Methods in Computer Science*, **8**(4), pp. 1-38, 2012.
17. **André Platzer** and Edmund M. Clarke. [Computing differential invariants of hybrid systems as fixedpoints](#). *Formal Methods in System Design*, **35**(1), pp. 98-120, 2009. Special issue for selected papers from CAV'08.
18. **André Platzer**. [Differential-algebraic dynamic logic for differential-algebraic programs](#). *Journal of Logic and Computation*, **20**(1), pp. 309-352, 2010. Advance Access published on November 18, 2008.
19. **André Platzer**. [Differential dynamic logic for hybrid systems](#). *Journal of Automated Reasoning*, **41**(2), pp. 143–189, 2008.

**Refereed
Conference
Publications**

1. Brandon Bohrer, Manuel Fernandez and **André Platzer**. dL_i : Definite descriptions in differential dynamic logic. In Pascal Fontaine, editor, *International Conference on Automated Deduction, CADE'19, Natal, Brazil, Proceedings, LNCS*. Springer, 2019.
2. Katherine Cordwell and **André Platzer**. Towards physical hybrid systems. In Pascal Fontaine, editor, *International Conference on Automated Deduction, CADE'19, Natal, Brazil, Proceedings, LNCS*. Springer, 2019.
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