

Table of Contents

Invited Contribution

Variations on Safety	1
<i>Orna Kupferman</i>	

Decision Procedures and Their Application in Analysis

Decision Procedures for Flat Array Properties	15
<i>Francesco Alberti, Silvio Ghilardi, and Natasha Sharygina</i>	
SATMC: A SAT-Based Model Checker for Security-Critical Systems	31
<i>Alessandro Armando, Roberto Carbone, and Luca Compagna</i>	
IC3 Modulo Theories via Implicit Predicate Abstraction	46
<i>Alessandro Cimatti, Alberto Griggio, Sergio Mover, and Stefano Tonetta</i>	
SMT-Based Verification of Software Countermeasures against Side-Channel Attacks	62
<i>Hassan Eldib, Chao Wang, and Patrick Schaumont</i>	
Detecting Unrealizable Specifications of Distributed Systems	78
<i>Bernd Finkbeiner and Leander Tentrup</i>	
Synthesizing Safe Bit-Precise Invariants	93
<i>Arie Gurfinkel, Anton Belov, and Joao Marques-Silva</i>	
PEALT: An Automated Reasoning Tool for Numerical Aggregation of Trust Evidence	109
<i>Michael Huth and Jim Huan-Pu Kuo</i>	
GRASShopper: Complete Heap Verification with Mixed Specifications	124
<i>Ruzica Piskac, Thomas Wies, and Damien Zufferey</i>	

Complexity and Termination Analysis

Alternating Runtime and Size Complexity Analysis of Integer Programs	140
<i>Marc Brockschmidt, Fabian Emmes, Stephan Falke, Carsten Fuhs, and Jürgen Giesl</i>	

Proving Nontermination via Safety	156
<i>Hong-Yi Chen, Byron Cook, Carsten Fuhs, Kaustubh Nimkar, and Peter O'Hearn</i>	
Ranking Templates for Linear Loops	172
<i>Jan Leike and Matthias Heizmann</i>	

Modeling and Model Checking Discrete Systems

FDR3 — A Modern Refinement Checker for CSP	187
<i>Thomas Gibson-Robinson, Philip Armstrong, Alexandre Boulgakov, and Andrew W. Roscoe</i>	
Concurrent Depth-First Search Algorithms	202
<i>Gavin Lowe</i>	
Basic Problems in Multi-View Modeling	217
<i>Jan Reineke and Stavros Tripakis</i>	
GPUexplore: Many-Core On-the-Fly State Space Exploration Using GPUs	233
<i>Anton Wijs and Dragan Bošnački</i>	

Timed and Hybrid Systems

Forward Reachability Computation for Autonomous Max-Plus-Linear Systems	248
<i>Dicky Adzkiya, Bart De Schutter, and Alessandro Abate</i>	
Compositional Invariant Generation for Timed Systems	263
<i>Lacramioara Aștefănoaei, Souha Ben Rayana, Saddek Bensalem, Marius Bozga, and Jacques Combaz</i>	
Characterizing Algebraic Invariants by Differential Radical Invariants	279
<i>Khalil Ghorbal and André Platzer</i>	
Quasi-Equal Clock Reduction: More Networks, More Queries	295
<i>Christian Herrera, Bernd Westphal, and Andreas Podelski</i>	
Are Timed Automata Bad for a Specification Language? Language Inclusion Checking for Timed Automata	310
<i>Ting Wang, Jun Sun, Yang Liu, Xinyu Wang, and Shanping Li</i>	

Monitoring, Fault Detection and Identification

Formal Design of Fault Detection and Identification Components Using Temporal Epistemic Logic.....	326
<i>Marco Bozzano, Alessandro Cimatti, Marco Gario, and Stefano Tonetta</i>	
Monitoring Modulo Theories	341
<i>Normann Decker, Martin Leucker, and Daniel Thoma</i>	
Temporal-Logic Based Runtime Observer Pairs for System Health Management of Real-Time Systems	357
<i>Thomas Reinbacher, Kristin Yvonne Rozier, and Johann Schumann</i>	

Competition on Software Verification

Status Report on Software Verification (Competition Summary SV-COMP 2014).....	373
<i>Dirk Beyer</i>	
CBMC – C Bounded Model Checker (Competition Contribution)	389
<i>Daniel Kroening and Michael Tautschnig</i>	
CPACHECKER with Sequential Combination of Explicit-Value Analyses and Predicate Analyses (Competition Contribution).....	392
<i>Stefan Löwe, Mikhail Mandrykin, and Philipp Wendler</i>	
CPALIEN: Shape Analyzer for CPAChecker (Competition Contribution)	395
<i>Petr Muller and Tomáš Vojnar</i>	
Lazy-CSeq: A Lazy Sequentialization Tool for C (Competition Contribution)	398
<i>Omar Inverso, Ermenegildo Tomasco, Bernd Fischer, Salvatore La Torre, and Gennaro Parlato</i>	
MU-CSeq: Sequentialization of C Programs by Shared Memory Unwindings (Competition Contribution)	402
<i>Ermenegildo Tomasco, Omar Inverso, Bernd Fischer, Salvatore La Torre, and Gennaro Parlato</i>	
ESBMC 1.22 (Competition Contribution)	405
<i>Jeremy Morse, Mikhail Ramalho, Lucas Cordeiro, Denis Nicole, and Bernd Fischer</i>	
FrankenBit: Bit-Precise Verification with Many Bits (Competition Contribution)	408
<i>Arie Gurfinkel and Anton Belov</i>	

Predator: A Shape Analyzer Based on Symbolic Memory Graphs (Competition Contribution)	412
<i>Kamil Dudka, Petr Peringer, and Tomáš Vojnar</i>	
Symbiotic 2: More Precise Slicing (Competition Contribution)	415
<i>Jiri Slaby and Jan Strejček</i>	
Ultimate Automizer with Unsatisfiable Cores (Competition Contribution)	418
<i>Matthias Heizmann, Jürgen Christ, Daniel Dietsch, Jochen Hoenicke, Markus Lindenmann, Betim Musa, Christian Schilling, Stefan Wissert, and Andreas Podelski</i>	
Ultimate Kojak (Competition Contribution)	421
<i>Evren Ermiş, Alexander Nutz, Daniel Dietsch, Jochen Hoenicke, and Andreas Podelski</i>	
Specifying and Checking Linear Time Properties	
Discounting in LTL	424
<i>Shaull Almagor, Udi Boker, and Orna Kupferman</i>	
Symbolic Model Checking of Stutter-Invariant Properties Using Generalized Testing Automata	440
<i>Ala Eddine Ben Salem, Alexandre Duret-Lutz, Fabrice Kordon, and Yann Thierry-Mieg</i>	
Synthesis and Learning	
Symbolic Synthesis for Epistemic Specifications with Observational Semantics	455
<i>Xiaowei Huang and Ron van der Meyden</i>	
Synthesis for Human-in-the-Loop Control Systems	470
<i>Wenchao Li, Dorsa Sadigh, S. Shankar Sastry, and Sanjit A. Seshia</i>	
Learning Regular Languages over Large Alphabets	485
<i>Oded Maler and Irini-Eleftheria Mens</i>	

Quantum and Probabilistic Systems

Verification of Concurrent Quantum Protocols by Equivalence Checking	500
<i>Ebrahim Ardeshir-Larijani, Simon J. Gay, and Rajagopal Nagarajan</i>	

Computing Conditional Probabilities in Markovian Models Efficiently	515
<i>Christel Baier, Joachim Klein, Sascha Klüppelholz, and Steffen Märcker</i>	
Permissive Controller Synthesis for Probabilistic Systems	531
<i>Klaus Dräger, Vojtěch Forejt, Marta Kwiatkowska, David Parker, and Mateusz Ujma</i>	
Precise Approximations of the Probability Distribution of a Markov Process in Time: An Application to Probabilistic Invariance	547
<i>Sadegh Esmail Zadeh Soudjani and Alessandro Abate</i>	

Tool Demonstrations

SACO: Static Analyzer for Concurrent Objects	562
<i>Elvira Albert, Puri Arenas, Antonio Flores-Montoya, Samir Genaim, Miguel Gómez-Zamalloa, Enrique Martin-Martin, German Puebla, and Guillermo Román-Díez</i>	
VeriMAP: A Tool for Verifying Programs through Transformations	568
<i>Emanuele De Angelis, Fabio Fioravanti, Alberto Pettorossi, and Maurizio Proietti</i>	
CIF 3: Model-Based Engineering of Supervisory Controllers	575
<i>Dirk A. van Beek, Wan J. Fokkink, Dennis Hendriks, Albert Hofkamp, Jasen Markovski, Joanna M. van de Mortel-Fronczak, and Michel A. Reniers</i>	
EDD: A Declarative Debugger for Sequential Erlang Programs	581
<i>Rafael Caballero, Enrique Martin-Martin, Adrian Riesco, and Salvador Tamarit</i>	
APTE: An Algorithm for Proving Trace Equivalence	587
<i>Vincent Cheval</i>	
The Modest Toolset: An Integrated Environment for Quantitative Modelling and Verification	593
<i>Arnd Hartmanns and Holger Hermanns</i>	
Bounds2: A Tool for Compositional Multi-parametrised Verification	599
<i>Antti Siirtola</i>	

Case Studies

On the Correctness of a Branch Displacement Algorithm	605
<i>Jaap Boender and Claudio Sacerdoti Coen</i>	

Analyzing the Next Generation Airborne Collision Avoidance System . . . 620
Christian von Essen and Dimitra Giannakopoulou

Environment-Model Based Testing of Control Systems: Case Studies . . . 636
*Erwan Jahier, Simplicie Djoko-Djoko, Chaouki Maiza, and
Eric Lafont*

Author Index 651