



Universiteit
Leiden
The Netherlands

Model checking of component connectors

Izadi, M.

Citation

Izadi, M. (2011, November 6). *Model checking of component connectors*. IPA Dissertation Series. Retrieved from <https://hdl.handle.net/1887/18189>

Version: Corrected Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/18189>

Note: To cite this publication please use the final published version (if applicable).

Titles in the IPA Dissertation Series since 2005

E. Ábrahám. *An Assertional Proof System for Multithreaded Java -Theory and Tool Support-*. Faculty of Mathematics and Natural Sciences, UL. 2005-01

R. Ruimerman. *Modeling and Remodeling in Bone Tissue*. Faculty of Biomedical Engineering, TU/e. 2005-02

C.N. Chong. *Experiments in Rights Control - Expression and Enforcement*. Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2005-03

H. Gao. *Design and Verification of Lock-free Parallel Algorithms*. Faculty of Mathematics and Computing Sciences, RUG. 2005-04

H.M.A. van Beek. *Specification and Analysis of Internet Applications*. Faculty of Mathematics and Computer Science, TU/e. 2005-05

M.T. Ionita. *Scenario-Based System Architecting - A Systematic Approach to Developing Future-Proof System Architectures*. Faculty of Mathematics and Computing Sciences, TU/e. 2005-06

G. Lenzini. *Integration of Analysis Techniques in Security and Fault-Tolerance*. Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2005-07

I. Kurtev. *Adaptability of Model Transformations*. Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2005-08

T. Wolle. *Computational Aspects of Treewidth - Lower Bounds and Network Reliability*. Faculty of Science, UU. 2005-09

O. Tveretina. *Decision Procedures for Equality Logic with Uninterpreted Functions*. Faculty of Mathematics and Computer Science, TU/e. 2005-10

A.M.L. Liekens. *Evolution of Finite Populations in Dynamic Environments*. Faculty of Biomedical Engineering, TU/e. 2005-11

J. Eggermont. *Data Mining using Genetic Programming: Classification and Symbolic Regression*. Faculty of Mathematics and Natural Sciences, UL. 2005-12

B.J. Heeren. *Top Quality Type Error Messages*. Faculty of Science, UU. 2005-13

G.F. Frehse. *Compositional Verification of Hybrid Systems using Simulation Relations*. Faculty of Science, Mathematics and Computer Science, RU. 2005-14

M.R. Mousavi. *Structuring Structural Operational Semantics*. Faculty of Mathematics and Computer Science, TU/e. 2005-15

A. Sokolova. *Coalgebraic Analysis of Probabilistic Systems*. Faculty of Mathematics and Computer Science, TU/e. 2005-16

T. Gelsema. *Effective Models for the Structure of pi-Calculus Processes with Replication*. Faculty of Mathematics and Natural Sciences, UL. 2005-17

P. Zoetewij. *Composing Constraint Solvers*. Faculty of Natural Sciences, Mathematics, and Computer Science, UvA. 2005-18

J.J. Vinju. *Analysis and Transformation of Source Code by Parsing and Rewriting*. Faculty of Natural Sciences, Mathematics, and Computer Science, UvA. 2005-19

M.Valero Espada. *Modal Abstraction and Replication of Processes with Data*. Faculty of Sciences, Division of Mathematics and Computer Science, VUA. 2005-20

A. Dijkstra. *Stepping through Haskell*. Faculty of Science, UU. 2005-21

Y.W. Law. *Key management and link-layer security of wireless sensor networks:*

energy-efficient attack and defense. Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2005-22

E. Dolstra. *The Purely Functional Software Deployment Model*. Faculty of Science, UU. 2006-01

R.J. Corin. *Analysis Models for Security Protocols*. Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2006-02

P.R.A. Verbaan. *The Computational Complexity of Evolving Systems*. Faculty of Science, UU. 2006-03

K.L. Man and R.R.H. Schiffelers. *Formal Specification and Analysis of Hybrid Systems*. Faculty of Mathematics and Computer Science and Faculty of Mechanical Engineering, TU/e. 2006-04

M. Kyas. *Verifying OCL Specifications of UML Models: Tool Support and Compositionality*. Faculty of Mathematics and Natural Sciences, UL. 2006-05

M. Hendriks. *Model Checking Timed Automata - Techniques and Applications*. Faculty of Science, Mathematics and Computer Science, RU. 2006-06

J. Ketema. *Böhm-Like Trees for Rewriting*. Faculty of Sciences, VUA. 2006-07

C.-B. Breunesse. *On JML: topics in tool-assisted verification of JML programs*. Faculty of Science, Mathematics and Computer Science, RU. 2006-08

B. Markvoort. *Towards Hybrid Molecular Simulations*. Faculty of Biomedical Engineering, TU/e. 2006-09

S.G.R. Nijssen. *Mining Structured Data*. Faculty of Mathematics and Natural Sciences, UL. 2006-10

G. Russello. *Separation and Adaptation of Concerns in a Shared Data Space*. Faculty of Mathematics and Computer Science, TU/e. 2006-11

L. Cheung. *Reconciling Nondeterministic and Probabilistic Choices*. Faculty of Science, Mathematics and Computer Science, RU. 2006-12

B. Badban. *Verification techniques for Extensions of Equality Logic*. Faculty of Sciences, Division of Mathematics and Computer Science, VUA. 2006-13

A.J. Mooij. *Constructive formal methods and protocol standardization*. Faculty of Mathematics and Computer Science, TU/e. 2006-14

T. Krilavicius. *Hybrid Techniques for Hybrid Systems*. Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2006-15

M.E. Warnier. *Language Based Security for Java and JML*. Faculty of Science, Mathematics and Computer Science, RU. 2006-16

V. Sundramoorthy. *At Home In Service Discovery*. Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2006-17

B. Gebremichael. *Expressivity of Timed Automata Models*. Faculty of Science, Mathematics and Computer Science, RU. 2006-18

L.C.M. van Gool. *Formalising Interface Specifications*. Faculty of Mathematics and Computer Science, TU/e. 2006-19

C.J.F. Cremers. *Scyther - Semantics and Verification of Security Protocols*. Faculty of Mathematics and Computer Science, TU/e. 2006-20

J.V. Guillen Scholten. *Mobile Channels for Exogenous Coordination of Distributed Systems: Semantics, Implementation and Composition.* Faculty of Mathematics and Natural Sciences, UL. 2006-21

H.A. de Jong. *Flexible Heterogeneous Software Systems.* Faculty of Natural Sciences, Mathematics, and Computer Science, UvA. 2007-01

N.K. Kavaldjiev. *A run-time reconfigurable Network-on-Chip for streaming DSP applications.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2007-02

M. van Veelen. *Considerations on Modeling for Early Detection of Abnormalities in Locally Autonomous Distributed Systems.* Faculty of Mathematics and Computing Sciences, RUG. 2007-03

T.D. Vu. *Semantics and Applications of Process and Program Algebra.* Faculty of Natural Sciences, Mathematics, and Computer Science, UvA. 2007-04

L. Brandán Briones. *Theories for Model-based Testing: Real-time and Coverage.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2007-05

I. Loeb. *Natural Deduction: Sharing by Presentation.* Faculty of Science, Mathematics and Computer Science, RU. 2007-06

M.W.A. Streppel. *Multifunctional Geometric Data Structures.* Faculty of Mathematics and Computer Science, TU/e. 2007-07

N. Trčka. *Silent Steps in Transition Systems and Markov Chains.* Faculty of Mathematics and Computer Science, TU/e. 2007-08

R. Brinkman. *Searching in encrypted data.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2007-09

A. van Weelden. *Putting types to good use.* Faculty of Science, Mathematics and Computer Science, RU. 2007-10

J.A.R. Noppen. *Imperfect Information in Software Development Processes.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2007-11

R. Boumen. *Integration and Test plans for Complex Manufacturing Systems.* Faculty of Mechanical Engineering, TU/e. 2007-12

A.J. Wijs. *What to do Next?: Analysing and Optimising System Behaviour in Time.* Faculty of Sciences, Division of Mathematics and Computer Science, VUA. 2007-13

C.F.J. Lange. *Assessing and Improving the Quality of Modeling: A Series of Empirical Studies about the UML.* Faculty of Mathematics and Computer Science, TU/e. 2007-14

T. van der Storm. *Component-based Configuration, Integration and Delivery.* Faculty of Natural Sciences, Mathematics, and Computer Science, UvA. 2007-15

B.S. Graaf. *Model-Driven Evolution of Software Architectures.* Faculty of Electrical Engineering, Mathematics, and Computer Science, TUD. 2007-16

A.H.J. Mathijssen. *Logical Calculi for Reasoning with Binding.* Faculty of Mathematics and Computer Science, TU/e. 2007-17

D. Jarnikov. *QoS framework for Video Streaming in Home Networks.* Faculty of Mathematics and Computer Science, TU/e. 2007-18

M. A. Abam. *New Data Structures and Algorithms for Mobile Data.* Faculty of Mathematics and Computer Science, TU/e. 2007-19

W. Pieters. *La Volonté Machinale: Understanding the Electronic Voting Controversy.*

Faculty of Science, Mathematics and Computer Science, RU. 2008-01

A.L. de Groot. *Practical Automaton Proofs in PVS*. Faculty of Science, Mathematics and Computer Science, RU. 2008-02

M. Bruntink. *Renovation of Idiomatic Crosscutting Concerns in Embedded Systems*. Faculty of Electrical Engineering, Mathematics, and Computer Science, TUD. 2008-03

A.M. Marin. *An Integrated System to Manage Crosscutting Concerns in Source Code*. Faculty of Electrical Engineering, Mathematics, and Computer Science, TUD. 2008-04

N.C.W.M. Braspenning. *Model-based Integration and Testing of High-tech Multi-disciplinary Systems*. Faculty of Mechanical Engineering, TU/e. 2008-05

M. Bravenboer. *Exercises in Free Syntax: Syntax Definition, Parsing, and Assimilation of Language Conglomerates*. Faculty of Science, UU. 2008-06

M. Torabi Dashti. *Keeping Fairness Alive: Design and Formal Verification of Optimistic Fair Exchange Protocols*. Faculty of Sciences, Division of Mathematics and Computer Science, VUA. 2008-07

I.S.M. de Jong. *Integration and Test Strategies for Complex Manufacturing Machines*. Faculty of Mechanical Engineering, TU/e. 2008-08

I. Hasuo. *Tracing Anonymity with Coalgebras*. Faculty of Science, Mathematics and Computer Science, RU. 2008-09

L.G.W.A. Cleophas. *Tree Algorithms: Two Taxonomies and a Toolkit*. Faculty of Mathematics and Computer Science, TU/e. 2008-10

I.S. Zapreev. *Model Checking Markov Chains: Techniques and Tools*. Faculty

of Electrical Engineering, Mathematics & Computer Science, UT. 2008-11

M. Farshi. *A Theoretical and Experimental Study of Geometric Networks*. Faculty of Mathematics and Computer Science, TU/e. 2008-12

G. Gulesir. *Evolvable Behavior Specifications Using Context-Sensitive Wildcards*. Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2008-13

F.D. Garcia. *Formal and Computational Cryptography: Protocols, Hashes and Commitments*. Faculty of Science, Mathematics and Computer Science, RU. 2008-14

P. E. A. Dürr. *Resource-based Verification for Robust Composition of Aspects*. Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2008-15

E.M. Bortnik. *Formal Methods in Support of SMC Design*. Faculty of Mechanical Engineering, TU/e. 2008-16

R.H. Mak. *Design and Performance Analysis of Data-Independent Stream Processing Systems*. Faculty of Mathematics and Computer Science, TU/e. 2008-17

M. van der Horst. *Scalable Block Processing Algorithms*. Faculty of Mathematics and Computer Science, TU/e. 2008-18

C.M. Gray. *Algorithms for Fat Objects: Decompositions and Applications*. Faculty of Mathematics and Computer Science, TU/e. 2008-19

J.R. Calamé. *Testing Reactive Systems with Data - Enumerative Methods and Constraint Solving*. Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2008-20

E. Mumford. *Drawing Graphs for Cartographic Applications*. Faculty of Mathematics and Computer Science, TU/e. 2008-21

E.H. de Graaf. *Mining Semi-structured Data, Theoretical and Experimental Aspects of Pattern Evaluation.* Faculty of Mathematics and Natural Sciences, UL. 2008-22

R. Brijder. *Models of Natural Computation: Gene Assembly and Membrane Systems.* Faculty of Mathematics and Natural Sciences, UL. 2008-23

A. Koprowski. *Termination of Rewriting and Its Certification.* Faculty of Mathematics and Computer Science, TU/e. 2008-24

U. Khadim. *Process Algebras for Hybrid Systems: Comparison and Development.* Faculty of Mathematics and Computer Science, TU/e. 2008-25

J. Markovski. *Real and Stochastic Time in Process Algebras for Performance Evaluation.* Faculty of Mathematics and Computer Science, TU/e. 2008-26

H. Kastenbergh. *Graph-Based Software Specification and Verification.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2008-27

I.R. Buhan. *Cryptographic Keys from Noisy Data Theory and Applications.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2008-28

R.S. Marin-Perianu. *Wireless Sensor Networks in Motion: Clustering Algorithms for Service Discovery and Provisioning.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2008-29

M.H.G. Verhoef. *Modeling and Validating Distributed Embedded Real-Time Control Systems.* Faculty of Science, Mathematics and Computer Science, RU. 2009-01

M. de Mol. *Reasoning about Functional Programs: Sparkle, a proof assistant for Clean.* Faculty of Science, Mathematics and Computer Science, RU. 2009-02

M. Lormans. *Managing Requirements Evolution.* Faculty of Electrical Engineering, Mathematics, and Computer Science, TUD. 2009-03

M.P.W.J. van Osch. *Automated Model-based Testing of Hybrid Systems.* Faculty of Mathematics and Computer Science, TU/e. 2009-04

H. Sozer. *Architecting Fault-Tolerant Software Systems.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2009-05

M.J. van Weerdenburg. *Efficient Rewriting Techniques.* Faculty of Mathematics and Computer Science, TU/e. 2009-06

H.H. Hansen. *Coalgebraic Modelling: Applications in Automata Theory and Modal Logic.* Faculty of Sciences, Division of Mathematics and Computer Science, VUA. 2009-07

A. Mesbah. *Analysis and Testing of Ajax-based Single-page Web Applications.* Faculty of Electrical Engineering, Mathematics, and Computer Science, TUD. 2009-08

A.L. Rodriguez Yakushev. *Towards Getting Generic Programming Ready for Prime Time.* Faculty of Science, UU. 2009-9

K.R. Olmos Joffré. *Strategies for Context Sensitive Program Transformation.* Faculty of Science, UU. 2009-10

J.A.G.M. van den Berg. *Reasoning about Java programs in PVS using JML.* Faculty of Science, Mathematics and Computer Science, RU. 2009-11

M.G. Khatib. *MEMS-Based Storage Devices. Integration in Energy-Constrained Mobile Systems.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2009-12

S.G.M. Cornelissen. *Evaluating Dynamic Analysis Techniques for Program Comprehension.* Faculty of Electrical Engineering, Mathematics, and Computer Science, TUD. 2009-13

D. Bolzoni. *Revisiting Anomaly-based Network Intrusion Detection Systems.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2009-14

H.L. Jonker. *Security Matters: Privacy in Voting and Fairness in Digital Exchange.* Faculty of Mathematics and Computer Science, TU/e. 2009-15

M.R. Czenko. *TuLiP - Reshaping Trust Management.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2009-16

T. Chen. *Clocks, Dice and Processes.* Faculty of Sciences, Division of Mathematics and Computer Science, VUA. 2009-17

C. Kaliszyk. *Correctness and Availability: Building Computer Algebra on top of Proof Assistants and making Proof Assistants available over the Web.* Faculty of Science, Mathematics and Computer Science, RU. 2009-18

R.S.S. O'Connor. *Incompleteness & Completeness: Formalizing Logic and Analysis in Type Theory.* Faculty of Science, Mathematics and Computer Science, RU. 2009-19

B. Ploeger. *Improved Verification Methods for Concurrent Systems.* Faculty of Mathematics and Computer Science, TU/e. 2009-20

T. Han. *Diagnosis, Synthesis and Analysis of Probabilistic Models.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2009-21

R. Li. *Mixed-Integer Evolution Strategies for Parameter Optimization and Their Applications to Medical Image Analysis.* Fac-

ulty of Mathematics and Natural Sciences, UL. 2009-22

J.H.P. Kwisthout. *The Computational Complexity of Probabilistic Networks.* Faculty of Science, UU. 2009-23

T.K. Cocx. *Algorithmic Tools for Data-Oriented Law Enforcement.* Faculty of Mathematics and Natural Sciences, UL. 2009-24

A.I. Baars. *Embedded Compilers.* Faculty of Science, UU. 2009-25

M.A.C. Dekker. *Flexible Access Control for Dynamic Collaborative Environments.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2009-26

J.F.J. Laros. *Metrics and Visualisation for Crime Analysis and Genomics.* Faculty of Mathematics and Natural Sciences, UL. 2009-27

C.J. Boogerd. *Focusing Automatic Code Inspections.* Faculty of Electrical Engineering, Mathematics, and Computer Science, TUD. 2010-01

M.R. Neuhäuser. *Model Checking Nondeterministic and Randomly Timed Systems.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2010-02

J. Endrullis. *Termination and Productivity.* Faculty of Sciences, Division of Mathematics and Computer Science, VUA. 2010-03

T. Staijen. *Graph-Based Specification and Verification for Aspect-Oriented Languages.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2010-04

Y. Wang. *Epistemic Modelling and Protocol Dynamics.* Faculty of Science, UvA. 2010-05

- J.K. Berendsen.** *Abstraction, Prices and Probability in Model Checking Timed Automata.* Faculty of Science, Mathematics and Computer Science, RU. 2010-06
- A. Nugroho.** *The Effects of UML Modeling on the Quality of Software.* Faculty of Mathematics and Natural Sciences, UL. 2010-07
- A. Silva.** *Kleene Coalgebra.* Faculty of Science, Mathematics and Computer Science, RU. 2010-08
- J.S. de Bruin.** *Service-Oriented Discovery of Knowledge - Foundations, Implementations and Applications.* Faculty of Mathematics and Natural Sciences, UL. 2010-09
- D. Costa.** *Formal Models for Component Connectors.* Faculty of Sciences, Division of Mathematics and Computer Science, VUA. 2010-10
- M.M. Jaghoori.** *Time at Your Service: Schedulability Analysis of Real-Time and Distributed Services.* Faculty of Mathematics and Natural Sciences, UL. 2010-11
- R. Bakhshi.** *Gossiping Models: Formal Analysis of Epidemic Protocols.* Faculty of Sciences, Department of Computer Science, VUA. 2011-01
- B.J. Arnoldus.** *An Illumination of the Template Enigma: Software Code Generation with Templates.* Faculty of Mathematics and Computer Science, TU/e. 2011-02
- E. Zambon.** *Towards Optimal IT Availability Planning: Methods and Tools.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2011-03
- L. Astefanoaei.** *An Executable Theory of Multi-Agent Systems Refinement.* Faculty of Mathematics and Natural Sciences, UL. 2011-04
- J. Proença.** *Synchronous coordination of distributed components.* Faculty of Mathematics and Natural Sciences, UL. 2011-05
- A. Morali.** *IT Architecture-Based Confidentiality Risk Assessment in Networks of Organizations.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2011-06
- M. van der Bijl.** *On changing models in Model-Based Testing.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2011-07
- C. Krause.** *Reconfigurable Component Connectors.* Faculty of Mathematics and Natural Sciences, UL. 2011-08
- M.E. Andrés.** *Quantitative Analysis of Information Leakage in Probabilistic and Nondeterministic Systems.* Faculty of Science, Mathematics and Computer Science, RU. 2011-09
- M. Atif.** *Formal Modeling and Verification of Distributed Failure Detectors.* Faculty of Mathematics and Computer Science, TU/e. 2011-10
- P.J.A. van Tilburg.** *From Computability to Executability – A process-theoretic view on automata theory.* Faculty of Mathematics and Computer Science, TU/e. 2011-11
- Z. Protic.** *Configuration management for models: Generic methods for model comparison and model co-evolution.* Faculty of Mathematics and Computer Science, TU/e. 2011-12
- S. Georgievska.** *Probability and Hiding in Concurrent Processes.* Faculty of Mathematics and Computer Science, TU/e. 2011-13
- S. Malakuti.** *Event Composition Model: Achieving Naturalness in Runtime Enforcement.* Faculty of Electrical Engineering, Mathematics & Computer Science, UT. 2011-14
- M. Raffelsieper.** *Cell Libraries and Verification.* Faculty of Mathematics and Computer Science, TU/e. 2011-15

C.P. Tsirogiannis. *Analysis of Flow and Visibility on Triangulated Terrains.* Faculty of Mathematics and Computer Science, TU/e. 2011-16

Y.-J. Moon. *Stochastic Models for Quality of Service of Component Connectors.* Faculty of Mathematics and Natural Sciences, UL. 2011-17

R. Middelkoop. *Capturing and Exploiting Abstract Views of States in OO Verification.* Faculty of Mathematics and Computer Science, TU/e. 2011-18

M.F. van Amstel. *Assessing and Improving*

the Quality of Model Transformations. Faculty of Mathematics and Computer Science, TU/e. 2011-19

A.N. Tamalet. *Towards Correct Programs in Practice.* Faculty of Science, Mathematics and Computer Science, RU. 2011-20

H.J.S. Basten. *Ambiguity Detection for Programming Language Grammars.* Faculty of Science, UvA. 2011-21

M. Izadi. *Model Checking of Component Connectors.* Faculty of Mathematics and Natural Sciences, UL. 2011-22