

Curriculum Vitae

Martijn Hendriks

June 23, 2006

1 Personal

Name: Martijn Hendriks
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2 Education

February 2002 – April 2006:

PhD Computing Science, Institute for Computing and Information Sciences (ICIS), Radboud University Nijmegen. Supervisor: prof. dr. F. W. Vaandrager. Title of thesis: “Model Checking Timed Automata – Techniques and Applications”, defended April 4, 2006.

September 1998 – February 2002:

MSc Computing Science (cum laude), Institute for Computing and Information Sciences (ICIS), Radboud University Nijmegen. Supervisors: prof. dr. F. W. Vaandrager, prof. dr. K. G. Larsen (University of Aalborg, Denmark) and dr. J. Hooman. Title of thesis: “Development of Reactive Programs using UPPAAL”.

September 1994 – August 1998:

Chemistry study at the Radboud University Nijmegen. I completed the first two years of this study before switching to computing science.

September 1988 – August 1994:

Highschool (VWO), Elshof college, Nijmegen.

3 Working experience

During the last four years I have conducted research on the specification and verification of real-time systems. (This research has been carried out in the context of the European Community project AMETIST; see the URL <http://ametist.cs.utwente.nl/>). More specifically, I have worked on the *model checking* of *timed automata*. Model checking is a methodology

that exhaustively analyzes the transition system that underlies a model given in some formal modeling language. The timed automata language is such a formal modeling language. It is capable of expressing quantitative timing constraints that, for instance, often are present in scheduling problems.

I have made two theoretical contributions that alleviate the state space explosion problem, which is the most fundamental problem of model checking. These are (i) symmetry reduction for timed automata and (ii) an exact acceleration technique that can be beneficial when there are large differences in the time-scales of the various components. The symmetry reduction technique has been implemented in the Uppaal model checker (<http://www.uppaa1.com>).

Furthermore, I have successfully applied timed automata technology to a number of case studies. These include a scheduling problem for the production of lacquer and a deadlock-avoidance and throughput-optimization problem from the semiconductor industry. Schedules have been generated for the former case study which are competitive with the schedules generated by a commercial value-chain optimization tool. The work done for the latter case study is referred to by patent application ASML ref. P-1784.010.

October 2005 – current:

Research scientist in the group Informatics for Technical Applications headed by prof. dr. F. W. Vaandrager, Institute for Computing and Information Sciences (ICIS), Radboud University Nijmegen.

1999 – 2001:

Teaching assistant, Institute for Computing and Information Sciences (ICIS), Radboud University Nijmegen:

- P1: Programming 1 (fall 1999),
- T1: Languages and Automata (spring 2000, spring 2001),
- A3: Architecture: Memory, distribution and networks (spring 2001).

4 Professional activities

Program committee memberships

1. 15th international Workshop on Parallel and Distributed Real-Time Systems (WPDRTS 2007).

International activities

1. Invited to the Dagstuhl-Seminar 06351 on Methods for Modelling Software Systems (MMOSS), August 27 – September 1, Wadern, Germany, 2006.
2. April 2004: 3 day research visit, VERIMAG, Grenoble, France. Joined work with Oded Maler (Verimag, France), Sebastian Panek (University of Dortmund, Germany), Dagmar Ludewig (AXXOM, Germany) and Angelika Mader (University of Twente, The Netherlands) on an AMETIST case study.

3. January 2003: 1 week research visit, Department of Computer Science, Aalborg University, Denmark. Joined work with Gerd Behrmann (University of Aalborg, Denmark) on a symmetry extension of the Uppaal tool.
4. September 2001: 1 month research visit, Department of Computer Science, Aalborg University, Denmark. Joined work with Kim Larsen (University of Aalborg, Denmark) on the fragmentation problem in timed automata model checking.

Presentations at international meetings

1. “Conference on Formal Analysis of Timed Systems” (FORMATS’05), September 26 – 28, 2005, Uppsala, Sweden.
2. Various presentations at AMETIST meetings: September 2002, December 2002, December 2003, September 2004, January 2005, and June 2005.
3. “First International Symposium on Leveraging Applications of Formal Methods” (ISoLA’04), Oktober 30 – November 2, 2004, Paphos, Cyprus.
4. “First Multidisciplinary International Conference on Scheduling : Theory and Applications” (MISTA’03), August 13–16, 2003, Nottingham, United Kingdom.
5. “Workshop on Theory and Practice of Timed Systems” (TPTS’02), April 6–7, 2002, Grenoble, France.

Publications: journals

- [1] M. Hendriks, N. J. M. van den Nieuwelaar, and F. W. Vaandrager. Model checker aided design of a controller for a wafer scanner. 2006. Accepted for a special issue of Software Tools for Technology Transfer.
- [2] M. Hendriks and K. G. Larsen. Exact acceleration of real-time model checking. *Electronic Notes in Theoretical Computer Science*, 65(6), April 2002.

Publications: conference proceedings

- [1] G. Behrmann, A. David, K. G. Larsen, J. Håkansson, P. Pettersson, W. Yi, and M. Hendriks. Uppaal 4.0. In *3rd International Conference on the Quantitative Evaluation of SysTems (QEST) 2006*. IEEE Computer Society, 2006. Invited paper, to appear.
- [2] M. Hendriks and M. Verhoef. Timed automata based analysis of embedded system architectures. 2006. Accepted for the Workshop on Parallel and Distributed Real-Time Systems 2006.
- [3] M. Hendriks. Model checking the time to reach agreement. In P. Pettersson and W. Yi, editors, *3rd International Conference on the Formal Modeling and Analysis of Timed Systems (FORMATS’05)*, number 3829 in LNCS, pages 98–111. Springer–Verlag, 2005.

- [4] G. Behrmann, E. Brinksma, M. Hendriks, and A. Mader. Scheduling lacquer production by reachability analysis – a case study. In *Workshop on Parallel and Distributed Real-Time Systems 2005*. IEEE Computer Society, 2005.
- [5] G. Behrmann, E. Brinksma, M. Hendriks, and A. Mader. Scheduling lacquer production by reachability analysis – a case study. In *Proceedings of the 16th IFAC World Congress*. Elsevier, 2005.
- [6] M. Hendriks, N. J. M. van den Nieuwelaar, and F. W. Vaandrager. Model checker aided design of a controller for a wafer scanner. In *First International Symposium on Leveraging Applications of Formal Methods (ISoLA'04)*, October 2004. Extended abstract.
- [7] M. Hendriks, G. Behrmann, K. G. Larsen, P. Niebert, and F. W. Vaandrager. Adding symmetry reduction to Uppaal. In K. G. Larsen and P. Niebert, editors, *1st International Conference on the Formal Modeling and Analysis of Timed Systems (FORMATS'03)*, number 2791 in LNCS, pages 46–59. Springer-Verlag, 2004.
- [8] M. Hendriks, N. J. M. van den Nieuwelaar, and F. W. Vaandrager. Recognizing finite repetitive scheduling patterns in manufacturing systems. In G. Kendall, E. Burke, and S. Petrovic, editors, *Multidisciplinary International Conference on Scheduling : Theory and Applications (MISTA'03)*, pages 291–319. ASAP, University of Nottingham, United Kingdom, August 2003.

Publications: technical reports

- [1] M. Hendriks and M. Verhoef. Timed automata based analysis of embedded system architectures. Technical Report ICIS-R06003, ICIS, University of Nijmegen, January 2006.
- [2] L. Cheung and M. Hendriks. Causal dependencies in parallel composition of stochastic processes. Technical Report ICIS-R05020, ICIS, University of Nijmegen, September 2005.
- [3] G. Behrmann, E. Brinksma, M. Hendriks, and A. Mader. Scheduling lacquer production by reachability analysis – a case study. Technical Report 05–05, CTIT, Technical University Twente, Enschede, 2005.
- [4] M. Hendriks. Model checking the time to reach agreement. Technical Report ICIS-R05014, ICIS, University of Nijmegen, February 2005.
- [5] G. Behrmann, E. Brinksma, M. Hendriks, and A. Mader. Scheduling lacquer production by reachability analysis – a case study. Technical Report NIII-R0455, NIII, Radboud University, Nijmegen, December 2004.
- [6] M. Hendriks, N. J. M. van den Nieuwelaar, and F. W. Vaandrager. Model checker aided design of a controller for a wafer scanner. Technical Report NIII-R0430, NIII, University of Nijmegen, June 2004.

- [7] M. Hendriks, G. Behrmann, K.G. Larsen, P. Niebert, and F.W. Vaandrager. Adding symmetry reduction to UPPAAL. Technical Report NIII-R0407, NIII, University of Nijmegen, February 2004.
- [8] M. Hendriks. Enhancing UPPAAL by exploiting symmetry. Technical Report NIII-R0208, NIII, University of Nijmegen, October 2002.
- [9] M. Hendriks. Translating UPPAAL to Not Quite C. Technical Report CSI-R0108, CSI, University of Nijmegen, March 2001.
- [10] M. Hendriks and K. G. Larsen. Exact acceleration of real-time model checking. Technical Report CSI-R0122, CSI, University of Nijmegen, December 2001.

Teaching experience

- 1. Course “Beweren en Bewijzen”, Institute for Computing and Information Sciences (ICIS), Radboud University Nijmegen (spring 2004, spring 2005, spring 2006).
- 2. Course “ICT Infrastructuren”, Institute for Computing and Information Sciences (ICIS), Radboud University Nijmegen (fall 2005).

Memberships

- 1. Member of the Association for Computing Machinery (ACM); see the URL <http://www.acm.org/>.
- 2. Member of the research school Institute for Programming research and Algorithmics (IPA); see the URL <http://www.win.tue.nl/ipa/>.
- 3. Member of the Dutch Association for Theoretical Computer Science (NVTI); see the URL <http://www.nvti.nl/>.

Miscellaneous

- 1. I received the *Rappe Promotie Premie* (Fast Doctorate Award) from the Institute for Computing and Information Sciences (Radboud University Nijmegen) for finishing my PhD project within four years.
- 2. I have implemented the symmetry reduction enhancement in the Uppaal model checker (see the URL <http://www.uppaal.com/>).