

## Pierre-Alain REYNIER

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April 29, 1980

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### Positions

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**2014-2015** : On leave at CNRS, researcher at LIF.

**since 2008** : Assistant professor in computer science at Aix Marseille University. Member of the research group "Modelization and Verification" of the LIF.

**2007-2008** : Post-doctoral researcher at the Free University of Brussels (Belgium) in the team of Prof. Jean-François Raskin.

### Education

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**2004-2007** : PhD thesis defended on June 21, 2007  
: *Title*: Verification of timed and distributed systems: models, algorithms and implementability  
: *Department*: LSV, CNRS & ENS Cachan  
: *Supervisors*: Patricia Bouyer-Decitre and François Laroussinie  
: *Committee*: Parosh A. Abdulla, Ahmed Bouajjani (referee), Patricia Bouyer-Decitre, Serge Haddad, Claude Jard, François Laroussinie, and Jean-François Raskin (referee)

**2003-2004** : "DEA" in Computer Science (with distinction TB, ranked 2nd)

**2002-2003** : "Agrégation" in Mathematics (ranked 47)

**2001-2002** : "Maîtrises" in Computer Science and Mathematics (both with distinction TB)

**Sept. 2001** : Entrance at "École Normale Supérieure de Cachan", department of Mathematics

### Awards

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**2012** "Prime d'Excellence Scientifique"

**2007** Lavoisier fellowship for a one year post-doctoral stay at Free University of Brussels

### Research interests

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My research works fall into the framework of formal methods for software verification. More precisely, I study automata based approaches and their connection with logics, and I am particularly interested in timed systems, transducers, weighted automata and distributed systems. The application domains range from embedded systems to static analysis of databases and transformations of XML documents.

## Projects I am/was involved in \_\_\_\_\_

- Participation to the ANR <sup>1</sup> Macaron on distributed computing, 2013–2017
- Participation to the FP7-IT european project Cassting on system synthesis with non-zero sum games, 2013–2016
- Participation to the CNRS PICS Project SOSP on synthesis of stream processors, 2013–2014
- Principal Investigator of the ANR ECSPER on study and conception of systems under perturbations, 2009–2013
- Principal Investigator of the regional project in collaboration with Novadem on formal methods for unmanned quadricopters, 2009–2012
- Participation to the ANR IMPRO on implementability and robustness of timed systems, 2011–2013
- Participation to the program Quasimodo (funded by European Commission) on Quantitative System Properties in Model-Driven Design of Embedded Systems, 2008–2010
- Participation to the IAP MoVES (Interuniversity Attraction Poles Programme) on Modelling, Verification and Evolution of Software, 2007–2011
- Participation to the ANR DOTS on distributed, open and timed systems, 2007–2010
- Participation to the ACI CORTOS on control of timed systems, 2003–2006

## Responsibilities in Schools and Conferences \_\_\_\_\_

### Steering committee

- MOVEP: from 2012 to 2016 (International School on Modelling and Verifying Parallel Processes)

### Program committee

- ATVA'14 (12th International Symposium on Automated Technology for Verification and Analysis)
- MOVEP'12 -chair- (10th Int. Winter School on Modelling and Verifying Parallel Processes)

### Organizing committee

- CSL'16 (25th Annual Conference on Computer Science Logic) - (*forthcoming*)
- MOVEP'12 -chair- (10th Int. Winter School on Modelling and Verifying Parallel Processes)
- FORMATS'06 (4th Int. Conference on Formal Modelling and Analysis of Timed Systems)

## Collaborations \_\_\_\_\_

Apart from collaborations in France (LSV, Labri, LIAFA, IRCCyN, LACL, IRISA), I also work with the following colleagues abroad:

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<sup>1</sup>The ANR is the french agency for research.

- Free university of Brussels (Belgium): Jean-François Raskin, Emmanuel Filiot
- University of Edimburgh (Scotland): Sebastian Maneth
- Aalborg university (Denmark): Kim G. Larsen
- NICTA (Australia): Franck Cassez
- IIT Mumbai (India): S. Akshay

## Reviews

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- Reviewer for international journals: Distributed Computing, Logical Methods in Computer Science, Theoretical Computer Science, Discrete Event Dynamic Systems, Information and Computation, Mathematical Reviews, Fundamenta Informaticae, Journal Européen des Systèmes Automatisés
- Reviewer for international conferences: LICS, ICALP, STACS, TACAS, FOSSACS, FORMATS, ICATPN, LATA, MFCS, QEST, MSR, CONCUR, WODES, SOFSEM, CAV...
- Reviewer for the selection of a CIFRE PhD thesis

## Supervision

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### Internships:

- Rémi Cheval (6 weeks in 2010, L3 ENS Cachan), co-supervised with Jean-Marc Talbot
- Rémi Poulain (6 weeks in 2013, L3 ENS Cachan)
- Rémi Jaubert (6 months in 2009, M2 Aix-Marseille University)
- Mathieu Caralp (6 months in 2011, M2 Aix-Marseille University), co-supervised with Jean-Marc Talbot

### PhD Thesis:

- Rémi Jaubert: Quantitative robustness of timed automata, 2009-2012
- Mathieu Caralp: Finite valuedness of visibly pushdown transducers, 2011-2015, co-supervised with JM Talbot
- Didier Villevalois: Synthesis of transformations, 2015-2018

### Post-doctoral students:

- Youssouf Oualhadj: Synthesis of robust controllers, funded by ANR ECSPER, 2012-2013
- Luc Dartois: First-order definable regular string functions, ATER Centrale Marseille, 2014-2015
- Laure Daviaud: Cost functions for nested words, funded by Labex Archimède, 2014-2015, co-supervised with JM Talbot
- Antoine Durand-Gasselín: Transductions of data-words, ATER Centrale Marseille, 2015-2016

## Talks

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- Invited lecture at MOVEP'14 on *Robustness of Timed Systems*
- Talks at international conferences: CONCUR'14, FSTTCS'11, Petri Nets'11, CONCUR'09, HSCC'09, FoSSaCS'08, ICALP'06, ATVA'06, FORMATS'05
- Talks at working groups or meetings of research projects
- Talks in the following laboratories: LACL, IRISA, ULB, LaBRI, LIF, LIAFA.

## Teaching

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Assistant professor at Aix-Marseille University since september 2008. Teaching at the department of Computer Science. Approximately 200h each year.

Main teaching responsibilities:

- Head of the Master 2 on Research in Fundamental Computer Science, since 2013
- Lecture on Automata and Logic, M2 Research, since 2013
- Lecture on Introduction to computer science, L1, since 2008
- Lecture on XML Technologies, M1, 2009-2011

Previously, I was a teaching assistant at ENS Cachan during my PhD and I was also examiner in “Classes Préparatoires” in mathematics and computer science.

## Administrative responsibilities

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- Head of the research group “Modelization and Verification” of the LIF since october 2015 (composed of 4 professors, 7 assistant professors and 5 non-permanent members)
- Member of the selection committee for assistant professor positions:
  - University of Provence, 2010
  - University Paris-Diderot, 2013 and 2015
  - University Paris-Est Créteil, 2015
- Responsibilities in the LIF:
  - selection committee for ATER positions at the computer science department (2014)
  - in charge of the visit of the LIF by the computer science department of ENS Cachan (2013)
  - representative member at the CCS27 (2011)
- Responsibilities in my research group:
  - representative member at the FRIIAM
  - in charge of the weekly seminar (2008-2015)
  - in charge of the webpage (2008-2014)
  - in charge of the valorisation (2008-)

## Publications

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My publications are available at:

<http://www.lif.univ-mrs.fr/~preynier/index.php?page=publis>

### Chapters in books

- [1] F. Cassez, K. Larsen, J.-F. Raskin, and P.-A. Reynier. *Quantitative Model-Based Analysis of Real-Time Embedded Systems*, chapter An Introduction to Automatic Synthesis of Discrete and Timed Controllers. Springer, 2012.
- [2] F. Cassez, K. Larsen, J.-F. Raskin, and P.-A. Reynier. *Quantitative Model-Based Analysis of Real-Time Embedded Systems*, chapter Timed Controller Synthesis: An Industrial Case Study. Springer, 2012.
- [3] P.-A. Reynier. *Models and Analysis in Distributed Systems*, chapter Verification of Timed Systems, pages 271–306. Wiley, 2011.

### Edited books

- [1] P.-A. Reynier, editor. *MOVEP 2012 - Modelization and Verification of Parallel Processes, 10th International Winter School, Marseille, France, December 3-7, 2012. Proceedings*, 2012.

### Articles in international journals

- [1] P.-A. Reynier and J.-M. Talbot. Visibly Pushdown Transducers with Well-nested Outputs. *International Journal of Foundations of Computer Science*, accepted with minor revisions, 2015.
- [2] E. Filiot, J.-F. Raskin, P.-A. Reynier, F. Servais, and J.-M. Talbot. Properties of visibly pushdown transducers. *Journal of Computer and System Sciences*, accepted with minor revisions, 2015.
- [3] M. Caralp, P.-A. Reynier and J.-M. Talbot. Trimming Visibly Pushdown Automata. *Theoretical Computer Science*, 578:13–29, 2015.
- [4] S. Akshay, L. Hélouet, C. Jard and P.-A. Reynier. Robustness of Time Petri Nets under Guard Enlargement. *Fundamenta Informaticae*, To appear, 2015.
- [5] P.-A. Reynier and F. Servais. Minimal coverability set for petri nets: Karp and Miller algorithm with pruning. *Fundamenta Informaticae*, 122(1-2):1–30, 2013.
- [6] O.-L. Nguena-Timo and P.-A. Reynier. On characteristic formulae for event-recording automata. *RAIRO - Theoretical Informatics and Applications*, 47(1):69–96, 2013.
- [7] P. Bouyer, S. Haddad, and P.-A. Reynier. Undecidability Results for Timed Automata with Silent Transitions. *Fundamenta Informaticae*, 92(1-2):1–25, 2009.
- [8] P. Bouyer, S. Haddad, and P.-A. Reynier. Timed Petri nets and timed automata: On the discriminating power of Zeno sequences. *Information and Computation* 206 (1), pp. 73-107, 2008. Elsevier.

## Articles in proceedings of international conferences

- [1] E. Filiot, S. Maneth, P.-A. Reynier and J.-M. Talbot. Decision problems for tree transducers with origins. In *Proc. 42nd International Colloquium on Automata, Languages, and Programming (ICALP 2015)*, volume 9135 of *Lecture Notes in Computer Science*, pages 209–221. Springer, 2015.
- [2] Y. Oualhadj, P.-A. Reynier and O. Sankur. Probabilistic Robust Timed Games. In *Proc. 25th International Conference on Concurrency Theory (CONCUR'14)*, volume 8704 of *Lecture Notes in Computer Science*, pages 204–217. Springer, 2014.
- [3] P.-A. Reynier and J.-M. Talbot. Visibly Pushdown Transducers with Well-nested Outputs. In *Proc. 18th International Conference on Developments in Language Theory (DLT'14)*, volume 8633 of *Lecture Notes in Computer Science*, pages 129–141. Springer, 2014.
- [4] O. Sankur, P. Bouyer, N. Markey, and P.-A. Reynier. Robust controller synthesis in timed automata. In *Proc. 24th International Conference on Concurrency Theory (CONCUR'13)*, volume 8052 of *Lecture Notes in Computer Science*, pages 546–560. Springer, 2013.
- [5] M. Caralp, P.-A. Reynier, and J.-M. Talbot. Trimming visibly pushdown automata. In *Proc. 18th International Conference on Implementation and Application of Automata (CIAA'13)*, volume 7982 of *Lecture Notes in Computer Science*, pages 84–96. Springer, 2013.
- [6] M. Caralp, E. Filiot, P.-A. Reynier, J.-M. Talbot, and F. Servais. Expressiveness of Visibly Pushdown Transducers. In *Proc. 2nd International Workshop on Trends in Tree Automata and Tree Transducers (TTATT'13)*, pages 17–26. EPTCS, 2013.
- [7] E. Filiot, O. Gauwin, P.-A. Reynier, and F. Servais. From two-way to one-way finite state transducers. In *Proc. 28th Annual IEEE Symposium on Logic in Computer Science (LICS'13)*, pages 468–477. IEEE Computer Society, 2013.
- [8] S. Akshay, L. Hélouet, C. Jard, and P.-A. Reynier. Robustness of time petri nets under guard enlargement. In *Proc. 6th International Workshop on Reachability Problems (RP'12)*, volume 7550 of *Lecture Notes in Computer Science*, pages 92–106. Springer, 2012.
- [9] P. Bulychev, F. Cassez, A. David, K. G. Larsen, J.-F. Raskin, and P.-A. Reynier. Controllers with minimal observation power (application to timed systems). In *Proc. 10th International Symposium on Automated Technology for Verification and Analysis (ATVA'12)*, volume 7561 of *Lecture Notes in Computer Science*, pages 223–237. Springer, 2012.
- [10] M. Caralp, P.-A. Reynier, and J.-M. Talbot. Visibly pushdown automata with multiplicities: Finiteness and k-boundedness. In *Proc. 16th International Conference on Developments in Language Theory (DLT'12)*, volume 7410 of *Lecture Notes in Computer Science*, pages 226–238. Springer, 2012.
- [11] E. Filiot, O. Gauwin, P.-A. Reynier, and F. Servais. Streamability of nested word transductions. In *Proc. 31st Annual International Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS'11)*, volume 13 of *LIPICs*, pages 312–324. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2011.
- [12] J. Malinowski, P. Niebert, and P.-A. Reynier. A hierarchical approach for the synthesis of stabilizing controllers for hybrid systems. In *Proc. 9th International Symposium on Automated Technology for Verification and Analysis (ATVA'11)*, volume 6996 of *Lecture Notes in Computer Science*, pages 198–212. Springer, 2012.

- [13] P.-A. Reynier and F. Servais. Minimal coverability set for petri nets: Karp and Miller algorithm with pruning. In *Proc. 32nd International Conference on Application and Theory of Petri Nets and Concurrency (ICATPN'11)*, volume 6709 of *Lecture Notes in Computer Science*, pages 69–88. Springer, 2011.
- [14] R. Jaubert and P.-A. Reynier. Quantitative robustness analysis of flat timed automata. In *Proc. 14th International Conference on Foundations of Software Science and Computation Structures (FoSSaCS'11)*, volume 6604 of *Lecture Notes in Computer Science*, pages 229–244. Springer, 2011.
- [15] E. Filiot, J.-F. Raskin, P.-A. Reynier, F. Servais, and J.-M. Talbot. Properties of visibly pushdown transducers. In *Proc. 35th International Symposium on Mathematical Foundations of Computer Science (MFCS'10)*, volume 6281 of *Lecture Notes in Computer Science*, pages 355–367. Springer, 2010.
- [16] P.-A. Reynier and A. Sangnier. Weak time petri nets strike back! In *Proc. 20th International Conference on Concurrency Theory (CONCUR'09)*, volume 5710 of *Lecture Notes in Computer Science*, pages 557–571. Springer, 2009.
- [17] F. Cassez, J. J. Jessen, K. G. Larsen, J.-F. Raskin, and P.-A. Reynier. Automatic synthesis of robust and optimal controllers - an industrial case study. In *Proc. 12th International Conference on Hybrid Systems: Computation and Control (HSCC'09)*, volume 5469 of *Lecture Notes in Computer Science*, pages 90–104. Springer, 2009.
- [18] P. Bouyer, N. Markey, and P.-A. Reynier. Robust Analysis of Timed Automata via Channel Machines. In *Proc. 11th Int. Conf. on Foundations of Software Science and Computation Structures (FoSSaCS'08)*, vol. 4962 de *LNCS*, pages 157–171. Springer.
- [19] P. Bouyer, S. Haddad, and P.-A. Reynier. Timed unfoldings for networks of timed automata. In *Proc. 4th Int. Symp. on Automated Technology for Verification and Analysis (ATVA'06)*, vol. 4218 de *LNCS*, pages 292–306. Springer.
- [20] P. Bouyer, S. Haddad, and P.-A. Reynier. Timed Petri nets and timed automata: On the discriminating power of Zeno sequences. In *Proc. 33rd Int. Coll. on Automata, Languages and Programming (ICALP'06) — Part II*, vol. 4052 de *LNCS*, pages 420–431. Springer.
- [21] P. Bouyer, S. Haddad, and P.-A. Reynier. Extended timed automata and time Petri nets. In *Proc. 6th Int. Conf. on Application of Concurrency to System Design (ACSD'06)*, pages 91–100. IEEE Computer Society Press.
- [22] P. Bouyer, N. Markey, and P.-A. Reynier. Robust model-checking of linear-time properties in timed automata. In *Proc. 7th Latin American Symposium on Theoretical Informatics (LATIN'06)*, vol. 3887 de *LNCS*, pages 238–249. Springer.
- [23] P. Bouyer, F. Laroussinie, and P.-A. Reynier. Diagonal constraints in timed automata: Forward analysis of timed systems. In *Proc. 3rd Int. Conf. on Formal Modelling and Analysis of Timed Systems (FORMATS'05)*, vol. 3829 de *LNCS*, pages 112–126. Springer.

## Invited Contributions

- [1] P.-A. Reynier. Robustness of Timed Systems. In *Actes de la 11ème École d'été sur la Modélisation et la Vérification des Systèmes Parallèles (MOVEP'14)*.
- [2] K. Altisen, N. Markey, P.-A. Reynier, and S. Tripakis. Implémentabilité des automates temporisés. In *Actes du 5ème Colloque sur la Modélisation des Systèmes Réactifs (MSR'05)*, pages 395–406. Hermès.

### **Publications with informal proceedings (Workshops)**

- [1] O.-L. Nguena-Timo and P.-A. Reynier. On characteristic formulae for event-recording automata. In *Proc. Workshop on Fixpoints In Computer Science (FICS'09)*, pages 70–78, 2009.
- [2] P.-A. Reynier. Forward analysis of timed automata. In *Proc. 5th Winter School on Modelling and Verifying Parallel Processes (MOVEP'04)*, pages 52–57, 2004.

### **Thesis**

- [1] P.-A. Reynier. Vérification de systèmes temporisés et distribués : modèles, algorithmes et implémentabilité. Thèse de doctorat, Laboratoire Spécification et Vérification, ENS de Cachan, France, juin 2007.
- [2] P.-A. Reynier. Analyse en avant des automates temporisés. Master's thesis, DEA Algorithmique, Paris, 2004.

### **Research reports of submitted works**

- [1] E. Filiot and P.-A. Reynier. On Streaming String Transducers and HDTOL Systems. <http://arxiv.org/abs/1412.0537>
- [2] L. Dartois and P.-A. Reynier. Aperiodic Transducers. <http://arxiv.org/abs/1506.04059>
- [3] L. Daviaud, P.-A. Reynier, and J.-M. Talbot. A Generalized Twinning Property for Minimisation of Cost Register Automata. <https://hal.archives-ouvertes.fr/hal-01201704>