

Nicolas BERTHIER

✉ University of Liverpool
Department of Computer Science
Liverpool L69 3BX, UNITED KINGDOM

@ nicolas.berthier@liverpool.ac.uk

www <https://nberth.space/>

ORCID <https://orcid.org/0000-0002-0933-8193>

Born 11/19/1985
French Nationality

Research Interests

- Symbolic Techniques and Abstract Interpretation for Program Analysis and Security
- Formal Verification and Test for Deep-learning
- Discrete Controller Synthesis Algorithms and Applications

Research Experience

- Dec 2015–... **RESEARCH ASSOCIATE** in the [Department of Computer Science](#) of the [University of Liverpool](#)
• *Static analysis for information-flow control in Java programs*
• *Verification and test for deep-learning models*
• *Control techniques for energy efficient circuits design*
- Jun 2013 **POSTDOCTORAL FELLOW** in [SUMO Team](#), [INRIA Rennes – Bretagne Atlantique](#), France
–Nov 2015 *Research on discrete controller synthesis for infinite state systems*
- Jun 2012 **POSTDOCTORAL FELLOW** in [ERODS Team](#), [LIG Lab.](#), Grenoble, France
–May 2013 *Investigating reactive control techniques for autonomic management systems*
- Oct 2008 **PH.D CANDIDATE** in [Synchrone Team](#), [Verimag Lab.](#), Grenoble
–Mar 2012 *Research on power-aware implementation of embedded systems*
Advised by Florence Maraninchi and Laurent Mounier; Defended on March 12, 2012
- Feb–Sept 2008 **RESEARCH INTERN** in [Synchrone Team](#), [Verimag Lab.](#)
Research on system-level modeling of embedded control systems
Advised by Florence Maraninchi and Christophe Rippert
- Apr–Sept 2007 **RESEARCH INTERN** in [ISE Team](#), [Verimag Lab.](#)
Designed a hybrid dynamic memory management mechanism for real-time Java applications
Advised by Christophe Rippert and Guillaume Salagnac
- Jun–Sept 2006 **RESEARCH INTERN** in [ISE Team](#), [Verimag Lab.](#)
Research on the life span of dynamically allocated objects in real-time Java applications
Advised by Christophe Rippert and Guillaume Salagnac
- Apr–Sept 2005 **INTERN** in [OSIRIS Team](#), [TIMC Lab.](#), Grenoble
Investigated and developed a tool for automatic generation of graphical user interface from ISIS query
Advised by Ana Simonet

Teaching Experience

- 2016, 2019 **LECTURING** at [University of Liverpool](#), United Kingdom
COMP524 – Safety and Dependability: lectures on continuous-time Markov chains and decision processes

Teaching Experience *(cont'd)*

- 2013 **TEACHING ASSISTANT** at [ISTIC, University of Rennes 1, France](#)
Algorithms on Graphs; tutorial class, 3rd year undergraduates
- 2008–2011 **TEACHING ASSISTANT** at [Ensimag, Grenoble INP, France](#)
Computer Architecture; practical courses, 1st year engineering school
Unix & Shell-script Development; lecture and practical courses, 1st year engineering school
C Programming; project supervision, 1st year engineering school
System Programming; project supervision, 2nd year engineering school
- 2008–2010 **TEACHING FELLOW** at [Conservatoire National des Arts et Métiers, regional centre in Grenoble](#)
Algorithms and Data Structures; evening classes, lecture courses, 1st year undergraduates
- Sept–Oct 2007 **TUTORING** at [Université Joseph Fourier, Grenoble](#)
Algorithms, language theory and automata; 3rd year undergraduates
-

Education

- 2008–2012 **PH.D IN COMPUTER SCIENCE** at [Université Joseph Fourier, Grenoble, France](#)
- 2005–2008 **M.RES IN COMPUTER SCIENCE (MAGISTÈRE)** at [Université Joseph Fourier, Grenoble, France](#)
magna cum laude
- 2006–2008 **M.Sc IN COMPUTER SCIENCE** at [Université Joseph Fourier](#)
cum laude
- 2005–2006 **B.Sc IN COMPUTER SCIENCE** at [Université Joseph Fourier](#)
cum laude
- 2003–2005 **UNDERGRADUATE DEGREE IN COMPUTER SCIENCE (DUT)**
at [Université Pierre-Mendès-France, Grenoble](#)
-

Student Supervision

- 2019–... **PH.D STUDENT AMANY ALSHAREEF**
Amny investigates high-level testing for deep learning models.
Her other supervisors are Xiaowei Huang and Sven Schewe.
- 2016–2020 **PH.D STUDENT METE ÖZBALTAN**
Mete studied concise and efficient control for the design of energy efficient synchronous circuits.
His other supervisors were Sven Schewe and Dominik Wojtczak.
-

Publications

Journal Articles

Nicolas Berthier, Éric Rutten, Noël De Palma, and Soguy Mak-Karé Gueye. [Designing Autonomic Management Systems by using Reactive Control Techniques](#). *IEEE Trans. Softw. Eng.*, 42(7):640–657, July 2016. ISSN 0098-5589. doi: 10.1109/TSE.2015.2510004.

Soguy Mak-Karé Gueye, Noël De Palma, Eric Rutten, Alain Tchana, and Nicolas Berthier. [Coordination de la Gestion autonome de la Réparation et du Dimensionnement d'un Système multi-niveaux par Contrôle Discret](#). *Revue des Sciences et Technologies de l'Information - Série TSI : Technique et Science Informatiques*, December 2016. doi: 10.3166/TSI.35.525-555. URL <https://hal.archives-ouvertes.fr/hal-01416992>.

Soguy Mak-Karé Gueye, Noël De Palma, Éric Rutten, Alain Tchana, and Nicolas Berthier. [Coordinating Self-sizing and Self-repair Managers for Multi-tier Systems](#). *Future Generation Computer Systems*, 35(0):14–26, June 2014. ISSN 0167-739X. doi: 10.1016/j.future.2013.12.037.

Nicolas Berthier, Florence Maraninchi, and Laurent Mounier. [Synchronous Programming of Device Drivers for Global Resource Control in Embedded Operating Systems](#). *ACM Trans. Embed. Comput. Syst.*, 12(1s):39:1–39:26, March 2013. ISSN 1539-9087. doi: 10.1145/2435227.2435235.

Conference Papers

Mete Özbaltan and Nicolas Berthier. [A Case for Symbolic Limited Optimal Discrete Control: Energy Management in Reactive Data-flow Circuits](#). *IFAC-PapersOnLine*, 53(2):10688–10694, 2020. ISSN 2405-8963. doi: 10.1016/j.ifacol.2020.12.2842. URL <https://www.sciencedirect.com/science/article/pii/S2405896320336077>. 21st IFAC World Congress.

Nicolas Berthier, Hervé Marchand, and Éric Rutten. [Symbolic Limited Lookahead Control for Best-effort Dynamic Computing Resource Management](#). In *14th Int. Workshop on Discrete Event Systems, WODES '18*, pages 112–119. IFAC, June 2018. doi: 10.1016/j.ifacol.2018.06.288.

Mete Özbaltan and Nicolas Berthier. [Exercising Symbolic Discrete Control for Designing Low-power Hardware Circuits: an Application to Clock-gating](#). In *14th Int. Workshop on Discrete Event Systems, WODES '18*, pages 120–126. IFAC, June 2018. doi: 10.1016/j.ifacol.2018.06.289.

Idress Husien, Sven Schewe, and Nicolas Berthier. [PranCS: A Protocol and Discrete Controller Synthesis Tool](#). In Kim Guldstrand Larsen, Oleg Sokolsky, and Ji Wang, editors, *Dependable Software Engineering. Theories, Tools, and Applications*, SETTA '17, pages 337–349. Springer International Publishing, October 2017. ISBN 978-3-319-69483-2.

Nicolas Berthier, Frederico Alvares, Hervé Marchand, Gwenaël Delaval, and Éric Rutten. [Logico-numerical Control for Software Components Reconfiguration](#). In *1st IEEE Conference on Control Technology and Applications*, CCTA '17. IEEE, August 2017. doi: 10.1109/CCTA.2017.8062685.

Idress Husien, Nicolas Berthier, and Sven Schewe. [A Hot Method for Synthesising Cool Controllers](#). In *Proceedings of the 24th ACM SIGSOFT International Symposium on Model Checking of Software*, SPIN 2017, pages 122–131. ACM, July 2017. ISBN 978-1-4503-5077-8. doi: 10.1145/3092282.3092299.

Nicolas Berthier and Hervé Marchand. [Deadlock-Free Discrete Controller Synthesis for Infinite State Systems](#). In *54th IEEE Conference on Decision and Control*, CDC '15, pages 1000–1007. IEEE, December 2015. doi: 10.1109/CDC.2015.7402003.

Nicolas Berthier, Xin An, and Hervé Marchand. [Towards Applying Logico-numerical Control to Dynamically Partially Reconfigurable Architectures](#). In *5th Int. Workshop on Dependable Control of Discrete Systems*, DCDS '15. IFAC, May 2015. doi: 10.1016/j.ifacol.2015.06.484.

Nicolas Berthier and Hervé Marchand. [Discrete Controller Synthesis for Infinite State Systems with ReaX](#). In *12th Int. Workshop on Discrete Event Systems*, WODES '14, pages 46–53. IFAC, May 2014. ISBN 978-3-902823-61-8. doi: 10.3182/20140514-3-FR-4046.00099.

Nicolas Berthier, Florence Maraninchi, and Laurent Mounier. [Synchronous Programming of Device Drivers for Global Resource Control in Embedded Operating Systems](#). In *Proceedings of the 2011 SIGPLAN/SIGBED Conference on Languages, Compilers and Tools for Embedded Systems*, LCTES '11, pages 81–90. ACM, 2011. ISBN 978-1-4503-0555-6. doi: 10.1145/1967677.1967689.

Thesis

Nicolas Berthier. *Programmation synchrone de pilotes de périphériques pour un contrôle global de ressources dans les systèmes embarqués*. PhD thesis, Université de Grenoble, March 2012.

Nicolas Berthier. *System-level Modeling of Embedded Control Systems: a Case Study from the Automated Transfer Vehicle*. Master's thesis, Université Joseph Fourier, June 2008.

Nicolas Berthier. *Gestion hybride de la mémoire dynamique dans les systèmes Java temps-réel*. Magistère deuxième année, Université Joseph Fourier, September 2007.

Nicolas Berthier. *Analyse de la démographie des objets dans les systèmes Java temps-réel*. Magistère première année, Université Joseph Fourier, September 2006.

Other

Nicolas Berthier, Youcheng Sun, Wei Huang, Yanghao Zhang, Wenjie Ruan, and Xiaowei Huang. *Tutorials on testing neural networks*, 2021. URL <https://arxiv.org/abs/2108.01734>.

Nicolas Berthier, Amany Alshareef, James Sharp, Sven Schewe, and Xiaowei Huang. *Abstraction and Symbolic Execution of Deep Neural Networks with Bayesian Approximation of Hidden Features*, 2021. URL <https://arxiv.org/abs/2103.03704>.

Nicolas Berthier, Florence Maraninchi, and Laurent Mounier. *Global Platform Management by Using Synchronous Device Drivers in μ -Kernel-based Systems*. Conference on Languages, Compilers, Tools and Theory for Embedded Systems (LCTES). Fun Ideas and Thoughts Session — FIT, April 2011. (*Best FIT Presentation Award*).

Reviewing Activities

- Discrete Event Dynamic Systems;
- IEEE Transactions on Automation Science and Engineering;
- IFAC Control Engineering Practice;
- CDC '20, IFAC '20, CCTA '18, CDC '17, IFAC '17, ICAC '15, WODES '14, EMSOFT '10