

# Dr. Ruben Martins

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## Employment

- Jan 2014–Current **Postdoctoral Research Assistant**, *University of Oxford, UK.*
- Improved the Satisfiability Modulo Theories (SMT) of Bit-Vectors and Arrays that are used in CBMC. CBMC is a bounded model checker for ANSI-C programs (around 0.5 million lines of C++) and is used by several companies, such as Toyota, ABB, BTC Embedded Systems, etc.
  - Improved CBMC performance on software from automotive origin used by BTC Embedded Systems by extending CBMC with an incremental approach.
  - Validated and verified the translation from AgentSpeak to C code that is used to operate Unmanned Aerial Vehicles (UAVs).
- Sep 2013–Dec 2013 **Visiting Researcher**, *University of Lisbon, Portugal.*
- Worked on incomplete algorithms for Boolean optimization and Mixed Integer Linear Programming (MILP) and its integration with CPLEX.
- May 2012–Jul 2012 **Research Intern**, *Microsoft Research, Cambridge, UK.*
- Implemented a lock-free unit propagation algorithm on top of MiniSAT.
  - Implemented a parallel unit propagation algorithm with OpenMP on top of MiniSAT.
- Nov 2012–Jan 2013 **Research Intern**, *Microsoft Research, Cambridge, UK.*
- Implemented a distributed SAT solver with MIP on top of MiniSAT.

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## Education

- Sep 2013 **Ph.D. in Information Systems and Computer Engineering**, *University of Lisbon, Portugal, Graduated with honors.*
- Developed new algorithms for Maximum Satisfiability (MaxSAT).
  - Implemented state-of-the-art single-threaded and multi-threaded MaxSAT solvers.
  - MaxSAT has many practical applications, such as software package upgrades (e.g. used in the Eclipse platform to manage plug-in dependencies), fault localization in C code, debugging of hardware designs, timetabling, etc.
- Jan 2008 **M.Sc. in Mathematics and Applications**, *University of Lisbon, Portugal.*
- Jan 2008 **B.Sc. in Applied Mathematics and Computation**, *University of Lisbon, Portugal.*

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## Software

Developed three constraint solvers (Open-WBO, WBO, PWBO) for Boolean optimization (around 30 thousand lines of C++ code). These solvers are used in:

- Academia: for teaching and research purposes.
- Onera (French Aerospace Lab): for complex design space exploration in critical embedded systems.

- 2013–Current **Open-WBO**, 🌐 [sat.inesc-id.pt/open-wbo](http://sat.inesc-id.pt/open-wbo).
- Open-source MaxSAT solver that can be easily modified and extended.
- Awards:**
- MaxSAT FLoC Olympic Games 2014: 2 gold medals
  - MaxSAT Evaluation 2014: 1 gold medal, 1 silver medal
- 2010–2013 **WBO**, 🌐 [sat.inesc-id.pt/wbo](http://sat.inesc-id.pt/wbo).
- Boolean optimization solver that can solve Weighted Boolean Optimization, Pseudo-Boolean optimization, 0-1 Integer Linear Programming, and MaxSAT problems.
- Awards:**
- MaxSAT Evaluation 2012: 1 gold medal, 1 bronze medal
  - MaxSAT Evaluation 2011: 1 silver medal, 1 bronze medal

2010-2013 **PWBO**, [sat.inesc-id.pt/pwbo](http://sat.inesc-id.pt/pwbo).

- Parallel Boolean optimization solver based on WBO.

**Awards:**

- MaxSAT Evaluation 2012: 1 gold medal, 1 silver medal
- MaxSAT Evaluation 2011: 1 silver medal
- PB Evaluation 2011: 1 bronze medal

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## Skills

Programming C, C++, Java, Shell Scripting, CPLEX  
Parallelism POSIX Threads, OpenMP, MPI  
Development eclipse, Visual Studio, git, SVN

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## Publications

Published more than 20 papers, including:

- 1 book chapter,
- 5 journal papers,
- 10 conference papers,
- 6 workshop papers.

- Selected Publications
- *“Stronger, Better, Faster: Optimally Propagating SAT Encodings.”* with Martin Brain, Liana Hadarean, and Daniel Kroening, CADE 2015 (Submitted).
  - *“Successful Use of Incremental BMC in Automotive Industry”* with Peter Schrammel, Daniel Kroening, Martin Brain, Tino Teige, and Tom Bienmüller, FMICS 2015.
  - *“Incremental Cardinality Constraints for MaxSAT”* with Saurabh Joshi, Vasco Manquinho and Inês Lynce, CP 2014.
  - *“Open-WBO: A Modular MaxSAT Solver”* with Vasco Manquinho and Inês Lynce, SAT 2014.
  - *“Community-based Partitioning for MaxSAT Solving”* with Vasco Manquinho and Inês Lynce, SAT 2013.
  - *“On Partitioning for Maximum Satisfiability”* with Vasco Manquinho and Inês Lynce, ECAI 2012.
  - *“Parallel Search for Maximum Satisfiability”* with Vasco Manquinho and Inês Lynce, AI Communications 2012.
  - *“An Overview of Parallel SAT Solving”* with Vasco Manquinho and Inês Lynce, SAT 2010.

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## Other Professional Activities

- Invited Talks
- *“MaxSAT Evaluation 2014”* FLoC Olympic Games, Award Ceremony for the MaxSAT Evaluation, 2014.
  - *“Maximum Satisfiability: Beyond Decision Problems”* University of Oxford, Verification Seminar, 2013.
- Teaching
- Lecturer for a week of tutorials on software verification at the University of Lleida, Spain: 3 two-hours theoretical lectures, 1 one-hour practical lecture, May 2015.
- Program Committee
- IJCAI'15
- Reviewer
- CAV'15, JSAT'15, AAAI'15, TACAS'15, SAT'10-'14, CP'12'14, FMCAD'12'14, IJCAI'13, LPAR'13, CPAIOR'12, LION'12, POS'11-'14, RCRA'12
- Management
- Co-supervised Eliot Ball, an undergraduate student at the University of Oxford, for a third year project on using extended resolution to improve the performance of SAT solvers (2014-2015).
  - Organized the weekly seminars for the Systems Verification Group in the University of Oxford (2014-2015).