

Dr. rer. nat. Jörg Brauer

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"Luck favors the prepared mind."
Louis Pasteur, 1822-1895

About me

I moved to Bremen.

Prior to moving up north, I used to be a PhD student heading the [\[mc\]square](#) project. [mc]square is a verification platform for microcontroller binary code. The key idea in [mc]square is to combine different formal methods in order to analyze hardware-specific microcontroller code. My own focus is the development of static analysis and abstract interpretation techniques specifically suited for verifying bit-twiddling programs. I am also involved in the [CEVTES](#) project, which is a joint project with the TU Vienna and the UAS Technikum Vienna on test-case generation for binary code.

Before I joined the Embedded Software Laboratory, I received my diploma degree from the Christian-Albrechts University of Kiel and visited [NICTA](#) in Sydney, Australia. At NICTA, I worked on [Goanna](#), a static analyzer for the C/C++ programming languages.

See [my CV](#) for more details.

News

- **16/03/2012:** Today I had my last day in Aachen, I leave the Embedded Software Laboratory to work in industry.
- **06/03/2012:** The slides for my presentation on automatic abstraction at the [Compiler Design Lab](#) in Saarbrücken are available [here](#).
- **05/03/2012:** The slides for my talk at the Max-Planck Institute in Saarbrücken are available from [here](#).
- **01/03/2012:** The slides for my talk at [InBot'12](#) are available from [here](#).
- **24/01/2012:** The paper [Inferring Definite Counterexamples Through Under-Approximation](#),

- which I co-authored with [Axel Simon](#) from the TU Munich, was accepted to the [4th NASA Formal Methods Symposium \(NFM 2012\)](#).
- **22/11/2011:** I gave an invited talk at CEA, LIST in Paris about automatic generation of abstraction for binary code. The slides are available from [here](#).
 - **15/11/2011:** Today, I gave an invited talk about formal verification of PLC software at the University of Bremen. The slides are available from [here](#).
 - **03/11/2011:** I gave an invited talk on automatic abstraction for bit-vector relations at the TU Vienna and the IST Austria.
 - **01/09/2011:** I have received a best paper award from [FMICS'11](#) for the paper [Past Time LTL Runtime Verification for Microcontroller Binary Code](#). The paper was co-authored [Thomas Reinbacher](#), [Martin Horauer](#), [Andreas Steininger](#) and [Stefan Kowalewski](#).
 - **01/08/2011:** The paper *Automated Test-Trace Inspection for Microcontroller Binary Code* which I co-authored with [Thomas Reinbacher](#), [Daniel Schachinger](#) and [Andreas Steininger](#) from the TU Vienna as well as [Stefan Kowalewski](#) from our group was accepted to [RV'11](#).
 - **20/07/2011:** The implementation for my [CAV'11 paper](#) is available from <http://www.cs.kent.ac.uk/amkdistribution>.
 - **03/07/2011:** The paper *Precise Control Flow Reconstruction Using Boolean Logic* that I co-authored with [Thomas Reinbacher](#), my colleague from TU Vienna, has been accepted to [EMSOFT'11](#). In this paper, me and Thomas combine several techniques such as bit-blasting, my elimination algorithm from CAV and forward/backward analysis to compute fairly precise approximations of CFGs from binary code.
 - **01/07/2011:** The paper *Adaptable Value-Set Analysis for Low-Level Code* that I have co-authored with [René Rydhof Hansen](#), [Kim G. Larsen](#) and [Mads Chr. Olesen](#) from Aalborg University as well as [Stefan Kowalewski](#) from our department was accepted for presentation at [SSV'11](#).
 - **10/06/2011:** I was invited to give a talk at the [MT-LAB](#) meeting in Copenhagen. The MT-LAB is a Danish research centre for formal methods, and the talk was about my work on existential quantifier elimination.
 - **06/05/2011:** The paper [Past Time LTL Runtime Verification for Microcontroller Binary Code](#) that I have co-authored with [Thomas Reinbacher](#), [Martin Horauer](#), [Andreas Steininger](#) and [Stefan Kowalewski](#) was accepted for [FMICS'11](#). The workshop will be held in Trento, Italy around end of August.
 - **06/04/2011:** We have assembled a [programme committee](#) for [SSV 2011](#). Additionally, a call for papers is available [here](#).
 - **22/03/2011:** The paper [Existential Quantification as Incremental SAT](#) which I co-authored with [Andy King](#) and [Jael Kriener](#) was accepted for [CAV'11](#). Yeah!
 - **14/03/2011:** [SSV 2011](#) will be co-located with the [2nd Conference on Interactive Theorem Proving \(ITP\)](#) in Nijmegen, The Netherlands. ITP will take place from August 22 till August 25, and SSV will be held as a 2-day workshop starting the day thereafter.
 - **11/03/2011:** I will be visiting the group of [Kim G. Larsen](#) in Aalborg from April till June. Hence, if you need to contact me, please try via email.
 - **10/02/2011:** Together with [Marco Roveri](#) (FBK-IRST, Trento) and [Hendrik Tews](#) (TU Dresden), I will co-chair the [6th International Workshop on Systems Software Verification \(SSV 2011\)](#).
 - **09/02/2011:** My paper [Approximate Quantifier Elimination for Propositional Boolean Formulae](#) co-authored with [Andy King](#) was accepted for [NFM'11](#).
 - **07/12/2010:** My paper [Transfer Function Synthesis without Quantifier Elimination](#) co-authored with [Andy King](#) was accepted for [ESOP'11](#).
 - **28/10/2010:** Together with [Thomas Reinbacher](#), [Martin Horauer](#), [Andreas Steininger](#) and [Stefan Kowalewski](#), I received a best paper award for our contribution to [MEMICS'10](#).
 - **08/06/2010:** My paper [Range Analysis of Microcontroller Code using Bit-Level Congruences](#) co-

authored with [Andy King](#) and [Stefan Kowalewski](#) was accepted for [FMICS'10](#).

- **04/05/2010:** My paper [Automatic Abstraction for Intervals using Boolean Formulae](#) co-authored with [Andy King](#) was accepted for [SAS'10](#).

Research Interests

- abstract interpretation of bit-vector programs (see [\[mc\]square](#)), in particular using *automatic abstraction*
- relational abstract domains
- formal verification
- software model checking
- software for embedded systems

In summary, I combine theoretical computer science with low-level programming, for example, by automatically deriving invariants for bit-twiddling binary code. I particularly enjoy utilizing SAT/SMT solvers for solving such problems. If you interested in this topic, you might want to check out [my SAS'10 paper](#) or [my ESOP'11 paper](#), which give a good feel about how precise SAT-based abstract interpretation of bit-vector programs (such as assembly code) can get. However, to make such techniques scale, you need to apply certain other techniques, such as the projection algorithm from [my CAV'11 paper](#).

Professional Activities

- Symposium co-chair for the Symposium on Design & Verification Methodologies for Embedded Systems, which is a symposium within the IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications (MESA) 2012 in Suzhou, China.
- Co-chair of the [6th International Workshop on Systems Software Verification](#) (SSV 2011) in Nijmegen, The Netherlands.
- Co-chair for the 4th Symposium on Design & Verification Tools for Embedded Systems (DVTES 2011) at [IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications \(MESA\) 2011](#) in Washington DC, USA
- Program committee for the [15th International Workshop on Formal Methods for Industrial Critical Systems \(FMICS 2010\)](#) in Antwerp, Belgium
- Local organizer for the [4th International Workshop on Systems Software Verification \(SSV 2009\)](#) in Aachen, Germany

B.Sc./M.Sc./Diploma Theses

We always have a number of different topics for diploma, bachelors, and masters theses in the [\[mc\]square](#) project. Even though I do not supervise theses myself anymore, please contact me if you are interested in working on verification in the field of embedded software, preferably via email. We can probably find an interesting topic and a supervisor.

- **Ongoing**
- **Finished**

- Na Bai (Diploma): *Dataflow Analysis for PLCs (September 2011)*
- Sebastian Biallas (Diploma): *Counterexample-Guided Abstraction Refinement for Programmable Logic Controllers (April 2010)*
- Frank Birbacher (Diploma): *Relational Static Analysis of IL-Programs using Congruences*
- Lucas Brutschy (B.Sc.): *Static Analysis of Microcontroller Software using SAT- and Constraint-Solving (August 2009)*
- Mustafa Karafil (Diploma): *Recovering Indirect Control Flow in Binary Code (August 2011)*
- Jörg Toborg (Diploma): *Static Analysis for the Renesas R8C/23 Tiny Microcontroller (February 2010)*

Publications

A more detailed list of my publications can be found [here](#) (including abstracts), and a list of my co-authors can be found [here](#).

[RBH+14]

[PDFBIB](#)

Reinbacher, T., Brauer, J., Horauer, M., Steininger, A., and Kowalewski, S., "Runtime verification of microcontroller binary code", *Science of computer programming*, vol. 80, pp. 109-129, 2014

Runtime verification of microcontroller binary code

Bibtex entry :

```
@article { RBH+14,
  author = { Reinbacher, Thomas and Brauer, J{"o}rg and Horauer,
  Martin
    and Steininger, Andreas and Kowalewski, Stefan },
  title = { Runtime verification of microcontroller binary code },
  journal = { Science of computer programming },
  publisher = { Elsevier },
  pages = { 109-129 },
  volume = { 80 },
  year = { 2014 },
  address = { Amsterdam },
  issn = { 0167-6423 },
  doi = { 10.1016/j.scico.2012.10.015 },
  typ = { PUB:(DE-HGF)16 },
  reportid = { RWTH-CONV-080463 },
  cin = { 120000 / 122810 },
  url = { http://publications.rwth-aachen.de/record/231479 },
}
```

[RFB14]

[PDFBIB](#)

Reinbacher, T., Fuegger, M., and Brauer, J., "Runtime verification of embedded real-time systems", *Formal methods in system design*, vol. 44, iss. 3, pp. 203-239, 2014

Runtime verification of embedded real-time systems

Bibtex entry :

```
@article { RFB14,
  author = { Reinbacher, Thomas and Fuegger, Matthias and Brauer,
    J{\\"o}rg },
  title = { Runtime verification of embedded real-time systems },
  journal = { Formal methods in system design },
  publisher = { Springer Science + Business Media B.V },
  pages = { 203-239 },
  volume = { 44 },
  number = { 3 },
  year = { 2014 },
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  issn = { 0925-9856 },
  doi = { 10.1007/s10703-013-0199-z },
  typ = { PUB:(DE-HGF)16 },
  reportid = { RWTH-CONV-089599 },
  cin = { 120000 / 122810 },
  url = { http://publications.rwth-aachen.de/record/446689 },
}
```

[BK13]

[PDFBIB](#)

Brauer, J. and Kowalewski, S., "Automatic abstraction for bit vectors using decision procedures", Aachen, AIB 2013 14, 2013.

Automatic abstraction for bit vectors using decision procedures

Bibtex entry :

```
@techreport { BK13,
  author = { Brauer, J{\\"o}rg and Kowalewski, Stefan },
  title = { Automatic abstraction for bit vectors using decision
    procedures },
  publisher = { Fachgruppe Informatik, RWTH Aachen University },
  pages = { IV, 207 S. : graph. Darst. },
  volume = { 2013,14 },
  number = { AIB 2013 14 },
  series = { Aachener Informatik-Berichte },
  year = { 2013 },
  address = { Aachen },
  typ = { PUB:(DE-HGF)11 },
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  cin = { 120000 / 122810 },
  url = {
    http://publications.rwth-aachen.de/record/229199/files/4836.pdf },
}
```

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}
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[BKK13]

[PDFBIB](#)

Brauer, J., King, A., and Kowalewski, S., "Abstract interpretation of microcontroller code: Intervals meet congruences", *Science of computer programming*, vol. 78, iss. 7, pp. 862-883, 2013

Abstract interpretation of microcontroller code: Intervals meet congruences

Bibtex entry :

```
@article { BKK13,  
  author = { Brauer, J{\\"o}rg and King, Andy and Kowalewski, Stefan  
},  
  title = { Abstract interpretation of microcontroller code:  
Intervals  
  meet congruences },  
  journal = { Science of computer programming },  
  publisher = { Elsevier },  
  pages = { 862-883 },  
  volume = { 78 },  
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}
```

[KPB13]

[PDFBIB](#)

Kowalewski, S., Philippou, A., and Brauer, J., "Model checking and abstract interpretation as building blocks of advanced program analysis techniques", *International journal on software tools for technology transfer : STTT*, vol. 15, iss. 4, pp. 287-289, 2013

Model checking and abstract interpretation as building blocks of advanced program analysis techniques

Bibtex entry :

```
@article { KPB13,  
  author = { Kowalewski, Stefan and Philippou, A. and Brauer, J. },  
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journal = { International journal on software tools for technology
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volume = { 15 },
number = { 4 },
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issn = { 1433-2787 },
organization = { 15th International Conference, TACAS 2009, York
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doi = { 10.1007/s10009-013-0280-3 },
typ = { PUB:(DE-HGF)16 },
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url = { http://publications.rwth-aachen.de/record/752289 },
}

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[BBK+12]

[PDFBIB](#)

Biallas, S., Brauer, J., King, A., and Kowalewski, S., "Loop Leaping with Closures", in *Proc. Static Analysis : 19th International Symposium, SAS 2012, Deauville, France, September 11-13, 2012. Proceedings / edited by Antoine Miné, David Schmidt*, Berlin, Heidelberg, 2012 in *Lecture Notes in Computer Science*, Springer, pp. 214-230.

Loop Leaping with Closures

Bibtex entry :

```

@inproceedings { BBK+12,
  author = { Biallas, Sebastian and Brauer, J{"o}rg and King, Andy
and
  Kowalewski, Stefan },
  title = { Loop Leaping with Closures },
  booktitle = { Static Analysis : 19th International Symposium, SAS
2012,
  Deauville, France, September 11-13, 2012. Proceedings /
  edited by Antoine Miné, David Schmidt },
  publisher = { Springer },
  pages = { 214-230 },
  series = { Lecture Notes in Computer Science },
  year = { 2012 },
  address = { Berlin, Heidelberg },
  organization = { Static Analysis : 19th International Symposium,
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  (France), 2012-09-11 - 2012-09-13 },
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[BBK12a]

[PDFBIB](#)

Beckschulze, E., Brauer, J., and Kowalewski, S., "Access-Based Localization for Octagons", *Electronic notes in theoretical computer science : ENTCS*, vol. 287, pp. 29-40, 2012

Access-Based Localization for Octagons

Bibtex entry :

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@article { BBK12a,
  author = { Beckschulze, Eva and Brauer, J{"o}rg and Kowalewski,
Stefan },
  title = { Access-Based Localization for Octagons },
  journal = { Electronic notes in theoretical computer science :
ENTCS },
  publisher = { Elsevier Science },
  pages = { 29-40 },
  volume = { 287 },
  year = { 2012 },
  address = { Amsterdam [u.a.] },
  issn = { 1571-0661 },
  typ = { PUB:(DE-HGF)16 },
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  cin = { 122810 / 120000 },
  url = { http://publications.rwth-aachen.de/record/165238 },
}
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[BBK12b]

[PDFBIB](#)

Biallas, S., Brauer, J., and Kowalewski, S., "Arcade.PLC : a Verification Platform for Programmable Logic Controllers", in *Proc. 2012 proceedings of the 27th IEEE/ACM International Conference on Automated Software Engineering (ASE 2012) : Essen, Germany, 3 - 7 September 2012*, Piscataway, NJ, 2012, IEEE, pp. 338-341.

Arcade.PLC : a Verification Platform for Programmable Logic Controllers

Bibtex entry :

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@inproceedings { BBK12b,
  author = { Biallas, Sebastian and Brauer, J{"o}rg and Kowalewski,
Stefan },
  title = { Arcade.PLC : a Verification Platform for Programmable
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Controllers },
  booktitle = { 2012 proceedings of the 27th IEEE/ACM International
Conference on Automated Software Engineering (ASE 2012) :
Essen, Germany, 3 - 7 September 2012 },
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publisher = { IEEE },
pages = { 338-341 },
year = { 2012 },
address = { Piscataway, NJ },
doi = { 10.1145/2351676.2351741 },
typ = { PUB:(DE-HGF)8 },
reportid = { RWTH-CONV-170936 },
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[BHK+12]

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Adaptable Value-Set Analysis for Low-Level Code

Bibtex entry :

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@inproceedings { BHK+12,
  author = { Brauer, J{"o}rg and Hansen, Rene Rydhof and Kowalewski,
    Stefan and Larsen, Kim G. and Olesen, Mads Chr. },
  title = { Adaptable Value-Set Analysis for Low-Level Code },
  booktitle = { 6th International Workshop on Systems Software
Verification
  (SSV 2011) [Elektronische Ressource] / Hrsg.: J{"o}rg
  Brauer ; Marco Roveri ; Hendrik Tews },
  publisher = { Schloss Dagstuhl - Leibniz-Zentrum f{"u}r Informatik
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  pages = { 32-43 },
  series = { OASlcs - OpenAccess Series in Informatics },
  year = { 2012 },
  address = { Wadern },
  doi = { 10.4230/OASlcs.SSV.2011.32 },
  typ = { PUB:(DE-HGF)8 },
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  cin = { 122810 / 120000 },
  url = { http://publications.rwth-aachen.de/record/128784 },
}

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[BK12a]

[PDFBIB](#)

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Transfer function synthesis without quantifier elimination

Bibtex entry :

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@article { BK12a,
  author = { Brauer, J{"o}rg and King, Andy },
  title = { Transfer function synthesis without quantifier
elimination },
  journal = { Logical methods in computer science : LMCS },
  publisher = { Department of Theoretical Computer Science, TU [u.a.]
},
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http://publications.rwth-aachen.de/record/218122/files/218122.pdf },
}
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[BS12]

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Brauer, J. and Simon, A., "Inferring Definite Counterexamples Through Under-Approximation", in *Proc. NASA formal methods : 4th international symposium, NFM 2012, Norfolk, VA, USA, April 3 - 5, 2012 ; proceedings / Alwyn E. Goodloe; Suzette Person (ed.)*, Berlin ; Heidelberg [u.a.], 2012 in *Lecture Notes in Computer Science*, Springer, pp. 54-69.

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Bibtex entry :

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Norfolk, VA, USA, April 3 - 5, 2012 ; proceedings / Alwyn E.
Goodloe; Suzette Person (ed.) },
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  pages = { 54-69 },
  series = { Lecture Notes in Computer Science },
  year = { 2012 },
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url = { http://publications.rwth-aachen.de/record/123648 },
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[BSK12]

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Bibtex entry :

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  author = { Brauer, J{\\"o}rg and Schlich, Bastian and Kowalewski, Stefan },
  title = { Parallel and distributed invariant checking of
    microcontroller software },
  journal = { Electronic notes in theoretical computer science :
    ENTCS },
  publisher = { Elsevier Science },
  pages = { 45-63 },
  volume = { 287 },
  year = { 2012 },
  address = { Amsterdam [u.a.] },
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  reportid = { RWTH-CONV-013643 },
  cin = { 122810 / 120000 },
  url = { http://publications.rwth-aachen.de/record/132534 },
}
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[BBK+11]

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Biallas, S., Brauer, J., Kowalewski, S., and Schlich, B., "Automatically Deriving Symbolic Invariants for PLC Programs Written in IL", in *Proc. Formal methods for automation and safety in railway and automotive systems : FORMS/FORMAT 2010 ; [8th symposium ; proceedings] / Eckehard Schnieder; Géza Tarnai, eds.*, Heidelberg [u.a.], 2011, Springer, pp. 237-245.

Automatically Deriving Symbolic Invariants for PLC Programs Written in IL

Bibtex entry :

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@inproceedings { BBK+11,
  author = { Biallas, Sebastian and Brauer, J{"o}rg and Kowalewski,
    Stefan and Schlich, Bastian },
  title = { Automatically Deriving Symbolic Invariants for PLC
Programs
  Written in IL },
  booktitle = { Formal methods for automation and safety in railway
and
  automotive systems : FORMS/FORMAT 2010 ; [8th symposium ;
  proceedings] / Eckehard Schnieder; Géza Tarnai, eds. },
  publisher = { Springer },
  pages = { 237-245 },
  year = { 2011 },
  address = { Heidelberg [u.a.] },
  doi = { 10.1007/978-3-642-14261-1 },
  typ = { PUB:(DE-HGF)8 },
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  cin = { 122810 / 120000 },
  url = { http://publications.rwth-aachen.de/record/126461 },
}
```

[BBK11]

[PDFBIB](#)

Biallas, S., Brauer, J., and Kowalewski, S., "SAT-Based Abstraction Refinement for Programmable Logic Controllers", in *Proc. 3rd International Workshop on Dependable Control of Discrete Systems 2011, DCDS 2011, Saarbrücken, Germany, 15th-17th June 2011*, Piscataway, NJ, 2011, IEEE, pp. 96-101.

SAT-Based Abstraction Refinement for Programmable Logic Controllers

Bibtex entry :

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@inproceedings { BBK11,
  author = { Biallas, Sebastian and Brauer, J{"o}rg and Kowalewski,
    Stefan },
  title = { SAT-Based Abstraction Refinement for Programmable Logic
  Controllers },
  booktitle = { 3rd International Workshop on Dependable Control of
  Discrete
  Systems 2011, DCDS 2011, Saarbr{"u}cken, Germany,
  15th-17th June 2011 },
  publisher = { IEEE },
  pages = { 96-101 },
  year = { 2011 },
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url = {
http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=05970325 },
}

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[BBS+11]

[PDFBIB](#)

Beckschulze, E., Brauer, J., Stollenwerk, A., and Kowalewski, S., "Analyzing Embedded Systems Code for Mixed-Critical Systems Using Hybrid Memory Representations", in *Proc. 2011 14th IEEE International Symposium on Object/Component/Service-Oriented Real-Time Distributed Computing workshops (ISORCW) : 28 - 31 March 2011, Newport Beach, California, USA ; proceedings*, Piscataway, NJ, 2011, IEEE, pp. 33-40.

Analyzing Embedded Systems Code for Mixed-Critical Systems Using Hybrid Memory Representations

Bibtex entry :

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@inproceedings { BBS+11,
  author = { Beckschulze, Eva and Brauer, J{"o}rg and Stollenwerk,
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  title = { Analyzing Embedded Systems Code for Mixed-Critical
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      Using Hybrid Memory Representations },
  booktitle = { 2011 14th IEEE International Symposium on
    Object/Component/Service-Oriented Real-Time Distributed
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    Beach, California, USA ; proceedings },
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  organization = { 14th IEEE International Symposium on
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    Computing, Newport Beach, CA (USA), 2011-03-28 - 2011-08-31 },
  doi = { 10.1109/ISORCW.2011.40 },
  typ = { PUB:(DE-HGF)7 },
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  author = { Brauer, J{\\"o}rg and King, Andy and Kriener, Jael },
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  author = { Brauer, Jörg and Roveri, Marco and Tews, Hendrik },
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    series = { Lecture Notes in Computer Science },
    year = { 2011 },
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    url = { http://publications.rwth-aachen.de/record/116214 },
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    year = { 2010 },
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}

```

[RHS+10]

[PDFBIB](#)

Reinbacher, T., Horauer, M., Schlich, B., Brauer, J., and Scheuer, F., "Model Checking Embedded Software of an Industrial Knitting Machine", *International journal of information technology, communications and convergence*, vol. 1, iss. 2, pp. 186-205, 2010

Model Checking Embedded Software of an Industrial Knitting Machine

Bibtex entry :

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@article { RHS+10,
    author = { Reinbacher, Thomas and Horauer, Martin and Schlich,
Bastian
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    title = { Model Checking Embedded Software of an Industrial
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    journal = { International journal of information technology,
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http://inderscience.metapress.com/content/y664g84625r780l0/fulltext.pdf
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}

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[BHS09]

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Brauer, J., Huuck, R., and Schlich, B., "Interprocedural pointer analysis in Goanna", *Electronic notes in theoretical computer science : ENTCS*, vol. 254, pp. 65-83, 2009

Interprocedural pointer analysis in Goanna

Bibtex entry :

```
@article { BHS09,
  author = { Brauer, J{\"}rg and Huuck, Ralf and Schlich, Bastian },
  title = { Interprocedural pointer analysis in Goanna },
  journal = { Electronic notes in theoretical computer science :
ENTCS },
  publisher = { Elsevier Science },
  pages = { 65-83 },
  volume = { 254 },
  year = { 2009 },
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  issn = { 1571-0661 },
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[BSR+09]

[PDFBIB](#)

Brauer, J., Schlich, B., Reinbacher, T., and Kowalewski, S., "Stack bounds analysis of microcontroller assembly code", in *Proc. Embedded Systems Week 2009 : CODES+ISSS'09, CASES'09, EMSOFT'09 ; Proceedings of the 2009 international conference on Compilers, architecture, and synthesis for embedded systems ; 2009, Grenoble, France, October 11 - 16, 2009*, New York, NY, 2009, ACM Press.

Stack bounds analysis of microcontroller assembly code

Bibtex entry :

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@inproceedings { BSR+09,
  author = { Brauer, J{\"}rg and Schlich, Bastian and Reinbacher,
Thomas
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  title = { Stack bounds analysis of microcontroller assembly code },
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EMSOFT'09 ; Proceedings of the 2009 international
conference on Compilers, architecture, and synthesis for
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doi = { 10.1145/1631716.1631721 },
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[RBH+09]

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Reinbacher, T., Brauer, J., Horauer, M., and Schlich, B., "Refining assembly code static analysis for the Intel MCS-51 microcontroller", in *Proc. 2009 IEEE International Symposium on Industrial Embedded Systems (SIES 2009) : Lausanne, Switzerland, 08 - 10 July 2009 / [sponsored by: IEEE Industrial Electronics Society (IES)]*, Piscataway, NJ, 2009, IEEE, pp. 161-170.

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Bibtex entry :

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  author = { Reinbacher, Thomas and Brauer, J{"o}rg and Horauer,
  Martin
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  title = { Refining assembly code static analysis for the Intel
  MCS-51
    microcontroller },
  booktitle = { 2009 IEEE International Symposium on Industrial
  Embedded
    Systems (SIES 2009) : Lausanne, Switzerland, 08 - 10 July
    2009 / [sponsored by: IEEE Industrial Electronics Society
    (IES)] },
  publisher = { IEEE },
  pages = { 161-170 },
  year = { 2009 },
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[RHS+09]

[PDFBIB](#)

Reinbacher, T., Horauer, M., Schlich, B., Brauer, J., and Scheuer, F., "Model checking assembly code of an industrial knitting machine", in *Proc. Proceedings of the 2009 Fourth International Conference on Embedded and Multimedia Computing : EM-Com 2009 : [December 10-12, 2009, Jeju Island, Korea]*, Piscataway, NJ, 2009, IEEE, p. 8.

Model checking assembly code of an industrial knitting machine

Bibtex entry :

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  author = { Reinbacher, Thomas and Horauer, Martin and Schlich,
    Bastian
    and Brauer, J{"o}rg and Scheuer, Florian },
  title = { Model checking assembly code of an industrial knitting
    machine },
  booktitle = { Proceedings of the 2009 Fourth International
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  publisher = { IEEE },
  pages = { 8 S. },
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[SBW+09]

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Schlich, B., Brauer, J., Wernerus, J., and Kowalewski, S., "Direct Model Checking of PLC Programs in IL", in *Proc. Dependable Control of Discrete Systems (DCDS'09), Bari, Italy, 2009*, pp. 28-33.

Direct Model Checking of {PLC} Programs in {IL}

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@inproceedings { SBW+09,
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    J{"o}rg
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  title = { Direct Model Checking of {PLC} Programs in {IL} },
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[HFS+08]

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Huuck, R., Fehnker, A., Seefried, S., and Brauer, J., "Goanna: syntactic software model checking" Berlin [u.a.]: Springer, 2008, vol. 5311, pp. 216-221.

Goanna: syntactic software model checking

Bibtex entry :

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@inbook { HFS+08,
  author = { Huuck, Ralf and Fehnker, Ansgar and Seefried, Sean and
    Brauer, J{\\"o}rg },
  title = { Goanna: syntactic software model checking },
  booktitle = { Automated technology for verification and analysis :
6th
  international symposium, ATVA 2008, Seoul, Korea, October 20
- 23, 2008 ; proceedings / Sungdeok (Steve) Cha; Jin-Young
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  publisher = { Springer },
  pages = { 216-221 },
  volume = { 5311 },
  series = { Lecture notes in computer science },
  year = { 2008 },
  address = { Berlin [u.a.] },
  organization = { 6th International Symposium on Automated
Technology for
  Verification and Analysis, Seoul (South Korea), 2008-10-20 -
2008-10-23 },
  doi = { 10.1007/978-3-540-88387-6_17 },
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Invited Talks

- Existential Quantification as Incremental SAT. Technical University of Denmark, Copenhagen. 10-06-2011.
- Automatic Abstraction for Binary Code Verification. Aalborg University, Denmark. 13-04-2011.
- Automatic Abstraction for Intervals using Boolean Formula. Technical University of Munich, Germany. 14-05-2010.
- Static Analysis in [mc]square. University of Applied Sciences FH Technikum Vienna, Austria. 31-03-2009.

Teaching

- Winter semester 2010/2011
 - [Formal Methods for Embedded Systems](#) (Lecture)
- Summer semester 2010
 - [Seminar: Programmanalyse](#) (Seminar)
- Winter semester 2009/2010
 - [Formal Methods for Embedded Systems](#) (Lecture)
 - [Verification and Program Analysis](#) (Seminar)
- Summer semester 2009
 - [Applying Formal Verification Methods to Embedded Systems](#) (Seminar)
- Winter semester 2008/2009
 - [Static Analysis of Embedded Systems Software](#) (Seminar)

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