

Christian Dernehl, M.Sc.



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Research Topics

- Autonomy for Micro Aerial Vehicles
- Static analysis of functional block diagrams
- Model checking of functional block diagrams
- Analysis of non-linear systems

Projects

- [IMAV](#)
- [Teilnahme am Carolo Cup](#)

Teaching

Semester	Title
Summer 2012	Hardware Programming Lab
Winter 2012/13	Introduction to Computer Engineering
Winter 2013/14	Introduction to Computer Engineering

Publications

[Der19]

[PDF](#) [BIB](#)

Dernehl, C. M., "Verification of embedded software models by combining abstract interpretation, symbolic execution and stability analysis", PhD Thesis, Aachen, 2019.

Verification of embedded software models by combining abstract interpretation, symbolic execution and stability analysis

Bibtex entry :

```
@phdthesis { Der19,  
  author = { Dernehl, Christian Michael },  
  othercontributors = { Kowalewski, Stefan and Moormann, Dieter },  
  title = { Verification of embedded software models by combining  
    abstract interpretation, symbolic execution and stability  
    analysis },  
  publisher = { RWTH Aachen University, Department of Computer  
Science },  
  school = { RWTH Aachen University },  
  pages = { 1 Online-Ressource (xxiii, 156 Seiten) : Illustrationen,  
    Diagramme },  
  series = { Aachener Informatik-Berichte },  
  year = { 2019 },  
  address = { Aachen },  
  doi = { 10.18154/RWTH-2019-05178 },  
  typ = { PUB:(DE-HGF)11 },  
  reportid = { RWTH-2019-05178 },  
  cin = { 122810 / 120000 },  
  url = {  
http://publications.rwth-aachen.de/record/761850/files/761850.pdf },  
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```

[DDK+17]

PDFBIB

Dankert, J., Dernehl, C., Kusmenko, E., Eckstein, L., Kowalewski, S., and Rumpe, B., "RapidCoop - Robuste Architektur durch geeignete Paradigmen für Kooperativ Interagierende Automobile", in *Proc. AAET - Automatisiertes und Vernetztes Fahren : Beiträge zum gleichnamigen 18. Braunschweiger Symposium vom 8. und 9. Februar 2017, Stadthalle, Braunschweig / ITS automotive nord e.V. (Hrsg.)*, Braunschweig, 2017, ITS automotive nord e.V., pp. 225-244.

RapidCoop - Robuste Architektur durch geeignete Paradigmen für Kooperativ Interagierende Automobile

Bibtex entry :

```
@inproceedings { DDK+17,  
  author = { Dankert, Jens and Dernehl, Christian and Kusmenko,  
Evgeny  
    and Eckstein, Lutz and Kowalewski, Stefan and Rumpe,  
    Bernhard },  
  title = { RapidCoop - Robuste Architektur durch geeignete  
Paradigmen
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f{"u}r Kooperativ Interagierende Automobile },
booktitle = { AAET - Automatisiertes und Vernetztes Fahren :
Beitr{"a}ge
zum gleichnamigen 18. Braunschweiger Symposium vom 8. und 9.
Februar 2017, Stadthalle, Braunschweig / ITS automotive nord
e.V. (Hrsg.) },
publisher = { ITS automotive nord e.V. },
pages = { 225-244 },
year = { 2017 },
address = { Braunschweig },
organization = { 18. Braunschweiger Symposium AAET -
Automatisiertes und
Vernetztes Fahren, Braunschweig (Germany), 2017-02-08 -
2017-02-09 },
typ = { PUB:(DE-HGF)7 },
reportid = { RWTH-2018-231931 },
cin = { 121510 / 120000 / 414110 / 122810 },
url = {
http://www.se-rwth.de/publications/RapidCoop-Robuste-Architektur-durch-
geeignete-Paradigmen-fuer-Kooperativ-Interagierende-
Automobile.pdf?PHPSESSID=eb66ba2042d9500e5135d33f6b7575af },
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```

[DKK17]

[PDFBIB](#)

Dernehl, C., Kühn, J., and Kowalewski, S., "Case studies on automated verification with slope boundaries for block diagrams", *Computer Languages, Systems & Structures*, vol. 54, pp. 528-543, 2017

Case studies on automated verification with slope boundaries for block diagrams

Bibtex entry :

```
@article { DKK17,
author = { Dernehl, Christian and K{"u}hn, Jan and Kowalewski,
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title = { Case studies on automated verification with slope
boundaries
for block diagrams },
journal = { Computer Languages, Systems & Structures },
publisher = { Elsevier Science },
pages = { 528-543 },
volume = { 54 },
year = { 2017 },
address = { Amsterdam [u.a.] },
issn = { 1477-8424 },
doi = { 10.1016/j.cl.2017.09.001 },
typ = { PUB:(DE-HGF)16 },
reportid = { RWTH-CONV-236294 },
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cin = { 122810 / 120000 },  
url = { http://publications.rwth-aachen.de/record/752271 },  
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[Der16]

[PDFBIB](#)

Dernehl, C., "Automatic invariant checking for discrete block diagrams using Lyapunov functions with sat modulo theory solvers", in *Proc. 2016 European Control Conference (ECC) : June 29-July 1, 2016, Aalborg, Denmark / [European Control Association (EUCA)]*, Piscataway, NJ, 2016, IEEE, pp. 441-446.

Automatic invariant checking for discrete block diagrams using Lyapunov functions with sat modulo theory solvers

Bibtex entry :

```
@inproceedings { Der16,  
  author = { Dernehl, Christian },  
  title = { Automatic invariant checking for discrete block diagrams  
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  booktitle = { 2016 European Control Conference (ECC) : June 29-July  
1,  
    2016, Aalborg, Denmark / [European Control Association  
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  publisher = { IEEE },  
  pages = { 441-446 },  
  year = { 2016 },  
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  organization = { 2016 European Control Conference, Aalborg  
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    2016-06-29 - 2016-07-01 },  
  doi = { 10.1109/ECC.2016.7810324 },  
  typ = { PUB:(DE-HGF)7 },  
  reportid = { RWTH-2017-06691 },  
  cin = { 122810 / 120000 },  
  url = { http://publications.rwth-aachen.de/record/696194 },  
}
```

[DHK16]

[PDFBIB](#)

Dernehl, C., Hansen, N., and Kowalewski, S., "Abstract Interpretation of MATLAB Code with Interval Sets", in *Proc. Critical systems: formal methods and automated verification : Joint 21st International Workshop on Formal Methods for Industrial Critical Systems and 16th International Workshop on Automated Verification of Critical Systems, FMICS-AVoCS 2016, Pisa, Italy, September 26-28, 2016 : proceedings / Maurice H. ter Beek, Stefania Gnesi, Alexander Knapp (eds.)*, Cham, 2016 in Lecture Notes in Computer Science, Springer International Publishing, pp. 25-38.

Abstract Interpretation of MATLAB Code with Interval Sets

Bibtex entry :

```
@inproceedings { DHK16,  
  author = { Dernehl, Christian and Hansen, Norman and Kowalewski,  
Stefan },  
  title = { Abstract Interpretation of MATLAB Code with Interval Sets  
},  
  booktitle = { Critical systems: formal methods and automated  
verification  
: Joint 21st International Workshop on Formal Methods for  
Industrial Critical Systems and 16th International Workshop  
on Automated Verification of Critical Systems, FMICS-AVoCS  
2016, Pisa, Italy, September 26-28, 2016 : proceedings /  
Maurice H. ter Beek, Stefania Gnesi, Alexander Knapp (eds.) },  
  publisher = { Springer International Publishing },  
  pages = { 25-38 },  
  series = { Lecture Notes in Computer Science },  
  year = { 2016 },  
  address = { Cham },  
  organization = { 21. International Workshop on Formal Methods for  
Industrial  
Critical Systems, Pisa (Italy), 2016-09-26 - 2016-09-28 },  
  doi = { 10.1007/978-3-319-45943-1_2 },  
  typ = { PUB:(DE-HGF)7 },  
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  cin = { 122810 / 120000 },  
  url = { http://publications.rwth-aachen.de/record/680837 },  
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```

[DHK16a]

[PDFBIB](#)

Dernehl, C., Hansen, N., and Kowalewski, S., "Combining Abstract Interpretation with Symbolic Execution for a Static Value Range Analysis of Block Diagrams", in *Proc. Software engineering and formal methods : 14th international conference, SEFM 2016, held as part of STAF 2016, Vienna, Austria, July 4-8, 2016 : proceedings / Rocco De Nicola, Eva Kühn (eds.)*, Cham, 2016 in *Lecture Notes in Computer Science*, Springer International Publishing, pp. 137-154.

Combining Abstract Interpretation with Symbolic Execution for a Static Value Range Analysis of Block Diagrams

Bibtex entry :

```
@inproceedings { DHK16a,  
  author = { Dernehl, Christian and Hansen, Norman and Kowalewski,  
Stefan },
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title = { Combining Abstract Interpretation with Symbolic Execution
          for a Static Value Range Analysis of Block Diagrams },
booktitle = { Software engineering and formal methods : 14th
international
              conference, SEFM 2016, held as part of STAF 2016, Vienna,
              Austria, July 4-8, 2016 : proceedings / Rocco De Nicola, Eva
              K{\u}hn (eds.) },
publisher = { Springer International Publishing },
pages = { 137-154 },
series = { Lecture Notes in Computer Science },
year = { 2016 },
address = { Cham },
organization = { Software Engineering and Formal Methods : 14.
International
                Conference, Vienna (Austria), 2016-07-04 - 2016-07-08 },
doi = { 10.1007/978-3-319-41591-8_10 },
typ = { PUB:(DE-HGF)7 },
reportid = { RWTH-2016-12037 },
cin = { 122810 / 120000 },
url = { http://publications.rwth-aachen.de/record/680854 },
}
```

[DKK16]

PDFBIB

Dernehl, C., Kühn, J., and Kowalewski, S., "Abstract Interpretation for Block Diagrams : Two Case Studies", in *Proc. MoDeVVa 2016 : Model-Driven Engineering, Verification and Validation : proceedings of the 13th Workshop on Model-Driven Engineering, Verification and Validation co-located with ACM/IEEE 19th International Conference on Model Driven Engineering Languages and Systems (MODELS 2016) : Saint-Malo, France, October 3, 2016 / edited by Michalis Famelis, Daniel Ratiu, Gehan M. K. Selim, Aachen, Germany, 2016* in CEUR workshop proceedings, RWTH Aachen, pp. 20-29.

Abstract Interpretation for Block Diagrams : Two Case Studies

Bibtex entry :

```
@inproceedings { DKK16,
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Stefan },
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                co-located with ACM/IEEE 19th International Conference on
                Model Driven Engineering Languages and Systems (MODELS 2016)
                : Saint-Malo, France, October 3, 2016 / edited by Michalis
                Famelis, Daniel Ratiu, Gehan M. K. Selim },
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publisher = { RWTH Aachen },
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cin = { 122810 / 120000 },
url = { http://nbn-resolving.de/urn:nbn:de:0074-1713-7 },
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[GHD+16]

[PDFBIB](#)

Gerlitz, T., Hansen, N., Dernehl, C., and Kowalewski, S., "Artshop: A Continuous Integration and Quality Assessment Framework for Model-Based Software Artifacts", in *Proc. [12. Dagstuhl-Workshop Modelbasierte Entwicklung eingebetteter Systeme (MBEES) / Michaela Huhn (Ostfalia Hochschule – Wolfenbüttel, DE), Matthias Riebisch (Universität Hamburg, DE), Bernhard Schätz (fortiss GmbH – München, DE)]*, 2016, fortiss Technischer Bericht, pp. 13-22.

artshop: A Continuous Integration and Quality Assessment Framework for Model-Based Software Artifacts

Bibtex entry :

```

@inproceedings { GHD+16,
  author = { Gerlitz, Thomas and Hansen, Norman and Dernehl,
Christian
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  title = { artshop: A Continuous Integration and Quality Assessment
Framework for Model-Based Software Artifacts },
  booktitle = { [12. Dagstuhl-Workshop Modelbasierte Entwicklung
eingebetteter Systeme (MBEES) / Michaela Huhn (Ostfalia
Hochschule – Wolfenb{\u}ttel, DE), Matthias Riebisch
(Universit{\a}t Hamburg, DE), Bernhard Sch{\a}tz (fortiss
GmbH – M{\u}nchen, DE)] },
  publisher = { fortiss Technischer Bericht },
  pages = { 13-22 },
  year = { 2016 },
  organization = { Modellbasierte Entwicklung eingebetteter Systeme,
Dagstuhl
    (Germany), 2016-03-30 - 2016-04-01 },
  typ = { PUB:(DE-HGF)8 },
  reportid = { RWTH-CONV-207908 },
  cin = { 122810 / 120000 },
  url = { http://publications.rwth-aachen.de/record/573828 },
}

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}

[DHG+15]

[PDFBIB](#)

Dernehl, C., Hansen, N., Gerlitz, T., and Kowalewski, S., "Static Value Range Analysis for Matlab/Simulink-Models", in *Proc. Informatik 2015 : Tagung vom 28. September – 02. Oktober 2015 in Cottbus / Douglas W. Cunningham ... (Hrsg.)*, [Bonn], 2015 in GI-Edition : lecture notes in informatics, Ges. für Informatik, pp. 1649-1660.

Static Value Range Analysis for Matlab/Simulink-Models

Bibtex entry :

```
@inproceedings { DHG+15,
  author = { Dernehl, Christian and Hansen, Norman and Gerlitz,
    Thomas
      and Kowalewski, Stefan },
  title = { Static Value Range Analysis for Matlab/Simulink-Models },
  booktitle = { Informatik 2015 : Tagung vom 28. September – 02.
    Oktober
      2015 in Cottbus / Douglas W. Cunningham ... (Hrsg.) },
  publisher = { Ges. f{"u"}r Informatik },
  pages = { 1649-1660 },
  series = { GI-Edition : lecture notes in informatics },
  year = { 2015 },
  address = { [Bonn] },
  organization = { 45. Jahrestagung der Gesellschaft f{"u"}r
    Informatik,
      Cottbus (Germany), 2015-09-28 - 2015-10-02 },
  typ = { PUB:(DE-HGF)8 },
  reportid = { RWTH-CONV-207913 },
  cin = { 122810 / 120000 },
  url = { http://publications.rwth-aachen.de/record/573834 },
}
```

[GDF+12]

[PDFBIB](#)

Gathmann, F., Dernehl, C. M., Franke, D., and Kowalewski, S., "An integrated vision aided GPS/INS Navigation System for ultra-low-cost MAVs", in *Proc. Proceedings / IMAV 2012 : Braunschweig, Germany, 03 - 06 July 2012 / Deutsche Gesellschaft für Ortung und Navigation*, Bonn, 2012, Deutsche Gesellschaft für Ortung und Navigation, pp. 1-8.

An integrated vision aided GPS/INS Navigation System for ultra-low-cost MAVs

Bibtex entry :

```
@inproceedings { GDF+12,
  author = { Gathmann, Felix and Dernehl, Christian Michael and
    Franke,
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Dominik and Kowalewski, Stefan },
title = { An integrated vision aided GPS/INS Navigation System for
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booktitle = { Proceedings / IMAV 2012 : Braunschweig, Germany, 03 -
06
July 2012 / Deutsche Gesellschaft f{"u}r Ortung und
Navigation },
publisher = { Deutsche Gesellschaft f{"u}r Ortung und Navigation
},
pages = { 1-8 },
year = { 2012 },
address = { Bonn },
organization = { International Micro Air Vehicle Conference and
Flight
Competition, Braunschweig (Germany), 2012-07-03 - 2012-07-06 },
typ = { PUB:(DE-HGF)8 },
reportid = { RWTH-CONV-236329 },
cin = { 122810 / 120000 },
url = { http://publications.rwth-aachen.de/record/752304 },
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```

[DFD+11]

[PDFBIB](#)

Dernehl, C., Franke, D., Diab, H., and Kowalewski, S., "An Architecture with Integrated Image Processing for Autonomous Micro Aerial Vehicles", in *Proc. International Micro Air Vehicle conference and competitions 2011 (IMAV 2011)*, 't Harde, The Netherlands, September 12-15, 2011, 2011, IMAV, pp. 138-145.

An Architecture with Integrated Image Processing for Autonomous Micro Aerial Vehicles

Bibtex entry :

```

@inproceedings { DFD+11,
author = { Dernehl, Christian and Franke, Dominik and Diab, Hilal
and
Kowalewski, Stefan },
title = { An Architecture with Integrated Image Processing for
Autonomous Micro Aerial Vehicles },
booktitle = { International Micro Air Vehicle conference and
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2011 (IMAV 2011), 't Harde, The Netherlands, September
12-15, 2011 },
publisher = { IMAV },
pages = { 138-145 },
year = { 2011 },
organization = { International Micro Air Vehicle conference and
competitions
2011, 't Harde (Netherlands), 2011-09-12 - 2011-09-15 },
doi = { 10.4233/uuid:19adedb6-e3d9-4cff-8ebc-6497b026adfe },
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reportid = { RWTH-CONV-198392 },  
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url = { http://publications.rwth-aachen.de/record/128268 },  
}
```

Office Hours

By appointment

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<https://www.embedded.rwth-aachen.de/> - **Informatik 11 - Embedded Software**

Permanent link:
<https://www.embedded.rwth-aachen.de/doku.php?id=en:lehrstuhl:mitarbeiter:dernehl>

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