

David Thönnessen, M.Sc. RWTH

OWA Nachschuss 1.25 System vernetzter Systeme in Industrie 4.0" (since 2015)

Patents

Research Associate

- Elektrisch angetriebene Transportvorrichtung für wenigstens eine Person sowie Steuerungsverfahren hierfür (102016217804.0, 16.09.2016)
- Transportsystem mit automatischer Folgefunktion sowie Steuerungsverfahren (102016217805.9, 16.09.2016)
- Verfahren zur Vertriebssteuerung eines dreispurigen Fahrzeugs sowie Fahrzeug (102016221367.9, 28.10.2016)
- Fahrzeug mit einem oder mehreren angetriebenen Rädern und Verfahren zum Lenken desselben (102016221366.0, 28.10.2016)
- Tethering of a Semi-Autonomous Vehicle (83866252, 03.08.2017)
- Conveying System with an Automatic Tethering Function (US20180081372A1, 14.09.2017)



Theses

In line with my research there are always new topics for theses. If you are interested please contact me via e-Mail or come to my office.

In Progress

Finished

- Complete Language Support and Error Detection of Sequential Function Charts in Twistturn
- Development of a Factory Acceptance Test for Reduction of Commissioning Times of Decentral Passenger Transport Facilities
 - Development of a Prototype Vehicle Status Display and Interaction Device
 - Extending Postsimulation by a Virtual Timebase
 - Utilizing Sequential Function Charts to Specify Hardware-in-the-Loop Tests
 - Analysis and Postsimulation of Hardware-in-the-Loop Tests
- Hardware-in-the-Loop Simulation Using an Extension of PLC Programming Languages
 - Extension of Twistturn to Support Hardware-in-the-Loop Simulation
 - Balance Point dependent Vehicle Dynamics Control
 - Tethering semi-autonomous Vehicles by relative Positioning
- [Integration of the PROFINET Stack into the RTAndroid Platform](#)
- Design and Implementation of an efficient on-board Field Device Adapter for Twistturn
- [OPC UA Connectivity of Android Devices and Machine Tools](#)
- [Utilizing Bluetooth for Supporting Real-Time Wireless Communication](#)

Teaching

Semester	Course	Type
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Winter term 14/15	Praktikum Systemprogrammierung	P
	Ausgesuchte Themen zur Eingebetteten Software	S
Summer term 15	Praktikum Systemprogrammierung	P
	Dienste in der Industrie 4.0	S
Winter term 15/16	Praktikum Systemprogrammierung	P
	Modellbasiertes Testen & Analyse eingebetteter Software	S
Summer term 16	Praktikum Systemprogrammierung	P
	Eingebettete Software in Medizintechnik & eMobilität	S
Winter term 16/17	Praktikum Systemprogrammierung	P
	Eingebettete Software in Medizintechnik & eMobilität	S
Summer term 17	Praktikum Systemprogrammierung	P
	Modellbasiertes Testen & Analyse eingebetteter Software	S
Winter term 17/18	Modellierungssprachen für eingebettete Systeme	PS
	Modellbasiertes Testen & Analyse eingebetteter Software	S
	Praktikum Systemprogrammierung (Experiment 1)	P
Summer term 18	Modellbasiertes Testen & Analyse eingebetteter Software	S
	Praktikum Systemprogrammierung (Experiment 1)	P
Winter term 18/19	Modellbasiertes Testen & Analyse eingebetteter Software	S
Summer term 19	Proseminar: Grundlagen eingebetteter Systeme	PS
	Seminar: Ausgesuchte Themen zur Eingebetteten Software	S

Office Hours

Office hours by appointment

Publications

[Tho21]

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

Thönnessen, D., "Hardware-in-the-Loop testing of industrial automation systems using PLC languages", PhD Thesis, Aachen, 2021.

Hardware-in-the-Loop testing of industrial automation systems using PLC languages

Bibtex entry :

```
@phdthesis { Tho21,  
  author = { Th{"o"}nnessen, David },  
  othercontributors = { Kowalewski, Stefan and Fabian, Martin },  
  title = { Hardware-in-the-Loop testing of industrial automation  
    systems using PLC languages },  
  publisher = { RWTH Aachen University },
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school = { RWTH Aachen University },
pages = { 1 Online-Ressource : Illustrationen, Diagramme },
series = { Aachener Informatik-Berichte },
year = { 2021 },
address = { Aachen },
doi = { 10.18154/RWTH-2021-08705 },
typ = { PUB:(DE-HGF)11 },
reportid = { RWTH-2021-08705 },
cin = { 122810 / 120000 },
url = {
http://publications.rwth-aachen.de/record/826036/files/826036.pdf },
}

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[SRT+20]

[PDFBIB](#)

Smieschek, M., Rakel, S., Thönnessen, D., Derks, A., Stollenwerk, A., and Kowalewski, S., "A Remote Test Environment for a Large-Scale Microcontroller Laboratory Course", in *Proc. Cyber physical systems : model-based design : 9th international workshop, CyPhy 2019 and 15th international workshop, WESE 2019, New York City, NY, USA, October 17-18, 2019 : revised selected papers / Roger Chamberlain, Martin Edin Grimheden, Walid Taha (eds.)*, Cham, 2020 in *Lecture Notes in Computer Science*, Springer, pp. 231-246.

A Remote Test Environment for a Large-Scale Microcontroller Laboratory Course

Bibtex entry :

```

@inproceedings { SRT+20,
  author = { Smieschek, Manfred and Rakel, Stefan and Thönnessen,
    David and Derks, Andreas and Stollenwerk, André and
    Kowalewski, Stefan },
  title = { A Remote Test Environment for a Large-Scale
Microcontroller
  Laboratory Course },
  booktitle = { Cyber physical systems : model-based design : 9th
    international workshop, CyPhy 2019 and 15th international
    workshop, WESE 2019, New York City, NY, USA, October 17-18,
    2019 : revised selected papers / Roger Chamberlain, Martin
    Edin Grimheden, Walid Taha (eds.) },
  publisher = { Springer },
  pages = { 231-246 },
  series = { Lecture Notes in Computer Science },
  year = { 2020 },
  address = { Cham },
  organization = { Workshop on Embedded Systems and Cyber-Physical
Systems
    Education, New York (USA), 2019-10-17 - 2019-10-18 },
  doi = { 10.1007/978-3-030-41131-2_11 },
  typ = { PUB:(DE-HGF)7 },
  reportid = { RWTH-2020-02344 },
}

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cin = { 122810 / 120000 },
url = {
http://publications.rwth-aachen.de/record/783169/files/Remote%20Pool%20
Final.pdf },
}
```

[KTF19]

[PDFBIB](#)

Khan, A., Thönnessen, D., and Fabian, M., "On-the-fly conformance testing of safety PLC code using QuickCheck", in *Proc. 2019 IEEE 17th International Conference on Industrial Informatics (INDIN) : Aalto University, Helsinki-Espoo, Finland, 22-25 July, 2019 : proceedings / organized by: Aalto University, Finland; Tampere University, Finland; Finnish Society of Automation, Finland ; sponsored by: the Institute of Electrical and Electronics Engineers (IEEE), IEEE Industrial Electronics Society (IES)*, Piscataway, NJ, 2019, IEEE, pp. 419-424.

On-the-fly conformance testing of safety PLC code using QuickCheck

Bibtex entry :

```
@inproceedings { KTF19,
  author = { Khan, Adnan and Th{"o"}nnessen, David and Fabian, Martin },
  title = { On-the-fly conformance testing of safety PLC code using QuickCheck },
  booktitle = { 2019 IEEE 17th International Conference on Industrial Informatics (INDIN) : Aalto University, Helsinki-Espoo, Finland, 22-25 July, 2019 : proceedings / organized by: Aalto University, Finland; Tampere University, Finland; Finnish Society of Automation, Finland ; sponsored by: the Institute of Electrical and Electronics Engineers (IEEE), IEEE Industrial Electronics Society (IES) },
  publisher = { IEEE },
  pages = { 419-424 },
  year = { 2019 },
  address = { Piscataway, NJ },
  organization = { 17. IEEE International Conference on Industrial Informatics, Helsinki (Finland), 2019-07-22 - 2019-07-25 },
  doi = { 10.1109/INDIN41052.2019.8972277 },
  typ = { PUB:(DE-HGF)7 },
  reportid = { RWTH-2019-04271 },
  cin = { 122810 / 120000 },
  url = { http://publications.rwth-aachen.de/record/760542 },
}
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[TSF+19]

[PDFBIB](#)

Thönnessen, D., Smallbone, N., Fabian, M., Claessen, K., and Kowalewski, S., "Testing Safety

PLCs Using QuickCheck", in *Proc. 2019 IEEE 15th International Conference on Automation Science and Engineering : (CASE) : August 22-26, 2019, Vancouver, BC, Canada / sponsored by IEEE Robotics and Automation Society ; CASE editorial board: editor-in-chief: Spiridon (Spyros) Reveliotis ; editors: Cappelleri, David; Dimarogonas, Dimos V.; Dotoli, Mariagrazia; Fanti, Maria Pia; LUTZ, Philippe; Seatzu, Carla; Xie, Xiaolan, Piscataway, NJ, 2019, IEEE, pp. 1388-1393.*

Testing Safety PLCs Using QuickCheck

Bibtex entry :

```
@inproceedings { TSF+19,
  author = { Th{"o}nnessen, David and Smallbone, Nick and Fabian,
    Martin
      and Claessen, Koen and Kowalewski, Stefan },
  title = { Testing Safety PLCs Using QuickCheck },
  booktitle = { 2019 IEEE 15th International Conference on Automation
    Science and Engineering : (CASE) : August 22-26, 2019,
    Vancouver, BC, Canada / sponsored by IEEE Robotics and
    Automation Society ; CASE editorial board: editor-in-chief:
    Spiridon (Spyros) Reveliotis ; editors: Cappelleri, David;
    Dimarogonas, Dimos V.; Dotoli, Mariagrazia; Fanti, Maria
    Pia; LUTZ, Philippe; Seatzu, Carla; Xie, Xiaolan },
  publisher = { IEEE },
  pages = { 1388-1393 },
  year = { 2019 },
  address = { Piscataway, NJ },
  organization = { 15. International Conference on Automation Science
and
  Engineering, Vancouver, BC (Canada), 2019-08-22 - 2019-08-26 },
  doi = { 10.1109/COASE.2019.8843227 },
  typ = { PUB:(DE-HGF)7 },
  reportid = { RWTH-2019-04632 },
  cin = { 122810 / 120000 },
  url = { http://publications.rwth-aachen.de/record/761173 },
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[BFH+18]

[PDFBIB](#)

Bordasch, M., Facchi, C., Heidepriem, S., Jähnert, J., Jung, T., Köllner, C., Kraas, A., Krause, J., Krüning, K., Kugler, A., Maschler, B., Schleicher, C., Siegrist, D., Simon, H., Störmer, C., Thönnessen, D., Wassermann, E., Weyrich, M., Wimmer, T., and Zeller, A., "VDI Status Report Testing of Networked Systems for Industrie 4.0", 2018.

VDI Status Report Testing of Networked Systems for Industrie 4.0

Bibtex entry :

```
@techreport { BFH+18,
  author = { Bordasch, Manuel and Facchi, Christian and Heidepriem,
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Sebastian and J{"a}hnert, J{"u}rger and Jung, Tobias and
K{"o}llner, Christian and Kraas, Alexander and Krause, Jan
and Kr{"u}ning, Kai and Kugler, Alexander and Maschler,
Benjamin and Schleicher, Christian and Siegrist, Daniel and
Simon, Hendrik and St{"o}rmer, Christoph and
Th{"o}nnessen, David and Wassermann, Erik and Weyrich,
Michael and Wimmer, Thomas and Zeller, Andreas },
title = { VDI Status Report Testing of Networked Systems for
Industrie
4.0 },
pages = { 1-20 },
year = { 2018 },
typ = { PUB:(DE-HGF)29 },
reportid = { RWTH-CONV-236295 },
cin = { 122810 / 120000 },
url = {
https://www.vdi.de/ueber-uns/presse/publikationen/details?tx\_vdipublications\_publicationdetails%5Bpublication%5D=19&cHash=e6b4c230eafa31d95ceb75395274c78c },
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[TK18]

[PDFBIB](#)

Thönnessen, D. and Kowalewski, S., "Agiles Testen von cyber-physischen Produktionssystemen : Einsatz von SPS-Sprachen zur Testfallbeschreibung", *Atp-Edition : automatisierungstechnische Praxis*, vol. 60, iss. 3, pp. 46-55, 2018

Agiles Testen von cyber-physischen Produktionssystemen : Einsatz von SPS-Sprachen zur Testfallbeschreibung

Bibtex entry :

```
@article { TK18,
author = { Th{"o}nnessen, David and Kowalewski, Stefan },
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Einsatz von SPS-Sprachen zur Testfallbeschreibung },
journal = { Atp-Edition : automatisierungstechnische Praxis },
publisher = { DIV Dt. Industrieverl. },
pages = { 46-55 },
volume = { 60 },
number = { 3 },
year = { 2018 },
address = { M{"u}nchen },
issn = { 2364-3137 },
doi = { 10.17560/atp.v58i03.1917 },
typ = { PUB:(DE-HGF)16 },
reportid = { RWTH-2018-225395 },
cin = { 122810 / 120000 },
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url = { http://publications.rwth-aachen.de/record/727012 },
}
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[TK18a]

[PDFBIB](#)

Thönnessen, D. and Kowalewski, S., "Using PLC Programming Languages for Test-Case Specification of Hardware-in-the-loop Tests", in *Proc. [Modellbasierte Entwicklung eingebetteter Systeme, MBEES 2018, 2018-04-16 - 2018-04-18, Hamburg, Germany]*, 2018, fortiss Technischer Bericht, pp. 41-50.

Using PLC Programming Languages for Test-Case Specification of Hardware-in-the-loop Tests

Bibtex entry :

```
@inproceedings { TK18a,
  author = { Th{"o"}nnessen, David and Kowalewski, Stefan },
  title = { Using PLC Programming Languages for Test-Case
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      of Hardware-in-the-loop Tests },
  booktitle = { [Modellbasierte Entwicklung eingebetteter Systeme,
    MBEES
      2018, 2018-04-16 - 2018-04-18, Hamburg, Germany] },
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  pages = { 41-50 },
  year = { 2018 },
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    Hamburg
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  reportid = { RWTH-CONV-236290 },
  cin = { 122810 / 120000 },
  url = { http://publications.rwth-aachen.de/record/752269 },
}
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[TRR+18]

[PDFBIB](#)

Thönnessen, D., Rakel, S., Reinker, N., and Kowalewski, S., "Matching Discrete Signals for Hardware-in-the-Loop-Testing of PLCs", *IFAC-PapersOnLine*, vol. 51, iss. 10, pp. 229-234, 2018

Matching Discrete Signals for Hardware-in-the-Loop-Testing of PLCs

Bibtex entry :

```
@article { TRR+18,
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Testing

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    of PLCs },
    journal = { IFAC-PapersOnLine },
    pages = { 229-234 },
    volume = { 51 },
    number = { 10 },
    year = { 2018 },
    address = { Laxenburg },
    issn = { 2405-8963 },
    organization = { 3. IFAC Conference on Embedded Systems,
Computational
    Intelligence and Telematics in Control },
    doi = { 10.1016/j.ifacol.2018.06.267 },
    typ = { PUB:(DE-HGF)16 },
    reportid = { RWTH-2018-227582 },
    cin = { 122810 / 110000 / 120000 },
    url = { http://publications.rwth-aachen.de/record/731576 },
}
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[TRR+18a]

[PDFBIB](#)

Thönnessen, D., Reinker, N., Rakel, S., Svetlakov, A., and Kowalewski, S., "Correctness Properties and Exemplified Applicability of a Signal Matching Algorithm with Multidimensional Tolerance Specifications", in *Proc. 2018 IEEE 14th International Conference on Automation Science and Engineering (CASE) : 20-24 Aug. 2018 / general chair: Birgit Vogel-Heuser (Technical University of Munich) ; publisher: IEEE, Piscataway, NJ, 2018, IEEE, pp. 1197-1202.*

Correctness Properties and Exemplified Applicability of a Signal Matching Algorithm with Multidimensional Tolerance Specifications

Bibtex entry :

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@inproceedings { TRR+18a,
    author = { Th{"o"}nnessen, David and Reinker, Niklas and Rakel,
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    title = { Correctness Properties and Exemplified Applicability of a
Signal Matching Algorithm with Multidimensional Tolerance
Specifications },
    booktitle = { 2018 IEEE 14th International Conference on Automation
Science and Engineering (CASE) : 20-24 Aug. 2018 / general
chair: Birgit Vogel-Heuser (Technical University of Munich)
; publisher: IEEE },
    publisher = { IEEE },
    pages = { 1197-1202 },
    year = { 2018 },
    address = { Piscataway, NJ },
    organization = { IEEE 14. International Conference on Automation
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Science and
    Engineering, Munich (Germany), 2018-08-20 - 2018-08-24 },
doi = { 10.1109/COASE.2018.8560407 },
typ = { PUB:(DE-HGF)7 },
reportid = { RWTH-2019-00319 },
cin = { 122810 / 120000 },
url = {
http://publications.rwth-aachen.de/record/752982/files/752982.pdf },
}

```

[TRR+17]

[PDFBIB](#)

Thönnessen, D., Reinker, N., Rakel, S., and Kowalewski, S., "A concept for PLC hardware-in-the-loop testing using an extension of structured text", in *Proc. 2017 22nd IEEE International Conference on Emerging Technologies and Factory Automation : September 12-15, 2017, Limassol, Cyprus / ABB, IEEE, IES, University of Cyprus*, Piscataway, NJ, 2017, IEEE, p. 8.

A concept for PLC hardware-in-the-loop testing using an extension of structured text

Bibtex entry :

```

@inproceedings { TRR+17,
    author = { Th{"o"}nnessen, David and Reinker, Niklas and Rakel,
Stefan
        and Kowalewski, Stefan },
    title = { A concept for PLC hardware-in-the-loop testing using an
extension of structured text },
    booktitle = { 2017 22nd IEEE International Conference on Emerging
Technologies and Factory Automation : September 12-15, 2017,
Limassol, Cyprus / ABB, IEEE, IES, University of Cyprus },
    publisher = { IEEE },
    pages = { 8 Seiten },
    year = { 2017 },
    address = { Piscataway, NJ },
    organization = { 22. IEEE International Conference on Emerging
Technologies
        and Factory Automation, Limassol (Cyprus), 2017-09-12 -
2017-09-15 },
    doi = { 10.1109/ETFA.2017.8247580 },
    typ = { PUB:(DE-HGF)7 },
    reportid = { RWTH-2018-223452 },
    cin = { 122810 / 120000 },
    url = { http://publications.rwth-aachen.de/record/722218 },
}

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[TSN+16]

[PDFBIB](#)

Thönnessen, D., Schweigler, M., Ney, O., and Kugelmeier, M., "Conveying system with an automatic tethering function", 2016.

Conveying system with an automatic tethering function

Bibtex entry :

```
@techreport { TSN+16,  
  author = { Th{"o"}nnessen, David and Schweigler, Martin and Ney,  
Oliver  
    and Kugelmeier, Mirko },  
  title = { Conveying system with an automatic tethering function },  
  pages = { 1-7 },  
  year = { 2016 },  
  typ = { PUB:(DE-HGF)23 },  
  reportid = { RWTH-CONV-236287 },  
  url = {  
https://worldwide.espacenet.com/patent/search?q=pn%3DUS20180081372A1 },  
}
```

[KKO+15]

[PDFBIB](#)

Kowalewski, S., Kalkov, I., Obster, M., and Thönnessen, D., "Echtzeiterweiterung für Android: SPS inside", *IEE - Elektrische Automatisierung + Antriebstechnik*, pp. 58-61, 2015

Echtzeiterweiterung für Android: SPS inside

Bibtex entry :

```
@article { KKO+15,  
  author = { Kowalewski, Stefan and Kalkov, Igor and Obster, Mathias  
and  
    Th{"o"}nnessen, David },  
  title = { Echtzeiterweiterung f{"u"}r Android: SPS inside },  
  journal = { IEE - Elektrische Automatisierung + Antriebstechnik },  
  publisher = { IEE },  
  pages = { 58-61 },  
  year = { 2015 },  
  issn = { 1434-2898 },  
  typ = { PUB:(DE-HGF)16 },  
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  cin = { 122810 / 120000 },  
  url = { http://publications.rwth-aachen.de/record/752275 },  
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From:

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

Permanent link:

<https://embedded.rwth-aachen.de/doku.php?id=en:lehrstuhl:mitarbeiter:thoennessen>

Last update: **2019/05/08 12:08**

