

# Gerwin Hoogsteen

P.O. Box 217  
7500 AE Enschede  
the Netherlands  
☎ +31 53 489 4681

Curriculum Vitae

✉ g.hoogsteen@utwente.nl

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Gerwin Hoogsteen received the PhD degree from the University of Twente in 2017 with his thesis “A Cyber-Physical Systems Perspective on Decentralized Energy Management”. He is currently employed as permanent researcher in the field of smart grids within the Computer Architecture for Embedded Systems chair, with a focus on applying theoretical research in field-tests. His research interest is in energy management for smart grids, and in particular where it concerns multi-disciplinary research and cyber-physical systems. Current research directions include the use of machine learning and artificial intelligence in smart grids, distributed coordination, and cyber-security of smart grids. Hoogsteen is the founder and maintainer of the DEMKit and ALPG software.

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## Education

- 2017 **PhD** – University of Twente, Enschede, the Netherlands  
Dept. of EEMCS, chair Computer Architecture for Embedded Systems  
**Thesis:** G. Hoogsteen, “A Cyber-Physical Systems Perspective on Decentralized Energy Management,” PhD thesis, Dec. 2017  
**Promotors:** prof. dr. ir. G. J. M. Smit and prof. dr. J. L. Hurink
  - 2013 **Master Embedded Systems** – University of Twente, Enschede, the Netherlands  
Dept. of EEMCS, chair Computer Architecture for Embedded Systems  
**Thesis:** G. Hoogsteen, “Simulating the Effects of Smart Grid Technologies on Power Quality,” Master’s thesis, July 2013  
**Supervisors:** prof. dr. ir. G. J. M. Smit, dr. ir. A. Molderink, dr. ir. V. Bakker and ir. T. Brand  
*Industrial collaboration with Alliander N.V.*
  - 2010 **Bachelor Electrical Engineering** – Hanze UAS, Groningen, the Netherlands  
Institute of Engineering, Centre of Expertise Energy  
**Thesis:** G. Hoogsteen, J. O. Krist, “Navigatiesysteem voor elektrische scooters” (English: “Navigation system for electric scooters”), Bachelor’s thesis, Jun. 2010  
**Supervisor:** ing. J. Leupen
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## Academic Employment / Research

- 2020 **Researcher (permanent position)** – University of Twente, Enschede  
– Now Dept. of EEMCS, chair Computer Architecture for Embedded Systems
  - Manage various research projects and technical support for demonstrators**Research:** Development and practical applicability of control algorithms for distributed coordination in smart grids. Including hardware-in-the-loop simulations.  
**Responsibilities:** Supervise students (BSc, MSc, PhD), manage research project, maintain DEMKit software and support integration in project.
- 2017 **Postdoctoral researcher** – University of Twente, Enschede  
– 2020 Dept. of EEMCS, chair Computer Architecture for Embedded Systems
  - TKI iDEEGO project “ORTEP”
  - EFRO, OP-Oost project “Vliegwielttechnologie voor energieopslag in microgrids”**Research:** Development and practical applicability of control algorithms for distributed coordination in smart grids. Including hardware-in-the-loop simulations.  
**Responsibilities:** Development, maintenance of, and developing interfaces for DEMKit.

- 2013 **PhD Student** – University of Twente, Enschede
- 2017 Dept. of EEMCS, chair Computer Architecture for Embedded Systems
  - NWO TTW project EASI**Research:** Development of models and algorithms for distributed coordination mechanisms for smart (micro)grids within a cyber-physical systems context.  
**Responsibilities:** Development and maintenance of DEMKit simulation software.
  
- 2015 **Visiting researcher** – University of Texas at Austin, Austin, Texas, United States  
 Cockrell School of Engineering, Center for Electromechanics  
**Research:** Coordination mechanisms for (islanded) microgrids and applicability of such mechanisms in different (regional) electricity systems and structures.
  
- 2012 **Research assistant** – University of Twente, Enschede  
 Dept. of EEMCS, chair Computer Architecture for Embedded Systems  
**Research:** Develop methods for non-intrusive detection of appliances using smart meters.

## Teaching and Supervision

### Courses

- 2018 **Distributed Energy Management for Smart Grids**  
 – Now Lectures, project tutoring – MSc EMSYS/EE/SET
- 2013 **Energy Efficient Embedded Systems**  
 – 2017 Guest lectures, project tutoring – MSc EMSYS/EE/CS
- 2013 **C Programming**  
 – 2014 Lab – BSc EE
- 2013 **Embedded Computer Architectures 1**  
 – 2014 Project tutoring – MSc EMSYS/CS

### Other

- 2018 **DEMKit Workshop – University of Twente & Saxion UAS, Enschede, the Netherlands**  
 – Now Lecture, lab – PhD, MSc, BSc
- 2018 **SuPREME International Summer School 2018 – KEZO Lab, Jabłonna, Poland**  
 Lectures, project tutoring, lab – PhD, MSc

### Supervision of students

- PhD students Bart Nijenhuis, Aswin Ramesh Vadavathi, Edmund Schaefer
- MSc students Jan Oene Krist (EMSYS), Robbert Cornelissen (SET), Qiang Fu (EMSYS), Jorrit Nutma (EMSYS), Klaas Hoekstra (EMSYS), Yinping Dai (SET), Sytze Buruma (SET), Sriganesh Karuppannan (SET), Aditya Pappu (SET)

## Reviewer

- Conferences IEEE PES Innovative Smart Grids
- Journals MDPI Energies, Elsevier Sustainable Energy Technologies and Assessments

## Other Qualifications

### Organisation

- DEMKit Maintainer of the open-source DEMKit simulation and demonstration software. Several PhD and MSc students at the University of Twente use this software. DEMKit is currently also in use by Saxion UAS staff, and gains attention in the research community.
- ALPG Maintainer of the open-source ALPG tool to generate benchmark sets for smart grid control systems and scheduling algorithms.

### Research Proposals

*Co-author of the following proposals. I cannot be a co-applicant due to my current position.*

- “LIFE living lab” – EFRO OP-Oost (*submitted, Project budget € 4.0M*)
- “Vliegwielttechnologie voor energieopslag in microgrids” – EFRO OP-Oost (*€ 2.9M*)
- “SlimPark” – TKI Urban Energy PPS (*€ 306k*)
- “FairPlay” – TKI Urban Energy

### Languages

- West Frisian – native
- Dutch – native (bilingual)
- English – fluent
- German – passive

### Entrepreneurial Development

- UT Entrepreneurial Challenge 2017 (*finalist*)
- Early Business Development (*workshop participant*)
- From idea, to patent, to business (*workshop participant*)

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## Public Engagement

- *“UT-onderzoeker ontdekt ‘per ongeluk’ mogelijkheid enorme energiebesparing”*  
– Tubantia, 4 Feb. 2018
- *“Labopstelling van dit format is uniek”*  
– U-Today, 2 Apr. 2015

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## Research

In my research I strive to join theoretical knowledge with practical applicability to solve real-world control problems in the domain of control and energy management. I am specialized in researching, developing and implementing control, coordination and optimization algorithms, targeted to run on low powered distributed (embedded) systems, in a cyber-physical systems context. In order to do so, I work together with researchers from various institutes (e.g., University of Twente, University of Texas, Saxion UAS), industry (e.g., Alliander, Coteq) and society (e.g., LochemEnergie, Aardehuizen Olst) in field tests. An example is the smart grid pilot site in Lochem, where we demonstrated the challenges of, and validated solutions for the energy transition. Current research focuses on bridging the gap between theory and practice by developing a software framework (DEMKit), such that theoretical models can be applied and validated more easily in practice, by e.g., using hardware-in-the-loop simulation.

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## Publications

### SciVal statistics (interval 2015 – 2019)

Field-weighted citation impact: 2.19  
Citation count: 126  
Citations per publication: 6.6

### International (refereed) Journals

B. Homan, **G. Hoogsteen**, S. Nebiolo, J. L. Hurink, and G. J. M. Smit, "Maximizing the degree of autarky of a 16 house neighbourhood by locally produced energy and smart control," In *Sustainable Energy, Grids and Networks*, vol. 20, p. 100270. October 2019.

D. F. Quintero Pulido, **G. Hoogsteen**, M. V. Ten Kortenaar, J. L. Hurink, R. E. Hebner, and G. J. M. Smit, "Characterization of storage sizing for an off-grid House in the US and the Netherlands," In *Energies*, vol. 11, no. 2, art. 265, February 2018, ISSN: 1996-1073.

**G. Hoogsteen**, A. Molderink, J. L. Hurink, G. J. M. Smit, B. Kootstra, and F. Schuring, "Charging electric vehicles, baking pizzas and melting a fuse in Lochem," *CIRE Open Access Journal*, 5 pages, 2017, ISSN 2515-0855.

### International (refereed) Conference Proceedings

**G. Hoogsteen**, M. E. T. Gerards, and J. L. Hurink, "Optimization of Multi-Energy Systems Using the Profile Steering Coordination Framework," In *2020 IEEE PES Innovative Smart Grid Technologies Europe*, The Hague, 5 pages, October 2020.

L. M. Bollen, L. R. Heinsius, M. L. Souilljee, M. Boe, **G. Hoogsteen**, M. E. T. Gerards, and J. L. Hurink, "Profile Steering with Non-regular Time-Intervals," In *2020 IEEE PES Innovative Smart Grid Technologies Europe*, The Hague, 5 pages, October 2020.

**G. Hoogsteen**, J. L. Hurink, and G. J. M. Smit, "DEMKit: a Decentralized energy management simulation and demonstration toolkit," In *2019 IEEE PES Innovative Smart Grid Technologies Europe*, Bucharest, 5 pages, October 2019.

B. Homan, S. Nebiolo, **G. Hoogsteen**, J. L. Hurink, and G. J. M. Smit, "Improving the degree of autarky of a 16 house neighbourhood in the Netherlands: a case study," In *2019 IEEE PES Innovative Smart Grid Technologies Europe*, Bucharest, 5 pages, October 2019.

**G. Hoogsteen**, M. E. T. Gerards, J. L. Hurink, G. J. M. Smit, O. Mansour, and D. Bijwaard, "Combining distributed synchronized high frequency measurements with a control system for smart low voltage grids," In *2019 CIRE*, Madrid, 5 pages, June 2019.

G. J. H. de Goeijen, **G. Hoogsteen**, J. L. Hurink, and G. J. M. Smit, "Using the ecovat system to supply the heat demand of a neighbourhood," In *2019 IEEE Milan PowerTech*, 6 pages, June 2019.

**G. Hoogsteen**, M. E. T. Gerards, J. L. Hurink, "On the scalability of decentralized energy management using profile steering," In *2018 IEEE PES Innovative Smart Grid Technologies Europe*, Sarajevo, 6 pages, October 2018.

B. Homan, V. M. J. J. Reijnders, **G. Hoogsteen**, J. L. Hurink, and G. J. M. Smit, "Implementation and verification of a realistic battery model in the DEMKit simulation software," In *2018 IEEE PES Innovative Smart Grid Technologies Europe*, Sarajevo, 6 pages, October 2018.

M. H. H. Schoot Uiterkamp, **G. Hoogsteen**, M. E. T. Gerards, J. L. Hurink, and G. J. M. Smit, "Multi-commodity support in profile steering," In *2017 IEEE PES Innovative Smart Grid Technologies Europe*, Turin, 6 pages, September 2017.

**G. Hoogsteen**, A. Molderink, J. L. Hurink, and G. J. M. Smit, "Asynchronous event driven distributed energy management using profile steering," In *2017 IEEE Manchester PowerTech*, 6 pages, June 2017.

J. S. Nutma, **G. Hoogsteen**, A. Molderink, W. Wijbrandi, J. L. Hurink, and G. J. M. Smit, "On integrating device level schedules into market based control," In *2017 IEEE Manchester PowerTech*, 6 pages, June 2017.

T. van der Klauw, **G. Hoogsteen**, M. E. T. Gerards, J. L. Hurink, X. Feng, R. E. Hebner, "Assessing the potential of residential HVAC systems for demand-side management," In *2016 IEEE PES Innovative Smart Grid Technologies Conference*, Minneapolis, 6 pages September 2016.

**G. Hoogsteen**, T. van der Klauw, A. Molderink, J. L. Hurink, G. J. M. Smit, X. Feng, and R. E. Hebner, "Balancing islanded residential microgrids using demand side management," In *2016 IEEE PES Innovative Smart Grid Technologies Conference*, Minneapolis, 6 pages September 2016.

**G. Hoogsteen**, A. Molderink, J. L. Hurink, and G. J. M. Smit, "Generation of flexible domestic load profiles to evaluate demand side management approaches," In *2016 IEEE International Energy Conference (ENERGYCON)*, Leuven, page 6 pages, April 2016.

T. van der Klauw, M. E. T. Gerards, **G. Hoogsteen**, G. J. M. Smit, and J. L. Hurink, "Considering grid limitations in profile steering," In *2016 IEEE International Energy Conference (ENERGYCON)*, Leuven, page 6 pages, April 2016.

K. X. Perez, M. Baldea, T. F. Edgar, **G. Hoogsteen**, R. P. van Leeuwen, T. van der Klauw, B. Homan, J. Fink, and G. J. M. Smit, "Soft-islanding a group of houses through scheduling of CHP, PV and storage," In *2016 IEEE International Energy Conference (ENERGYCON)*, Leuven, page 6 pages, April 2016.

**G. Hoogsteen**, A. Molderink, J. L. Hurink, G. J. M. Smit, B. Kootstra, and F. Schuring, "Impact of peak electricity demand in distribution grids: a stress test," In *PowerTech, 2015 IEEE*, Eindhoven, 6 pages, June 2015.

M. E. T. Gerards, H. A. Toersche, **G. Hoogsteen**, T. van der Klauw, J. L. Hurink, and G. J. M. Smit, "Demand side management using profile steering," In *PowerTech, 2015 IEEE*, Eindhoven, 6 pages, June 2015.

**G. Hoogsteen**, A. Molderink, J. L. Hurink, and G. J. M. Smit, "Managing energy in time and space in smart grids using TRIANA," In *2014 IEEE PES Innovative Smart Grid Technologies Europe*, Istanbul, 6 pages, October 2014.

**G. Hoogsteen**, A. Molderink, V. Bakker, G. J. M. Smit, "Integrating LV network models and load-flow calculations into smart grid planning," In *2013 IEEE PES Innovative Smart Grid Technologies Europe*, Copenhagen, 6 pages, October 2013.

**G. Hoogsteen**, J. O. Krist, V. Bakker, G. J. M. Smit, "Non-intrusive appliance recognition," In *2012 IEEE PES Innovative Smart Grid Technologies Europe*, Berlin, 7 pages, October 2012.