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# Curriculum Vitae

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## Personal Information

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Physicist and Computer Scientist

## Academic Career

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2016	Habilitation in the Department of Mathematics and Computer Science, University of Bremen, with the Venia Legendi for Computer Science. Topic of the habilitation Distributed sensor and environmental information processing with multi-agent systems
1998-2002	Doctoral studies at the University of Bremen, Department of Physics (Dr. rer. nat.), Topic of the dissertation: An experimental laser light scattering method for measuring velocity gradients in non-Newtonian liquids with high viscosity
1994-1998	Studies of Physics, University of Bremen, thesis topic: Measurement of the rotation and distortion of rough solid surfaces by means of coherent light scattering, diploma physicist
1990-1994	Studies of Physics, University of Bremen, graduation pre-diploma

## Professional Experience

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2022-today	Lecturer at the University of Siegen, Department of Mechanical Engineering, Focus on AI Methods in the Engineering Sciences
2022-today	Principle Investigator and project Manager at the AI Center for Health Care of the U Bremen Research Alliance
2020-today	Principle Investigator and project leader of the transregional DFG Research Group 3022 "Ultrasonic Monitoring of Fibre Metal Laminates Using Integrated Sensors", subproject "Model-free Damage Diagnostics"
2018-2019	W3 Interim Professor of Practical Computer Science and lecturer at the Faculty of Computer Science, Institute of Software Engineering, University of Koblenz-Landau
2016-today	<b>Privatdozent</b> (Associate professor) in the Department of Mathematics and Computer Science with a working group, teaching in the departments of Computer Science, Electrical Engineering, Sociology, Production Engineering (with materials science), University of Bremen
2010-2018	Project Leader and Council member at the Integrated Solutions in Sensorial Structure Engineering Research Center
2003-today	Senior Researcher in the Department of Mathematics and Computer Science, Robotics Research Group, University of Bremen

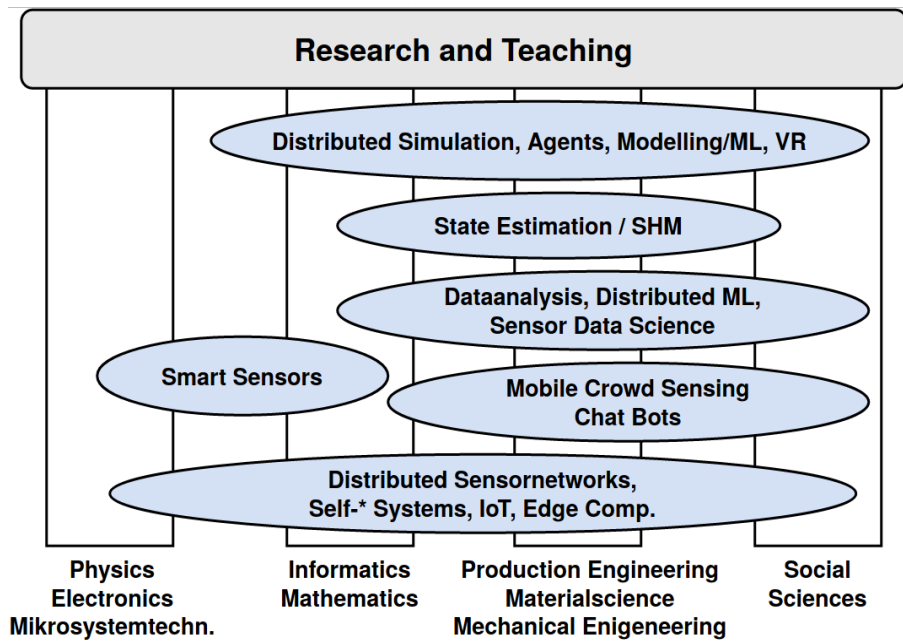
2002-2003 Postdoctoral researcher in the Department of Production Engineering, Institute of Measurement and Control Engineering, University of Bremen

## Scientific Profile

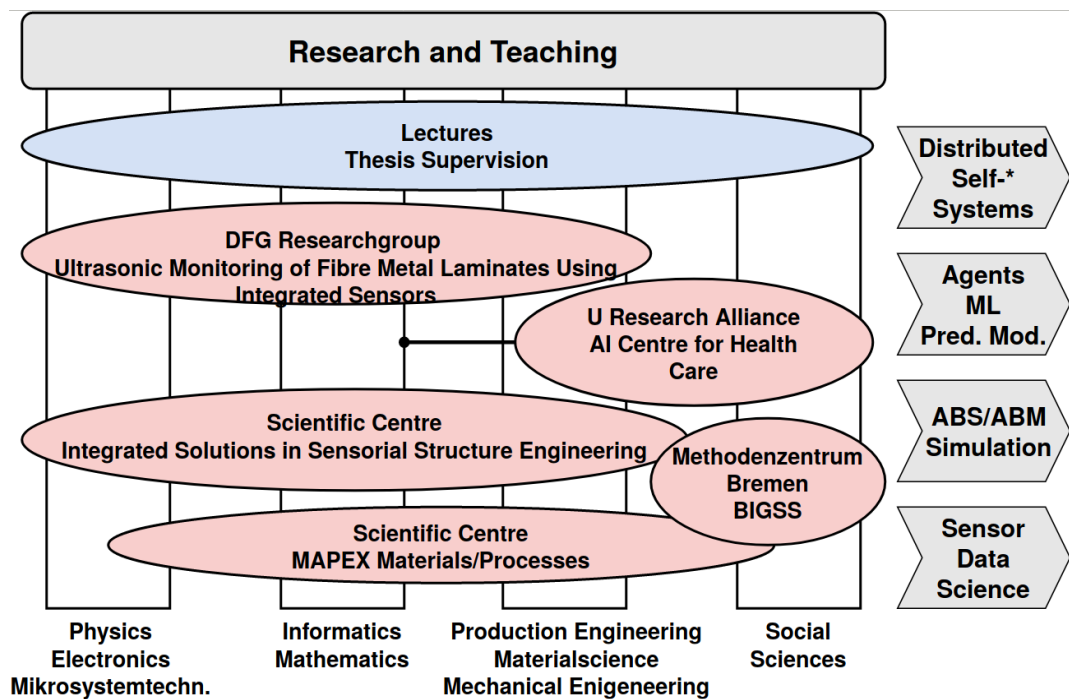
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<b>Distributed AI/ML</b>	Transformation of AI algorithms and biologically inspired concepts to large-scale heterogeneous technical and socio-technical systems (IoT, CPS, mobile networks) with massively parallel and distributed properties in terms of interaction / communication, robustness and scalability (efficiency, real-time capability, complexity, mapping to mobile and embedded systems including hardware design) with local data aggregation and global fusion, especially hybrid methods.
<b>Sensor Data Science</b>	Processing and analysis of massively distributed large-volume data mostly from ubiq. Robust and scalable sensor sources at all levels (survey, aggregation, application) with uniform approaches to reliably obtain relevant information
<b>Data Mining and ML</b>	Data aggregation and feature extraction from high-dimensional concentrated or distributed sensor data using multivariate data analysis and ML methods.
<b>Mobile Data/Networks</b>	The human being as a sensor: Data aggregation, reduction, and mobile crowd and things sensing combined with data mining and ML of inherently acquired sensor data and personalized survey data obtained via the Internet and from mobile devices. The basis for the simulation and implementation of new smart environments. The focus here is on local data aggregation and fusion with agent-based methods and self-organizing systems.
<b>Simulation</b>	Data-based simulation of large-scale/complex distributed systems mainly by means of agent-based methods and simulation of multi-agent systems, combined with physical simulation (multi-area simulation). Furthermore, coupling of virtual and real worlds (machine- and human-in-the-loop simulation, data collection for simulation) for real-time capable simulation with large sensor databases. Distributed simulation
<b>Agents and CA</b>	Mobile learning multi-agent systems for robust and adaptive information processing in highly heterogeneous environments (IoT, cloud, WEB). Important research aspects: interaction, distributed databases, implementation of self-* characteristics such as self-organization, self-adaptivity, self-configuration.  Development of algorithms on cellular automata for parallel data processing and analysis of large data volumes.
<b>Applications</b>	Internet of Things and Edge Computing, Mobile networks, Smart sensor networks, Crowd sensing and CSS (man and machine as a sensor), Socio-technical systems, Measurement technology, Tomography and image recognition, Ubiq. Data Mining, Production, Logistics, Smart City, Energy networks

### Topics and Fields of Application



### Networking Research and Teaching



## Memberships in Scientific Organisations

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2021-today	Netzwerk für Wissenschaftsfreiheit
2020-today	MAPEX Center for Materials and Processes
2020-today	Akademie der Soziologie (AS)
2020-today	European Association of Methodology
2019-today	DGZFP Deutsche Gesellschaft für Zerstörungsfreie Prüfung
2018-today	DGM Deutsche Gesellschaft für Materialkunde
2015-today	ACM Association for Computing Machinery
2008-2018	ISIS Wissenschafts- und Forschungszentrum
2003-today	DPG Deutsche Physikalische Gesellschaft

## Expert / Reviewer Activities

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Journale	ACM Transactions on Autonomous and Adaptive Systems TAAS, Cluster Computing, Cognitive Systems Research, IEEE Transactions on Parallel and Distributed Systems, Computer Methods and Programs in Biomedicine, IEEE Transactions on Industrial Informatics, Machine Learning and Knowledge Extraction [MDPI], Sensors (GE), Computers, Information, Informatics, Applied Sciences [MDPI]; Elsevier Mechatronics, Journal of Internet Technology, Sensors & Actuators: A. Physical, IEEE Transactions on Industrial Electronics, ACM Transactions on Reconfigurable Technology and Systems, ACM Transactions on Design Automation of Electronic Systems TODEAS, IEEE Sensors
Conferences	International Conference on Sensors and Applications ECSA, International Conference on System-Integrated Intelligence Intelligent, flexible and connected systems in products and production SysInt, Future Internet of Things and Cloud FiCloud (IPC), International Conference on Advances in Future Internet AFIN, International Conference on Evolving Internet INTERNET, International Conference on Adaptive and Self-Adaptive Systems and Applications ADAPTIVE, International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies UBICOMM, International Conference on Advances in Sensors, Actuators, Metering and Sensing ALLSENSORS [IARIA] (IPC), IEEE International Conference on Self-Adaptive and Self-Organizing Systems SASO
Sponsoring companies	Österreichische Forschungsfördergesellschaft FFG Carl-Zeiss Stiftung Alexander von Humboldt-Stiftung

## Conference Organisation, Editorships

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	(Selection)
2022	Computers, MPDI, Special Issue "System-Integrated Intelligence and Intelligent Systems", Guest Editor
2015-heute	International Electronic Conference on Sensors and Applications (ECSA), MDPI, Chair & PC (jährlich)
2014-heute	International Conference on System-Integrated Intelligence Intelligent, flexible and connected systems in products and production (SysInt), PC, Orga (zweijährlich)
2020	Computers, MPDI, Special Issue "System-Integrated Intelligence and Intelligent Systems", Guest Editor
2020	Session Pervasive and Ubiquitous Computing, International Conference on System-Integrated Intelligence Intelligent, flexible and connected systems in products and production
2018	Mobile Cloud Services, IEEE International Conference on Future Internet of Things and Cloud, Track Chair & IPC
2018	Sensors, SI, Guest Editor, MDPI
2017	3rd International Workshop on Data-driven Self-regulating Systems (DSS 2017), Workshop Chair & IPC
2016	Sensors, Special Issue "System-Integrated Intelligence and Intelligent Systems", Guest Editor, MDPI
2014	Sensors, SI, Guest Editor, IEEE

## Call for Professorship

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2020	W2 professorship "Angewandte Informatik, insbesondere Künstliche Intelligenz" (Applied Cognitive Computing)", Hochschule Düsseldorf, Zentrum für Digitalisierung und Digitalität (Fachbereich Medien)
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## Publications

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More information and complete lists can be found here:  
<https://www.sblab.de> <https://edu-9.de>  
<https://orcid.org/0000-0002-8774-6141>  
[https://www.researchgate.net/profile/Stefan\\_Bosse](https://www.researchgate.net/profile/Stefan_Bosse)

### Summary

**21 Journals**

**73 Conferences / Proceedings**

**4 Books**

**14 Book Chapters**

**3 Technical Reports**

**Google Scholar: 641 citations, h-index=14**

**Impact factor of Journals: MDPI Sensors 2.6, Computers: 3.7, Materials: 3.7, Cluster Computing 2.7, IEEE Sensors 3.3**

### Monographs, Books, Book Chapters

- 2022 S. Bosse, *Crowdsourcing and Simulation with Mobile Agents and the JavaScript Agent Machine*, ISBN 978-1-4710-7813-2
- 2022 M. Valle, S. Bosse, D. Lehmus et al. (Ed.)  
*Advances in System-Integrated Intelligence: Proceedings of the 6th International Conference on System-Integrated Intelligence (SysInt 2022)*  
 Springer, 2022, ISBN 978-3031162800
- 2021 S. Bosse, Chapters *Combining crowd sensing and social data mining with large-scale simulation using mobile agents* in *Handbook of Computational Social Science, Volume 2*, U. Engel, A. Quan-Haase, S. Xun-Liu, L. Lyberg, (Ed.) Taylor & Francis, in print (2021)
- U. Engel, S. Bosse, L. Dahlhaus, *WEB Scraping and Data Mining*, in *Handbook of Computational Social Science, Volume 2*, U. Engel, A. Quan-Haase, S. Xun-Liu, L. Lyberg, (Ed.) Taylor & Francis, in print (2021)
- 2018 S. Bosse, *Unified Distributed Sensor and Environmental Information Processing with Multi-Agent Systems: Models, Platforms, and Technological Aspects*, epubli, 584 pages, ISBN 9783746752228 (2018)
- 2018 S. Bosse, D. Lehmus, W. Lang, M. Busse (Ed.), *Material-Integrated Intelligent Systems: Technology and Applications*, Wiley, ISBN: 978-3-527-33606-7, und S. Bosse, Chapters 1, 10-14, 16, 19 (2018)
- 2014 S. Bosse, D. Lehmus, Chapter 17 *Sensorial Materials*, D. Lehmus, M. Busse, A. S. Herrmann, K. Kayvantash (Ed.): “Structural Materials and Processes in Transportation”, Wiley-VCH (2014)

## Journals

- 2022 C. Shah, S. Bosse, A. von Hehl, *Taxonomy of Damage Patterns in Composite Materials, Measuring Signals, and Methods for Automated Damage Diagnostics*, *Materials* 15 (MDPI), no. 13 (2022): 4645.
- M. L. Altmann, S. Bosse, C. Werner, R. Fechte-Heinen, A. Toenjes, *Programmable Density of Laser Additive Manufactured Parts by Considering an Inverse Problem*, *Materials* (MDPI), 2022
- S. Bosse, *PSciLab: An Unified Distributed and Parallel Software Framework for Data Analysis, Simulation and Machine Learning - Design Practice, Software Architecture, and User Experience*, *Applied Sciences*, MDPI, SI Applications of Parallel Computing
- 2021 S. Bosse, D. Weiss, D. Schmidt, *Supervised Distributed Multi-instance and Unsupervised Single-instance Autoencoder Machine Learning for Damage Diagnostics with Highdimensional Data - A Hybrid Approach and Comparison Study*, *Computers*, MDPI, 2021, in print
- 2019 S. Bosse, U. Engel, *Real-time Human-in-the-loop Simulation with Mobile Agents, Chat Bots, and Crowd Sensing for Smart Cities*, *Sensors* (MDPI), 2019, doi: 10.3390/s19204356
- S. Bosse, D. Lehmhus, *Material-integrated cluster computing in self-adaptive robotic materials using mobile multi-agent systems*, *Cluster Computing*, Volume 22, Number 3, pp. 1017-1037, doi 10.1007/s10586-018-02894-x, ISSN 1386-7857 (2019)
- S. Bosse, *Modellierung und Simulation komplexer Systeme mit annotiertem JavaScript*, *Industrie 4.0 Management, Intelligente vernetzte Systeme*, 1.2019, GITO Verlag, ISSN 2364-9208
- 2018 S. Bosse, D. Lehmhus, *Adaptive Materialien mit Multigatentensystemen*, *Industrie 4.0 Management*, 4.2018, GITO Verlag, ISSN 2364-9208
- 2017 S. Bosse. *Incremental Distributed Learning with JavaScript Agents for Earthquake and Disaster Monitoring*, In: *International Journal of Distributed Systems and Technologies (IJ DST)* (2017)
- 2016 S. Bosse, A. Lechleiter, *A hybrid approach for Structural Monitoring with self-organizing multi-agent systems and inverse numerical methods in material-embedded sensor networks*, *Mechatronics*, (2016), DOI:10.1016/j.mechatronics.2015.08.005.
- S. Bosse, *Industrielle Agenten und Agenten-basiertes Lernen im technischen Kontext*, *Industrie Management*, 6/2016.
- 2015 D. Lehmhus, T. Wuest, S. Wellsandt, S. Bosse, T. Kaihara, KD. Thoben, M. Busse, *Cloud-Based Automated Design and Additive Manufacturing: A Usage Data-Enabled Paradigm Shift*, *Sensors* (MDPI), 15 (12), pp. 32079-32122, 2015, DOI:10.3390/s151229905.



- S. Bosse, *Design and Simulation of Material-Integrated Distributed Sensor Processing with a Code-Based Agent Platform and Mobile Multi-Agent Systems*, *Sensors (MDPI)*, 15 (2), pp. 4513-4549, 2015, DOI:10.3390/s150204513.
- 2014 S. Bosse, *Distributed Agent-based Computing in Material-Embedded Sensor Network Systems with the Agent-on-Chip Architecture*, *IEEE Sensors Journal*, Special Issue MIS, 2014, DOI: 10.1109/JSEN.2014.2301938.
- D. Lehmus, S. Bosse, W. Lang, P.C. Chao, F. Chang, Guest Editorial *Special Issue on Material-Integrated Sensing, Data Processing and Communication*, *IEEE Sensors*, 14 (7), 2014, DOI: 10.1109/JSEN.2014.2330133.
- 2013 T. Behrmann, C. Budelmann, S. Bosse, D. Lehmus, M. C. Lemmel, *Tool chain for harvesting, simulation and management of energy in Sensorial Materials*, *Journal of Intelligent Material Systems and Structures*, 2013, DOI:10.1177/1045389X13488248
- S. Bosse, F. Kirchner, *Autonomie und Robustheit in Verteilten Cyber-Physical Systems und Sensorischen Materialien mit Methoden der Künstlichen Intelligenz*, *Industrie Management*, 1, 2013, ISSN: 1434-1980.
- 2012 S. Bosse, F. Pantke, *Distributed computing and reliable communication in sensor networks using multi-agent systems*, *Production Engineering, Research and Development*, 2012, ISSN: 0944-6524, DOI:10.1007/s11740-012-0420-8.
- 2011 S. Bosse, F. Kirchner, *Smart energy management and low-power embedded system design*, *SPIE Newsroom*, 2011, DOI:10.1117/2.1201106.003694.

### Conference Proceedings

- 2022 S. Bosse, *Fusion of Distributed Sensor Tuple Spaces and Agents using Broadcast Radio Communication for Mobile Networks*, Proc. of the IARIA Mobility Conference, June 26, 2022 to June 30, 2022 - Porto, Portugal, (2022) **Best Paper Award**
- C. Polle, S. Bosse, M. Koerdt, B. Maack, A. S. Herrmann, *Fast Temperature-Compensated Method for Damage Detection and Structural Health Monitoring with Guided Ultrasonic Waves and Embedded Systems*, Proc. of the SysInt Conference, Sep. 6, 2022 to Sep. 8, 2022 - Genova, Italy, DOI: 10.1007/978-3-031-16281-7\_35 (2022)
- C. Shah, S. Bosse, C. Zinn, A. von Hehl, *Optimization of Non-destructive Damage Detection of Hidden Damages in Fiber Metal Laminates Using X-ray Tomography and Machine Learning Algorithms*, Proc. of the SysInt Conference, Sep. 6, 2022 to Sep. 8, 2022 - Genova, Italy, DOI: 10.1007/978-3-031-16281-7\_37

- S. Bosse, *BeeTS: Smart Distributed Sensor Tuple Spaces combined with Agents using Bluetooth and IP Broadcasting*, CoRR abs/2204.02464 (2022)
- S. Bosse, *Wireless Agent-based Distributed Sensor Tuple Spaces using Bluetooth and IP Broadcasting*, Proc. of the 17th CONFERENCE ON COMPUTER SCIENCE AND INTELLIGENCE SYSTEMS FedCSIS 2022, Sofia, Bulgaria, 4-7 September (2022)
- 2021 S. Bosse, U. Engel, *Predictive Modelling by fusion of Agent-based Simulation, Digital Twins, and Machine Learning*, 11 th. International Conference on Simulation and Modeling Methodologies, Technologies and Applications (SIMULTECH) , 2021
- S. Bosse, C. Polle, *Spatial Damage Prediction in Composite Materials using Multipath Ultrasonic Monitoring, advanced Signal Feature Selection and combined Classifier-Regression Artificial Neural Network*, The 8th International Electronic Conference on Sensors and Applications (ECSA), in Engineering Proceedings, MDPI, Online, Worldwide, 1-15-10.2021
- S. Bosse, *Distributed Serverless Chat Bot Networks using mobile Agents: A Distributed Data Base Model for Social Networking and Data Analytics*, 13th International Conference on Agents and Artificial Intelligence (ICAART), 2021
- S. Bosse, *Long-term Longitudinal data collection and analysis in highly dynamic systems using mobile Crowd Sensing and mobile Agents*, 9th European Congress of Methodology EAM 2021, 21-23.7.2021, Valenica, Spain
- S. Bosse, D. Schmidt, *Ortsaufgelöste Schadensdiagnostik mit geführten Wellen und zustandsbasierten Modellen mit Modellfusion für Faserverbundwerkstoffe*, Proc. of the DAGA 2021 - 47. Jahrestagung für Akustik, 15. - 18. August 2021, Wien & Online
- S. Bosse, *Surrogate Predictive and Multi-domain Modelling of Complex Systems by fusion of Agent-based Simulation, Cellular Automata, and Machine Learning*, Proc. of the SIMUL 2021 Conference, The Thirteenth International Conference on Advances in System Simulation, IARIA, 3. - 7. October 2021, Barcelona, Spain, & Online, **Best Paper Award**
- 2020 S. Bosse, *Self-organising Urban Traffic control on micro-level using Reinforcement Learning and Agent-based Modelling*, Proc. of the SAI IntelliSys Conference, Springer Lecture Notes in Networks and Systems, 3-4.9.2020, Amsterdam, Netherlands, 2020
- S. Bosse, *Learning Damage Event Discriminator Functions with Distributed Multi-instance RNN/LSTM Machine Learning - Mastering the Challenge*, Proc. of the 5th International Conference on System-Integrated Intelligence Conference, Procedia Manufacturing, Elsevier, 11.11-13.11.2020, Bremen, Germany, 2020
- S. Bosse, *Self-adaptive Traffic and Logistics Flow Control using Learning Agents and Ubiquitous Sensors*, Proc. of the 5th Interna-

- tional Conference on System-Integrated Intelligence Conference, Procedia Manufacturing, Elsevier, 11.11-13.11.2020, Bremen, Germany, 2020
- 2019 S. Bosse, U. Engel, *Combining Crowd Sensing and Social Data Mining with Agent-based Simulation using Mobile Agents towards Augmented Virtuality*, Social Simulation Conference, 23-27.9.2019, Mainz, Germany
- S. Bosse, D. Lehmus, *Robust detection of hidden material damages using low-cost external sensors and Machine Learning*, 6th International Electronic Conference on Sensors and Applications (ECSA), 15-30 Nov. 2019, MDPI
- 2018 S. Bosse, *Smart Micro-scale Energy Management and Energy Distribution in Decentralized Self-Powered Networks Using Multi-Agent Systems*, FedCSIS Conference, 6th International Workshop on Smart Energy Networks & Multi-Agent Systems, 9-12.9.2018, Poznan, Poland, 2018
- S. Bosse, M. Koerdt and A. v. Hehl, *Robust and Adaptive Non Destructive Testing of Hybrids with Guided Waves and Learning Agents*, 3. Internationale Konferenz Hybrid Materials and Structures (2018) 18-19.4.2018, Bremen, Germany
- S. Bosse, *A Unified System Modelling and Programming Language based on JavaScript and a Semantic Type System*, Procedia Manufacturing, Elsevier, Volume 24, 2018, Pages 21-39, Proc. of the 4th International Conference on System-Integrated Intelligence Conference, Hanover, Germany, DOI: 10.1016/j.promfg.2018.06.005
- S. Bosse, U. Engel, *Augmented Virtual Reality: Combining Crowd Sensing and Social Data Mining with Large-Scale Simulation Using Mobile Agents for Future Smart Cities*, Proceedings, Volume 4, ECSA-5 5th International Electronic Conference on Sensors and Applications 15-30 November, 2018 DOI 10.3390/ecsa-5-05762
- 2017 S. Bosse, E. Pournaras, *An Ubiquitous Multi-Agent Mobile Platform for Distributed Crowd Sensing and Social Mining*, FiCloud 2017, IEEE, The 5th International Conference on Future Internet of Things and Cloud, Aug 21, 2017 - Aug 23, 2017, Prague, Czech Republic
- S. Bosse, D. Lehmus, *Towards Large-scale Material-integrated Computing: Self-Adaptive Materials and Agents*, IEEE 2nd International Workshops on Foundations and Applications of Self Systems (FASW), DOI: 10.1109/FAS-W.2017.123, 18-22 September 2017, University of Arizona, Tucson, AZ
- S. Bosse, D. Schmidt, M. Koerdt, *Robust and Adaptive Signal Segmentation for Structural Monitoring Using Autonomous Agents*, In Proceedings of the 4th Int. Electron. Conf. Sens. Appl., 15-30 November 2017; Doi:10.3390/ecsa-4-04917
- 2016 S. Bosse, *Distributed Machine Learning with Self-organizing Mobile Agents for Earthquake Monitoring*, IEEE 1st International

Workshops on Foundations and Applications of Self Systems (FASW), SASO Conference, DSS Workshop, 12 September 2016, Augsburg, Germany, 2016, 2016, DOI:10.1109/FAS-W.2016.38.

S. Bosse, A. Lechleiter, D. Lehmhus, *Data evaluation in smart sensor networks using inverse methods and artificial intelligence (AI): Towards real-time capability and enhanced flexibility*, Proc. of the CIMTEC, - 7th Forum on New Materials, Perugia, Italy, June 5 to 9, 2016, 5th International Conference Smart and Multifunctional Materials, Structures and Systems, 2016, 2016, DOI:10.4028/www.scientific.net/AST.101.55.

S. Bosse, *Industrial Agents and Distributed Agent-based Learning*, 3rd International Electronic Conference on Sensors and Applications . 15-30 Nov. 2016, MDPI, 2016, DOI:10.3390/ecsa-3-S2004.

S. Bosse, *Mobile Multi-Agent Systems for the Internet-of-Things and Clouds using the JavaScript Agent Machine Platform and Machine Learning as a Service*, The IEEE 4th International Conference on Future Internet of Things and Cloud , 22-24 August 2016, Vienna, Austria, 2016, 2016, DOI:10.1109/FiCloud.2016.43.

S. Bosse, *Structural Monitoring with Distributed-Regional and Event-based NN-Decision Tree Learning using Mobile Multi-Agent Systems and common JavaScript platforms*, Procedia Technology, 3rd International Conference on System-Integrated Intelligence: New Challenges for Product and Production Engineering, June 13th (Mon.) - 15th (Wed.) 2016: Paderborn, Germany, 2016, DOI:10.1016/j.protcy.2016.08.063.

2015

S. Bosse, *Design and Simulation of a Low-Resource Processing Platform for Mobile Multi-Agent Systems in Distributed Heterogeneous Networks*, Béatrice Duval, Herik, Jaap van den, Loiseau, Stephane, Filipe, Joaquim (Ed.): *Agents and Artificial Intelligence (LNAI 8946)*, Springer, 2015, ISBN: 978-3-319-25209-4, DOI:10.1007/978-3-319-25210-0\_5.

S. Bosse, *Unified Distributed Computing and Co-ordination in Pervasive/Ubiquitous Networks with Mobile Multi-Agent Systems using a Modular and Portable Agent Code Processing Platform*, The 6th International Conference on Emerging Ubiquitous Systems and Pervasive Networks (EUSPN 2015), Procedia Computer Science, Berlin, Germany, 27-30.9.2015, 63, Procedia Computer Science, Elsevier, 2015, DOI:10.1016/j.procs.2015.08.312.

S. Bosse, *A Unified Distributed Computing Framework with Mobile Multi- Agent Systems and Virtual Machines for Large-Scale Applications: From the Internet-of-Things to Sensor Clouds*, Annals of Computer Science and Information Systems Volume 6, Position Papers of the 2015 Federated Conference on Computer Science and Information Systems (FEDCSIS), Lodz, Poland, 13 - 16 Sep, 6, 2015, DOI:10.15439/2015F252.

2014

S. Bosse, A. Lechleiter, *Structural Health and Load Monitoring with Material-embedded Sensor Networks and Self-organizing*

- Multi-Agent Systems*, Procedia Technology, Proceeding of the Sys-Int 2014 Conference, 2-4 July 2014, Bremen, Germany, 2014, DOI:10.1016/j.protcy.2014.09.039.
- S. Bosse, *Design of Material-integrated Distributed Data Processing Platforms with Mobile Multi-Agent Systems in Heterogeneous Networks*, Proc. of the 6<sup>th</sup> International Conference on Agents and Artificial Intelligence ICAART 2014, 2014, DOI:10.5220/0004817500690080.
- 2013 S. Bosse, *Intelligent Microchip Networks: An Agent-on-Chip Synthesis Framework for the Design of Smart and Robust Sensor Networks*, Proceedings of the SPIE 2013, Microtechnologie Conference, Session EMT 102 VLSI Circuits and Systems, 24-26 April 2013, Alpexpo/Grenoble, France, SPIE, 2013, DOI:10.1117/12.2017224.
- 2012 S. Bosse, F. Pantke, F. Kirchner, *Distributed Computing in Sensor Networks Using Multi-Agent Systems and Code Morphing*, Proceedings of the 11th International Conference on Artificial Intelligence and Soft Computing Conference ICAISC 2012, 29.4. – 3.5.2012, Zakapone, Poland, Springer, 2012.
- K. Tracht, B. Kuhfuss, E. Brinksmeier, M. Busse, L. Kroll, S. Högrevé, M. Garbrecht, D. Lehmus, M. Heinrich, S. Bosse, *Enabling the factories of the future: The role of smart systems in manufacturing and robotics*, Proceedings of the Smart Systems Integration Conference 2012, Special Session EpoSS, Zürich, Schweiz, 21 – 22 Mar. 2012, ISBN: 978-3-8007-3423-8.
- 2011 F. Pantke, S. Bosse, D. Lehmus, M. Lawo, M. Busse, *Combining Simulation and Machine-Learning for Real-Time Load Identification in Sensorial Materials*, Proceedings of the International Conference SIMBIO-M-2011, Simulations in BIO-Sciences and Multiphysics, 20-22.6.2011, Marseille, France, 2011.
- S. Bosse, T. Behrmann, *Smart Energy Management and Low-Power Design of Sensor and Actuator Nodes on Algorithmic Level for Self-Powered Sensorial Materials and Robotics*, Proceedings of the SPIE Microtechnologies 2011 Conference, 18.4.-20.4.2011, Prague, Session EMT 101 Smart Sensors, Actuators and MEMS, 2011, DOI:10.1117/12.888124.
- 2010 F. Pantke, J. Sprado, E. Pal, S. Bosse, M. Lawo, *Evaluating Simulation Techniques for Sensorial Materials*, Symposium A : From embedded sensors to sensorial materials of the E-MRS 2010 Spring Meeting, Congress Center in Strasbourg (France) from June 7 to 11, 2010
- Studies**
- 2020 U. Engel, S. Bosse, et al., *Blick in die Zukunft: Wie künstliche Intelligenz das Leben verändern wird. Ergebnisse eines Umfrageprojekts in der Wissenschaft, Politik und Bevölkerung der Freien*

*Hansestadt Bremen*, Universität Bremen, Methodenzentrum, Februar 2020, Bericht

*Bremen AI Delphi survey about artificial intelligence and its impact on future life*. <http://dx.doi.org/10.13140/RG.2.2.14478.92489>

### Invited Talks

(Auswahl)

- 2022 Data-driven and automated Damage Diagnostics from High-dimensional Data - Towards Learning Technical Systems and Sensor Data Science, Universität Siegen, FB Maschinenbau, Lehrstuhl für Materialkunde und Werkstoffprüfung, 22.9.2022
- Self-organising Distributed and Learning Technical Systems, Universität Koblenz-Landau, Fachbereich 4, Informatik, Institut für Informatik, 5.7.2022
- Material-integrated Intelligent Systems, Universität Bochum, Fakultät für Elektrotechnik und Informationstechnik, 30.5.2022
- 2021 Maschinelles lernen in der Schadensdiagnostik und Ultraschallmesstechnik mit Zeitseriendaten, Workshop, Summer School 2021 der DFG Forschungsgruppe 3022, 13-15.9.2021, Bremen, Baumwollbörse
- Ortsaufgelöste Schadensdiagnostik mit geführten Wellen und zustandsbasierten Modellen mit Modellfusion für Faserverbundwerkstoffe, Special Session Maschinelles Lernen und Künstliche Intelligenz für Vibroakustik, Ultraschall sowie Zustandsüberwachung von Strukturen und Maschinen, DAGA 2021 - 47. Jahrestagung für Akustik, 15. - 18. August 2021, Wien & Online
- 2020 Einführung in die Künstliche Intelligenz: Chat Bots, Crowdsensing, und NLP, Universität für angewandte Wissenschaften Düsseldorf, Fachbereich Medien, 16.9.2020
- Anwendung von Maschinellen Lernalgorithmen auf SHM/NDT Daten. Eingeladener Überblicksvortrag mit praktischen Erfahrungen und Anwendung im Rahmen der DFG Forschungsgruppe 3022, Deutsche Gesellschaft für zerstörungsfreie Prüfung, Fachausschusssitzung SHM, Dresden, 30.9.2020
- Smarte Adaptive Materialien und Agenten, Invited Talk, AWT - VDI - Arbeitskreis Werkstofftechnik Bremen 2018/19, 06.03. 2019, Leibniz-Institut für Werkstofforientierte Technologien - IWT, Bremen, Germany
- 2019 WEB-basierte Interaktive Notebooks und Tutorials für das maschinell geführte Selbststudium, Tag der Lehre, 4.12.2019, Universität Bremen, "Informatiklehre und Digital — Passt das? Muss das?", Bremen, Germany
- 2018 Data mining with Machine Learning for the Social Sciences, Invited Keynote Talk, 18.5.2018, Bremen, Computational Social Sciences Talks, BIGSSS, SOCIUM, doi 10.13140/

RG.2.2.12746.67526, University of Bremen, Jacobs University  
Bremen, 2018

## Lectures

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More information can be found here: <https://edu-9.de/Lehre>

### Parallel and Distributed Systems

- 2020-today Course Distributed and Parallel programming, Lecture with integrated exercise and laboratory, Target group: Computer scientists, engineers, Number of participants: 30, Univ. Bremen VAK 03-IMVP-VPP
- 2020-today Course Distributed sensor networks, Lecture with integrated exercise and laboratory, Target group: Computer scientists, engineers, Number of participants: 30, Univ. Bremen VAK 03-IMVP-VSD
- 2018-2019 Course Distributed and parallel programming, Lecture and exercise, Target group: Computer scientists, Number of participants: 30, Univ. Koblenz VAK 04IN2052
- 2007-today Course Parallel and distributed embedded systems, Lecture with integrated exercise and laboratory (design with FPGAs), Project work, Target groups: Computer scientists, engineers, Number of participants: 30, Univ. Bremen VAK 03-ME-712.06
- 2006-today Course Design of embedded systems with digital logic, Lecture with integrated exercise and laboratory (design with FPGAs), Project work, Target groups: Computer scientists, engineers, Number of participants: 30, Univ. Bremen VAK 03-ME-712.05

### Multi-agent Systems and Agents

- 2019 Course Mobile Crowdsensing with agents, lecture and exercise, Target group: Computer scientists, Number of participants: 20, Univ. Koblenz VAK 04IN2111
- 2018-2019 Course Multi-agent systems - Programming and architectures, Lecture and exercise, Target group: Computer scientists, Number of participants: 30, Univ. Koblenz VAK 04IN2053
- 2017-today Multi-agent Systems course - Technologies, design, platforms, course with integrated practice and laboratory. Target groups: Computer scientists, engineers, sociologists, Number of participants: 20, Univ. Bremen VAK 03-ME-710.20

### Machine Learning and Data Science

- 2022-today Course Automatic feature analysis in Materials Testing Technology with ML and imaging methods, University of Siegen, Department of Mechanical Engineering, english lang.
- 2020-today Course Machine learning and data analysis in measurement and testing technology, Synchronous frontal teaching with livestream and chat dialog interaction, Asynchronous tutorials, DokuWiki, Inverted classroom, interactive digital exercises with online live



- support, Target group: Engineers, computer scientists, Number of participants: 40, Univ. Bremen VAK 04-M09-AM-022
- 2020- Mobile Crowdsensing and Social Data Mining course, lecture with integrated exercises and field study, Target group: Sociologists, Number of participants: 30, Univ. Bremen VAK 08-29-4-FEM-1-e
- 2020- Online course Machine learning and data analysis for sociologists, Synchronous frontal lessons with livestream and chat dialog interaction, Asynchronous tutorials, DokuWiki, Inverted classroom, interactive digital exercises with online live support, Target group: Sociologists, Number of participants: 30, Univ. Bremen VAK 08-29-5-FEM-1-c
- Material Science and Sensornetworks**
- 2013-today Course, Material-integrated sensory systems, lecture with integrated exercise and laboratory, Project work, Target groups: engineers, computer scientists, Number of participants: 20, Univ. Bremen VAK 04-326-FT-041
- 2011-today Lecture series with excursion, Sensory materials: visions, technology, basics, Univ. Bremen
- 2011-2012 Project event learnISIS, Research-based learning, Univ. Bremen
- Computer Science Basics**
- 2018-2019 Lecture with live programming and exercise, Basics of functional programming, Target groups: Computer scientists, business informatics, Number of participants: 100, Univ. Koblenz VAK 04IN1023
- 2006-2015 Lecture and exercise, Fundamentals of Computer Science 1 for electrical engineers - Introduction, computer architecture, operating systems, networks, programming languages, Number of participants: 100, Univ. Bremen
- 2007-2015 Lecture and exercise, Fundamentals of Computer Science 2 for electrical engineers - Compiler construction, algorithms and data structures, number of participants: 100, Univ. Bremen
- Thesis**
- 2010-today More than 30 Bachelor and Master theses (Univ. Bremen, Univ. Koblenz, Univ. Genoa/ERASMUS program) as supervisor, first and second reviewer, study and research papers, supervision of and first reviewer in doctorates
- Supervision, first and second opinions
- Degree programs: Computer Science, Systems Engineering, Electrical Engineering, Production and Process Engineering, Materials Science, Sociology, Mechanical Engineering

Courses consist of the module areas of fundamentals and specialization and are offered in the fields of computer science, sociology, production engineering and electrical engineering. The courses are offered for the degree programs Computer science, business informatics, industrial engineering, administrative informatics, production technology, manufacturing technology, process-oriented materials research, systems engineering, sociology, and electrical and information technology. The current average teaching load as a private lecturer is 8 SWS per semester.

## Research Projects

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	(Selection)
2022-today	Interdisciplinary research project, <i>Prediction of mechanical properties of additively manufactured parts by means of Machine Learning</i> - PORTAL, U Bremen Research Alliance, AI Center for Health Care
2021-2023	Industrial project, technology transfer, MaritimKIB, <i>Maritime KI unterstützte Bildverarbeitung</i> , FEI Programm, EFRE/BAB
2020-today	Interdisciplinary DFG researchgroup FORHYB 3022 <i>Ultrasonic Monitoring of Fibre-Metal Laminates Using Integrated Sensors</i> , Principle Investigator, Scientific director and project manager with personnel responsibility, subproject Model-free damage diagnostics, distributed and parallel sensor and data processing (data aggregation and fusion), ML, data analysis and feature extraction from large amounts of sensor data (damage forecasting and classification)
2008-2018	Interdisciplinary Scientific Centre <i>Integrated Solutions in Sensorial Structure Engineering</i> ISIS, Projektleiter (mehrere Projekte) mit Personalverantwortung, Principle Investigator Project SENSTRUCT (Simulation Sensorischer Materialien, Lokale autonome und verteilte Perzeption) Project MODUACT (Verteilte Sensornetzwerke in robotischen Systemen mit modularen Aktuatoren) Project SMARTENERGY (Verteiltes und dezentrales Energiemanagement in Sensornetzwerken mit autonomer Energiegewinnung)
2015-2016	SADA, <i>Smart Adaptive Data Aggregation</i> , Development of technologies that make it possible to intelligently and flexibly link data from mobile on-board sensors (in vehicles) with data from an unknown stationary sensor infrastructure, BMW
2010-2013	iStruct, Intelligente Strukturen für mobile Robotersysteme, Development of biologically inspired movement structure components, the structures are self-contained and distributed with regard to the acquisition and processing of sensor data, engine control and communication. BMBF
2008-2010	go!CART, <i>Entwurf von Flugrobotiksystemen</i> (Preparation of a competence network in the field of civil flying robots), Civil fields of application of flying robots, control architecturesWFB
2007-2008	DLR/ESA Projekt Space-Climber (Robotik, Hardware and software design, communication networks, Parallel and distributed systems). The goal of the "SpaceClimber" project was the investigation of a biologically inspired, energy-efficient and adaptively free-climbing robot for steep slopes

- 2007-2010 DFG SFB TR-8 *Spatial Cognition*, Teilprojekt A3, *Coordinated Multi-Robot Navigation and Exploration* Robotics, Vision, Hardware and software design, Parallel data processing
- 2006-2007 SentryBot: An autonomous, cooperative multi-robot system for security and surveillance. Development of a team of autonomous mobile security robots that can be seamlessly integrated into existing security systems. The robot team is self-organizing and can provide an intuitive user interface via voice control
- 2003-2006 DLR/ESA Projekt ARAMIES (Robotik, Hard- und Software-entwurf) Ziel des Projektes war es, einen multifunktionalen, autonomen Laufroboter mit mehreren Freiheitsgraden für unwegsames Gelände zu erforschen und zu entwickeln.
- 2003-2005 SCORPION - Autonomous six-legged walking robot with biologically inspired control structures, NASA/DARPA
- 2003-2005 DFG SFB TR-8 *Spatial Cognition*, Teilprojekt A6, *Hybrid Learning Architecture for Spatial Recognition, Representation and Navigation*, Robotics, Vision, Hardware and software design, Parallel data processing
- 2002-2003 DFG SFB TR-4 *Process chains to replicate complex optical components*, Subproject Metrology M1, Distributed and parallel data analysis and simulation

## Cooperations

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	(Selection)
National	<p>Lehrstuhl für Materialkunde und Werkstoffprüfung (LMW), Universität Siegen, Naturwissenschaftlich-Technische Fakultät, Fachbereich Maschinenbau</p> <p>Fraunhofer Institut für Fertigungstechnik und angewandte Material- forschung (IFAM), Bremen</p> <p>Fraunhofer-Institut für Keramische Technologien und Systeme (IKTS), Dresden</p> <p>Institute of Composite Structures and Adaptive Systems, DLR, Braunschweig</p> <p>Institut für Adaptronik und Funktionsintegration, TU Braunschweig</p> <p>Faserinstitut FIBRE, Bremen</p> <p>Leibniz Institut für Werkstofftechnologien (IWT), Bremen</p> <p>Lehrstuhl Mechanik, HSU, Hamburg</p> <p>Zentrum für Technomathematik ZeTeM, Bremen</p> <p>Bremer Institut für Messtechnik, Automatisierung und Qual- itätswissenschaft (BIMAQ)</p> <p>DFKI CPS/RIC Bremen</p> <p>Methodenzentrum Bremen</p> <p>Fachgruppe Regelungstechnik und Mechatronik, Heinz Nixdorf Institut, Universität Paderborn</p> <p>Institut für Fertigungstechnik und Werkzeugmaschinen (IFW), Leibniz Universität Hannover</p> <p>Institut für Partielle Differentialgleichungen, Technische Universi- tät Braunschweig</p> <p>Institut für Analysis und Algebra, Technische Universität Braun- schweig</p>
International	<p>Artificial Intelligence Center FEE, Faculty of Electrical Engineer- ing, Czech Technical University in Prague (CTU)</p> <p>Benjamin M. Statler College of Engineering and Mineral Resources, Industrial &amp; Management Systems Engineering (IMSE) Department, West Virginia University, USA</p> <p>School of Computer Science &amp; Informatics, University College Dublin, Irland</p> <p>Politecnico di Milano, Milano · Department of Civil and Environ- mental Engineering, Italien</p>

Università degli Studi di Genoa, Genoa · Dipartimento di Ingegneria Navale, Elettrica, Elettronica e delle Telecomunicazioni (DITEN), Italien

Department of Electrical, Electronic and Communication Engineering & Institute for Smart Cities (ISC), Public University of Navarre, Spain

Laboratory of Electronics, SYstèmes de COmmunications and Microsystems, Université Gustave Eiffel, France

Corell Lab, Department of Computer Science, CU Colerado USA

ETH Zürich, Chair of Computational Social Science, Schweiz