

Curriculum Vitæ

Sören Schwertfeger

School Address

School of Information Science and Technology
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December 15, 2016

RESEARCH INTERESTS

- Mobile Robotics
- Robot Autonomy & Intelligence
- Rescue Robotics
- Service Robotics
- Mobile Manipulation
- Robot Performance Evaluation
- Map Evaluation
- Mapping & Simultaneous Localization and Mapping (SLAM)
- Semantic Maps

EDUCATION

Ph.D. in Computer Science

Jacobs University Bremen, Germany

July 2012

Thesis: Robotic Mapping in the Real World: Performance Evaluation and System Integration

Advisor: Professor Andreas Birk

Diploma in Computer Science

University Bremen, Germany

June 2005

Thesis: Fine-Grained Qualitative Spatial Reasoning about Point Positions

Advisors: Christian Freska and Reinhard Moratz

PROFESSIONAL EXPERIENCE

ShanghaiTech University, Shanghai, China

Since September 2014

Assistant Professor at the School of Information Science and Technology (SIST), ShanghaiTech University, Shanghai, China

Research on Robotics and teaching in robotics and computer science

University of California Berkeley, California, USA

September – October 2015

Two months visit at UC Berkeley in the lab of Professor Pieter Abbeel. Also close observation of the Computer Architecture course CS61C.

Jacobs University Bremen, Germany

August 2006 – July 2014

Research associate and PostDoc in the Robotics group of Prof. Andreas Birk.

Research on intelligent functions for ground, underwater, aerial and space robots.

Projects:

- DLR SpaceBot Cup November 2013
- MORPH January 2012 – July 2014
Marine robotic system of self-organizing, logically linked physical nodes (EU FP-7)
- RobLog January 2011 – July 2014
Cognitive Robot for Automation of Logistic Processes (EU FP-7)

- Co3-AUVs January 2009 – December 2012
Cooperative Cognitive Control for Autonomous Underwater Vehicles (EU FP-7)
- 3D Mapping in Unstructured Environments (DFG) June 2006 – July 2009

National Institute of Standards and Technology NIST February – October 2010
Eight-month research visit at NIST in Gaithersburg, Maryland, USA. Development of the NIST/ Jacobs Map Evaluation Toolkit as part of the DAAD (German Academic Exchange Service) project "Response Robots Performance Evaluation"

University of Bremen October 2002 – June 2005
Student research assistant at the University of Bremen, Germany. Activities: implementation and verification of different methods of spatial reasoning, teaching assistant for the lecture speech technology

Internship OHB-System GmbH July – September 2001
Ten-week internship at the OHB-System GmbH, design and development of a control program and of two simulators for the European Physiology Module of the Columbus Module of the International Space Station

MEMBERSHIPS

Institute of Electrical and Electronics Engineers IEEE
Robotics and Automation Society RAS - IEEE
Executive Committee RoboCup Rescue
Gesellschaft für Informatik (German computer scientists organization)

SERVICES

- General Chair 2017 IEEE International Symposium on Safety, Security and Rescue Robotics (SSRR)
- Co-Organizer of ShanghaiTech Symposium on Information Science and Technology 2016.
- Chair of the 2014 German Open RoboCup Rescue League
- Co-Chair SIST Public Relations Committee (2016 - now)
- Member of the SIST Research Management Committee (2014 - now)
- Member of the SIST Teaching Committee (2014 - 2016)
- SIST Graduate Admission Student Interviews: Computer Science 2015 (about 43) & 2016 (about 70)
- Leading the establishment of the SIST Machine Shop (2015 - now)
- Introduction to Robotics Lecture (2 hours). ShanghaiTech 2016, 2015

REVIEWER

- IEEE Transactions on Robotics T-RO: 2016
- IEEE Transactions on Automation Science and Engineering T-ASE: 2015
- Journal of Field Robotics: 2013; 3x 2014; 2015
- Advanced Robotics: 2012
- IEEE Transactions on Systems, Man, and Cybernetics: 2014
- KI-Künstliche Intelligenz Journal: 2016
- Robot: 2016
- ICRA: 2x 2011; 3x 2017;
- IROS: 2014; 2x 2015; 2x 2016
- Humanoids: 2015
- SSRR: 2013; 2x 2014; 2015; 3x 2016
- RoboCup Symposium: 2010
- NIST: 2010
- RoboCup: 2013, 2014, 15x 2015; 26x 2016

Advisees (Graduate students)

Tianyan Yu, <i>Room Detection and Path Matching for Topological Map Evaluation</i> (Master Thesis)	July 2016
Qingwen Xu	expected 2018
Xiangyang Zhi	expected 2018
Jiawei Hou	expected 2019
Zeyong Shan	expected 2019

Teaching

Graduate course: Robotics/ Mobile Robotics	Fall: 2014, 2015, 2016
Graduate course: Mobile Robotics Lab	Spring 2015
Undergraduate course: Computer Architecture	Spring 2016
Undergraduate course: 1/4 th of Introduction to Information Science and Technology	Spring: 2015, 2016
Summer Internships in Robotics	Summer: 2015, 2016

Invited Talks, Conference Visits & Competitions

- Invited talks: "Intelligent Robotics and Topology Graphs for Robotics" Southeast University May 10 2016; Nanjing University May 11 2016; Fudan University Sep 26 2016
- ICRA: 2015, 2013, 2009, 2008
- IROS: 2016
- SSR: 2015, 2012, 2011, 2010, 2007
- IAV: 2016, 2007
- PerMIS: 2010
- LAB-RS: 2008
- RoboCup Rescue Team: 2006 - 2010 (in total 11 regional and international competitions)
- RoboCup Rescue Admin & Judge: 2011 - now (up to now 8 regional and international competitions)
- Robot testing administrative and adjudication support:
 - DARPA Robotics Challenge Trials 2013
 - MAGIC 2010
- DLR Spacebot Cup Team: 2013
- Disaster City Robot testing: 2011, 2010, 2008
- ICRA Robot Space Challenge Team: 2008, 2007
- ELROB Team: 2008, 2007
- SICK Robot Day Team: 2007
- SAUC-E Team: 2006

PUBLICATIONS · Journals

Google scholar h-index of 12 with 505 citations in total as of Dec 2016. Citation counts according to google are added at the end of each entry. Clickable DOI links are also provided.

1. Raymond Sheh, **Sören Schwertfeger**, and Arnoud Visser. 16 years of robocup rescue. *KI-Künstliche Intelligenz*, 30(3-4):267–277, 2016. <http://dx.doi.org/10.1007/s13218-016-0444-x> Citations: 0
2. Todor Stoyanov, Narunas Vaskevicius, Christian A Mueller, Tobias Fromm, Robert Krug, Vinicio Tinca, Rasoul Mojtahedzadeh, Stefan Kunaschk, R Mortensen Ernits, D Ricao Canelhas, Manuel Bonilla, **Sören Schwertfeger**, Marco Bonini, Harry Halfar, Kaustubh Pathak, Moritz Rohde, Gualtiero Fantoni, Antonio Bicchi, Andreas Birk, Achim Lilienthal, and Wolfgang Echelmeyer. No more heavy lifting: Robotic solutions to the container unloading problem. *Robotics and Automation Magazine*, 2016. <http://dx.doi.org/10.1109/MRA.2016.2535098> Citations: 0
3. **Schwertfeger, Sören** and Andreas Birk. Map evaluation using matched topology graphs. *Autonomous Robots*, pages 1–27, 2015. <http://dx.doi.org/10.1007/s10514-015-9493-5> Citations: 4
4. Andreas Birk, Burkhard Wiggerich, Heiko Bülow, Max Pflingsthor, and **Sören Schwertfeger**. Safety, security, and rescue missions with an unmanned aerial vehicle (uav): Aerial mosaicking and autonomous flight at the 2009 european land robots trials (elrob) and the 2010 response robot evaluation exercises (rree). *Journal of Intelligent and Robotic Systems*, 64(1):57–76, 2011. <http://dx.doi.org/10.1007/s10846-011-9546-8> Citations: 20
5. Andreas Birk, Kaustubh Pathak, Narunas Vaskevicius, Max Pflingsthor, Jann Poppinga, and **Sören Schwertfeger**. Surface representations for 3d mapping: A case for a paradigm shift. *KI - Kuenstliche Intelligenz*, 24(3):249–254, 2010. <http://dx.doi.org/10.1007/s13218-010-0035-1> Citations: 8
6. Kaustubh Pathak, Andreas Birk, Narunas Vaskevicius, Max Pflingsthor, **Sören Schwertfeger**, and Jann Poppinga. Online 3d slam by registration of large planar surface segments and closed form pose-graph relaxation. *Journal of Field Robotics, Special Issue on 3D Mapping*, 27(1):52–84, 2010. <http://dx.doi.org/10.1002/rob.20322> Citations: 76
7. Andreas Birk, **Sören Schwertfeger**, and Kaustubh Pathak. A networking framework for teleoperation in safety, security, and rescue robotics (ssrr). *IEEE Wireless Communications, Special Issue on Wireless Communications in Networked Robotics*, 6(13):6–13, 2009. <http://dx.doi.org/10.1109/MWC.2009.4804363> Citations: 31
8. Andreas Birk, Narunas Vaskevicius, Kaustubh Pathak, **Sören Schwertfeger**, Jann Poppinga, and Heiko Bülow. 3d perception and modeling: Motion level teleoperation and intelligent autonomous functions. *IEEE Robotics and Automation Magazine (RAM)*, 6(4):53–60, 2009. <http://dx.doi.org/10.1109/MRA.2009.934822> Citations: 24
9. Narunas Vaskevicius, Andreas Birk, Kaustubh Pathak, **Sören Schwertfeger**, and Ravi Rathnam. Efficient representation in 3d environment modeling for planetary robotic exploration. *Advanced Robotics*, 24(8-9):1169–1197, 2010. <http://dx.doi.org/> Citations: 32

PUBLICATIONS · Peer Reviewed Conferences

1. Xiangyang Zhi, and **Sören Schwertfeger**. Simultaneous Hand-Eye Calibration and Reconstruction. Submitted to CVPR 2017
2. Qingwen Xu, and **Sören Schwertfeger**. Comparison and Evaluation of 2D and 3D Range Sensors. Submitted to ICRA 2017
3. Xiangyang Zhi, and **Sören Schwertfeger**. Extended Hand-eye Calibration Using Convex Optimization. Submitted to ICRA 2017
4. **Sören Schwertfeger** and Tianyan Yu. Matching paths in topological maps. In *9th Symposium on Intelligent Autonomous Vehicles (IAV), IFAC*. IFAC, 2016. <http://dx.doi.org/10.1016/j.ifacol.2016.07.736> Citations: 0
5. **Sören Schwertfeger** and Andreas Birk. Using fiducials in 3d map evaluation. In *IEEE International Symposium on Safety, Security, Rescue Robotics (SSRR)*. IEEE Press, 2015. <http://dx.doi.org/10.1109/SSRR.2015.7442997> Citations: 2 **Finalist for the Best Paper Award**

6. **Sören Schwertfeger** and Andreas Birk. Evaluation of map quality by matching and scoring high-level, topological map structures. In *Robotics and Automation (ICRA), 2013 IEEE International Conference on*, 2013. <http://dx.doi.org/10.1109/ICRA.2013.6630876> Citations: 4
7. **Sören Schwertfeger** and Andreas Birk. A short overview of recent advances in map evaluation. In *IEEE International Symposium on Safety, Security, Rescue Robotics (SSRR)*. IEEE Press, 2012. <http://dx.doi.org/10.1109/SSRR.2012.6523906> Citations: 3
8. Adam Jacoff, Raymond Sheh, Ann-Marie Virts, Tetsuya Kimura, Johannes Pellenz, **Sören Schwertfeger**, and Jackrit Suthakorn. Using competitions to advance the development of standard test methods for response robots. In *Proceedings of the Workshop on Performance Metrics for Intelligent Systems*, pages 182–189. ACM, 2012. <http://dx.doi.org/10.1145/2393091.2393126> Citations: 15
9. Raymond Sheh, Adam Jacoff, Ann-Marie Virts, Tetsuya Kimura, Johannes Pellenz, **Sören Schwertfeger**, and Jackrit Suthakorn. Advancing the state of urban search and rescue robotics through the robocuprescue robot league competition. *8th International Conference on Field and Service Robotics*, 2012. http://dx.doi.org/10.1007/978-3-642-40686-7_9 Citations: 18
10. Raymond Sheh, Tetsuya Kimura, Ehsan Mihankhah, Johannes Pellenz, **Sören Schwertfeger**, and Jackrit Suthakorn. The robocuprescue robot league: Guiding robots towards fieldable capabilities. In *Advanced Robotics and its Social Impacts (ARSO), 2011 IEEE Workshop on*, pages 31–34. IEEE, 2011. <http://dx.doi.org/10.1109/ARSO.2011.6301977> Citations: 12
11. **Sören Schwertfeger**, Adam Jacoff, Johannes Pellenz, and Andreas Birk. Using a fiducial map metric for assessing map quality in the context of robocup rescue. In *International Workshop on Safety, Security, and Rescue Robotics (SSRR)*. IEEE Press, 2011. <http://dx.doi.org/10.1109/SSRR.2011.6106762> Citations: 12
12. **Sören Schwertfeger**, Andreas Birk, and Heiko Buelow. Using ifmi spectral registration for video stabilization and motion detection by an unmanned aerial vehicle (uav). In *International Workshop on Safety, Security, and Rescue Robotics (SSRR)*. IEEE Press, 2011. <http://dx.doi.org/10.1109/SSRR.2011.6106770> Citations: 7 **Best Paper Award**
13. Max Pflingsthorn, Andreas Birk, **Sören Schwertfeger**, Heiko Bülow, and Kaustubh Pathak. Maximum likelihood mapping with spectral image registration. In *Robotics and Automation, 2010. ICRA 2010. Proceedings of the 2010 IEEE International Conference on*, 2010. <http://dx.doi.org/10.1109/ROBOT.2010.5509366> Citations: 25
14. **Swertfeger, Sören**, Heio Bülow, and Andreas Birk. On the effects of Sampling Resolution in Improved Fourier Mellin based Registration for Underwater Mapping. In *7th International Symposium on Intelligent Autonomous Vehicles (IAV 2010)*. IFAC, 2010. <http://dx.doi.org/10.3182/20100906-3-IT-2019.00106> Citations: 8
15. **Swertfeger, Sören**, Adam Jacoff, Chris Scrapper, Johannes Pellenz, and Alexander Kleiner. Evaluation of maps using fixed shapes: The fiducial map metric. In *Proceedings of PerMIS*, 2010. <http://dx.doi.org/10.1145/2377576.2377638> Citations: 11
16. Andreas Birk, Burkhard Wiggerich, Heiko Bülow, Max Pflingsthorn, and **Sören Schwertfeger**. Reconnaissance and camp security missions with an unmanned aerial vehicle (uav) at the 2009 european land robots trials (elrob). In *IEEE International Workshop on Safety, Security and Rescue Robotics, SSRR*, November 2009. <http://dx.doi.org/10.1109/SSRR.2009.5424163> Citations: 4
17. Kaustubh Pathak, Narunas Vaskevicius, Jann Poppinga, Max Pflingsthorn, **Sören Schwertfeger**, and Andreas Birk. Fast 3d mapping by matching planes extracted from range sensor point-clouds. In *International Conference on Intelligent Robots and Systems (IROS)*. IEEE Press, 2009. <http://dx.doi.org/10.1109/IROS.2009.5354061> Citations: 51
18. Andreas Birk, **Sören Schwertfeger**, and Kaustubh Pathak. 3d data collection at disaster city at the 2008 nist response robot evaluation exercise (rree). In *International Workshop on Safety, Security, and Rescue Robotics (SSRR)*. IEEE Press, 2009. <http://dx.doi.org/10.1109/SSRR.2009.5424164> Citations: 4
19. Andreas Birk, Burkhard Wiggerich, Heiko Bülow, Max Pflingsthorn, and **Sören Schwertfeger**. Reconnaissance and camp security missions with an unmanned aerial vehicle (uav) at the 2009 european land robots trials (elrob). In *IEEE International Workshop on Safety, Security, and Rescue Robotics (SSRR)*. IEEE Press, 2009. <http://dx.doi.org/10.1109/SSRR.2009.5424163> Citations: 4

20. **Sören Schwertfeger**, Jann Poppinga, and Andreas Birk. Towards object classification using 3d sensor data. In *ECSIS Symposium on Learning and Adaptive Behaviors for Robotic Systems (LAB-RS)*. IEEE, 2008. <http://dx.doi.org/10.1109/LAB-RS.2008.28> Citations: 1
21. Andreas Birk, Kaustubh Pathak, Jann Poppinga, **Sören Schwertfeger**, and Winai Chonnaparamutt. Intelligent behaviors in outdoor environments. In *13th International Conference on Robotics and Applications, Special Session on Outdoor Robotics - Taking Robots off road*. IASTED, 2007. <http://www.actapress.com/PaperInfo.aspx?PaperID=31344&reason=500> Citations: 1
22. Kaustubh Pathak, Andreas Birk, Jann Poppinga, and **Schwertfeger, Sören**. 3d forward sensor modeling and application to occupancy grid based sensor fusion. In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, San Diego, Nov 2007. <http://dx.doi.org/10.1109/IROS.2007.4399406> Citations: 44
23. Jann Poppinga, Max Pfingsthorn, **Sören Schwertfeger**, Kaustubh Pathak, and Andreas Birk. Optimized octtree datastructure and access methods for 3d mapping. In *IEEE Safety, Security, and Rescue Robotics (SSRR)*. IEEE Press, 2007. <http://dx.doi.org/10.1109/SSRR.2007.4381275> Citations: 10
24. Diana Albu, Andreas Birk, Petar Dobrev, Farah Gammoh, Andrei Giurgiu, Sergiu-Cristian Mihut, Bogdan Minzu, Razvan Pascanu, **Schwertfeger, Sören***, Alexandru Stan, and Stefan Videv. Fast prototyping of an autonomous underwater vehicle (auv) with the cubesystem. In *6th International Symposium on Intelligent Autonomous Vehicles (IAV 2007)*. IFAC, 2007. <http://dx.doi.org/10.3182/20070903-3-FR-2921.00016> Citations: 0
25. Kaustubh Pathak, Andreas Birk, **Sören Schwertfeger**, Ivan Delchev, and Stefan Markov. Fully autonomous operations of a jacobs rugbot in the robocup rescue robot league 2006. In *International Workshop on Safety, Security, and Rescue Robotics (SSRR)*. IEEE Press, 2007. <http://dx.doi.org/10.1109/SSRR.2007.4381267> Citations: 6
26. Andreas Birk, Kaustubh Pathak, **Sören Schwertfeger**, and Winai Chonnaparamutt. The iub rugbot: an intelligent, rugged mobile robot for search and rescue operations. In *IEEE International Workshop on Safety, Security, and Rescue Robotics (SSRR)*. IEEE Press, 2006. <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.72.8908&rank=1> Citations: 55

PUBLICATIONS · Other

1. Sören Schwertfeger. Robotic mapping in the real world: Performance evaluation and system integration. Master's thesis, Department of Electrical Engineering and Computer Science, Jacobs University Bremen, 2012. <http://d-nb.info/1035268981/34> Citations: 5
2. Sören Schwertfeger. Fine-grained qualitative spatial reasoning about point positions., 2005. <http://s-schwertfeger.eu/FSPP.pdf> Diploma Thesis Citations: 1
3. Ioana Varsadan, Andreas Birk, Max Pfingsthorn, **Sören Schwertfeger**, and Kaustubh Pathak. The jacobs map analysis toolkit. *Workshop on experimental methodology and benchmarking in robotics research (RSS 2008)*, 2008. http://www.heeronrobots.com/EuronGEMSig/downloads/Zurich/AbstractRESCUE_RSS08_MapQuality_Abstract.pdf Citations: 3
4. Andreas Birk, Kaustubh Pathak, Jann Poppinga, **Sören Schwertfeger**, Max Pfingsthorn, and Heiko Bülow. The jacobs test arena for safety, security, and rescue robotics (ssrr). In *Workshop on Performance Evaluation and Benchmarking for Intelligent Robots and Systems, International Conference on Intelligent Robots and Systems (IROS)*. IEEE Press, 2007. <https://www.researchgate.net/publication/263258287> Citations: 2