

Cyrill Stachniss

PROFESSOR · PHOTOGRAMMETRY & ROBOTICS

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Research Interests

Main areas Probabilistic robotics; photogrammetry; perception and state estimation; simultaneous localization and mapping; navigation; scene interpretation;

Applications autonomous cars; agriculture robotics; service robotics

Education

Habilitation and venia legendi in computer science

HABILITATION THESIS: *Spatial Modeling and Robot Navigation*; REVIEWER: W. BURGARD, N. ROY

University of Freiburg

11/2009

Dr. rer. nat. (Ph.D.) in Computer Science – *summa cum laude*

PH.D. THESIS: *Exploration and Mapping with Mobile Robots*; REVIEWER: W. BURGARD, D. FOX

University of Freiburg

04/2006

Diplom (M.Sc.) in Computer Science – *summa cum laude*

THESIS: *Goal-directed Obstacle Avoidance for Mobile Robots in Dynamic Environments*; REVIEWER: W. BURGARD, B. NEBEL

University of Freiburg

08/2002

Vordiplom in Computer Science & Physics

DEGREE IN COMPUTER SCIENCE: 03/200; DEGREE IN PHYSICS: 11/1999

University of Marburg

1999/2000

Academic Positions

Full professor (W3) and head of the Photogrammetry & Robotics Lab

PHOTOGRAMMETRY & ROBOTICS LAB, INSTITUTE OF GEODESY AND GEOINFORMATION, UNIVERSITY OF BONN

University of Bonn

04/2014 - PRESENT

Lecturer (Privatdozent und Akademischer Rat, A13)

LAB FOR AUTONOMOUS INTELLIGENT SYSTEMS, DEPARTMENT OF COMPUTER SCIENCE, UNIVERSITY OF FREIBURG

University of Freiburg

10/2010-03/2014

Deputy professorship (Lehrstuhlvertretung, W3)

LAB FOR AUTONOMOUS INTELLIGENT SYSTEMS, DEPARTMENT OF COMPUTER SCIENCE, UNIVERSITY OF FREIBURG

University of Freiburg

10/2009-09/2010

Guest lecturer

DIPARTIMENTO INFORMÁTICA E INGENIERÍA DE SISTEMAS, UNIVERSITY OF ZARAGOZA

University of Zaragoza

Spring 2009

Akademischer Rat (A13)

LAB FOR AUTONOMOUS INTELLIGENT SYSTEMS, DEPARTMENT OF COMPUTER SCIENCE, UNIVERSITY OF FREIBURG

University of Freiburg

10/2007-09/2009

Postdoc (E13)

LAB FOR AUTONOMOUS INTELLIGENT SYSTEMS, DEPARTMENT OF COMPUTER SCIENCE, UNIVERSITY OF FREIBURG

University of Freiburg

10/2007-09/2009

Senior researcher

AUTONOMOUS SYSTEMS LAB, DEP. OF MECHANICAL AND PROCESS ENGINEERING, ETH ZURICH

University of Freiburg

05/2006-10/2006

Ph.D. student and research associate (E13)

LAB FOR AUTONOMOUS INTELLIGENT SYSTEMS, DEPARTMENT OF COMPUTER SCIENCE, UNIVERSITY OF FREIBURG

University of Freiburg

12/2002-04/2006

Citation Indices

h-index: 53 · **i10-index: 151** · **Number of citations: 15,485** · all indices determined using “Google Scholar” on Mar 10

Honors & Awards

Best Demo Award of the ICRA 2018 Workshop on Multimodal Robot Perception: Perception, Inference, and Learning for Joint Semantic, Geometric, and Physical Understanding

2018

Finalist – ICRA 2018 Best Service Paper for *Real-Time Semantic Segmentation of Crop and Weed for Precision Agriculture Robots Leveraging Background Knowledge in CNN*

2018

Finalist – IROS 2017 Best Application Paper for *Semi-Supervised Online Visual Crop and Weed Classification in Precision Farming Exploiting Plant Arrangement*

2017

ICRA 2017 Best Automation Paper for <i>UAV-Based Crop and Weed Classification for Smart Farming</i>	2017
Finalist – ICRA 2015 Best Service Robotics Paper for <i>Robot, Organize my Shelves! Tidying up Objects by Predicting User Preferences</i>	2015
Faculty Teaching Award (Fakultätslehrpreis) for the lecture <i>Robot Mapping</i> taught in winter term 2012/13	2013
IEEE RAS Early Career Award for my contributions to mobile robot exploration and SLAM	2013
ICRA 2013 Best Associate Editor Award	2013
Finalist – ICRA 2013 Best Student Paper for <i>Robust Map Optimization Using Dynamic Covariance Scaling</i>	2013
Robotics: Science and Systems Early Career Spotlight	2012
Microsoft Research Faculty Fellow	2010
EURON Georges Giralte Award for the best robotics thesis in Europe defended in 2006	2008
Wolfgang-Gentner Award for my Ph.D. thesis <i>Exploration and Mapping with Mobile Robots</i>	2006
Finalist – ICRA 2005 Best Student Paper for <i>Supervised Learning of Places from Range Data using AdaBoost</i>	2005
ICASE-IROS 2004 Best Paper Award on Application for <i>Grid-based FastSLAM and Exploration with Active Loop Closing</i>	2005
Förderpreis des Vereins Deutscher Ingenieure (VDI) for my Master's thesis	2003

Research Projects

Research Project Coordination Activities

Spokesperson of the DFG Cluster of Excellence EXC 2070 PhenoRob	2019-2025
Spokesperson of the DFG Research Unit FOR 1505 Mapping on Demand	2015-2019
Coordinator of the EC funded FP7 project ROVINA	2013-2016
Vice-Coordinator of the EC funded FP7 project EUROPA2	2013-2014
Vorstandsmitglied (member of the board of directors) of the SFB-TR 8 “Spatial Cognition”	2013-2014
Vice-Coordinator and scientific project manager of the FP7 project First-MM	2010-2013
Vice-Coordinator and scientific project manager of the FP7 project EUROPA	2009-2012

Principal Investigator of Funded Research Projects

DFG Cluster of Excellence EXC 2070 PhenoRob – Robotics and Phenotyping for Sustainable Crop Production Spokesperson and principal investigator, funded by the DFG.	2019-2025
Determining Plant Performance Indicators with Agricultural Robots Principal investigator, funded by the Robert Bosch GmbH.	2019-2020
Exploration for Micro Aerial Vehicles , project within the Research Unit FOR 1505 “Mapping on Demand” Principal investigator, funded by the DFG.	2016-2019
Incremental Mapping from Image Sequences , project within the Research Unit FOR 1505 “Mapping on Demand” Principal investigator, funded by the DFG.	2015-2018
Robust Direct Georeferencing of Lightweight UAV , project within the Research Unit FOR 1505 “Mapping on Demand” 2nd principal investigator, funded by the DFG.	2015-2018
Flourish – Aerial Data Collection and Analysis, and Automated Ground Intervention for Precision Farming Principal investigator, funded by the European Commission within H2020.	2015-2018
RobDREAM – Optimising Robote Performance While Dreaming Principal investigator, funded by the European Commission within H2020.	2015-2018
AdvancedEDC – Advanced Intracortical Neural Probes with Electronic Depth Control. Principal investigator, funded by the DFG with in the Cluster of Excellence BrainLinks—BrainTools.	2014-2015
EUROPA2 – European Robotic Pedestrian Assistant 2.0. Vice-coordinator and principal investigator, funded by the European Commission within FP7.	2013-2016
STAMINA – Sustainable and Reliable Robotics for Part Handling in Manufacturing Automation Principal investigator, funded by the European Commission within FP7, participation ended with the move to the University of Bonn in 2014.	2013-2014
ROVINA – Mobile Robots for Exploration, Digital Preservation and Visualization of Archaeological Sites Coordinator and principal investigator, funded by the European Commission within FP7.	2013-2016
Industry project on the automatic evaluation of an obstacle detection systems for cars. Principal investigator, funded by ifm automotive GmbH.	2012

MultiBot – Cooperative Human-Robot Exploration Principal investigator, project within the 3 rd phase of the SFB/TR 8 “Spatial Cognition”, funded by the DFG.	2011-2014
TAPAS – Robotics-enabled Logistics and Assistive Services for the Transformable Factory of the Future Principal investigator, funded by the European Commission within FP7.	2010-2014
First-MM – Flexible Skill Acquisition and Intuitive Robot Tasking for Mobile Manipulation in the Real World Vice-coordinator and principal investigator, funded by the European Commission within FP7.	2009-2013
EUROPA – European Robotic Pedestrian Assistant vice-coordinator and principal investigator, funded by the European Commission within FP7.	2009-2012
Industry project on service robotics in industrial applications principal investigator, funded by MT Robotik AG.	2012
MultiBot – Cooperative Multi-Robot Exploration Principal investigator, project within the 2 nd phase of the SFB/TR 8 “Spatial Cognition”, funded by the DFG.	2007-2010
RAWSEEDS – Robotics Advancements through Web-publishing of Sensorial and Elaborated Extensive Data Sets principal investigator, funded by the European Commission within FP7.	2007-2009
Industry project on navigation and service robotics Principal investigator, funded by Toyota Europe.	2007-2009
Industry project on robust simultaneous localization and mapping Principal investigator, funded by Toyota Europe.	2006

Co-Founded Companies

Pheno-Inspect GmbH located in Oberhausen, Germany	2020
Escarda Technologies GmbH located in Berlin, Germany	2019
DeepUp GmbH / DeepUp Beteiligungs UG located in Bonn, Germany	2019

Teaching

Photogrammetry I – University of Bonn, BSc, lecture, 5 h/week, summer term	since 2014
Photogrammetry II – University of Bonn, BSc, lecture, 3 h/week, winter term	since 2014
Photogrammetry and Remote Sensing – University of Bonn, MSc, lecture, 3 h/week, winter term	since 2014
Mobile Sensing and Robotics I – University of Bonn, MSc, lecture, 3 h/week, winter term	since 2017
Mobile Sensing and Robotics II – University of Bonn, MSc, inverted class room lecture, 3 h/week, summer term	since 2017
Modern C++ for Computer Vision – University of Bonn, MSc, lecture & project, 4 h/week	since 2015
Robot Programming using ROS – University of Bonn, MSc, lecture & project, 4 h/week	since 2016
Mobile Sensing and Robotics Project – University of Bonn, master project, MSc, every term	since 2018
Mobile Mapping with Multi-Sensor Systems Project – University of Bonn, master project, MSc every term	2015-2017
3D Mapping – University of Bonn, MSc, lecture & project, 4 h/week	2016-2017
Several small lectures & practical courses – University of Bonn	since 2014
Robot Mapping – University of Freiburg, MSc, lecture, 4 h/week, winter term	2012-2013
Introduction to Mobile Robotics – University of Freiburg, MSc, lecture, 4 h/week, shared teaching, summer term	2007-2013
Mobile Robotics/Robotics II – University of Freiburg, MSc, lecture, 4 h/week, shared teaching, winter term	2010-2012
Introduction to CS – University of Freiburg, BSc, lecture, 4 h/week, partially shared teaching, summer term	2007-2013
Several practical courses and seminars – University of Freiburg	2007-2013

External Ph.D. Committee Memberships

ETH Zurich , Switzerland	2018, 2019
University of Lincoln , UK	2019
La Sapienza University of Rome , Italy	2017, 2019
Queensland University of Technology , Australia	2014, 2018
University of Freiburg , Germany	2014-2017
University of Hannover , Germany	2016
University of Oxford , UK	2014
KTH Stockholm , Sweden	2012
University of Sydney , Australia	2011
Polytechnic University of Catalonia , Barcelona, Spain	2011

Invited Talks

Plenary and Keynote Talks

BMVA Technical Meeting – Keynote speech at the BMVA Technical Meeting, London, UK	07/2018
ISPRS Congress – Keynote speech at the XXIII ISPRS Congress, Prague, CZ	07/2016
IAS – Plenary talk at the Int. Conf. on Intelligent Autonomous Systems, Padua, IT	07/2014

Other Invited Talks (since 2009)

GeoDIALOG, Bonn, DE	12/2019
University of Lincoln, CS Seminar, Lincoln, UK	12/2019
Forschungsklausur der Universität Bonn, DE	12/2019
Symposium Bioeconomy Science Center, Cologne, DE	11/2019
DFG Rundgespräch Landwirtschaft, Berlin, DE	09/2019
TU Dresden, Geodetic Colloquium, Dresden, DE	07/2019
University of Bonn Sommerfest, Bonn, DE	06/2019
Pontifical Academy of Sciences and of Social Sciences (PAS/PASS), Vatican, VI	05/2019
Forschungszentrum Jülich, IBG-2 Seminar, Jülich, DE	04/2019
UnRAVel GRK Workshop of RWTH Aachen, DE	02/2019
University Club Bonn, Bonn, DE	01/2019
Berlin Industrial Group, Berlin, DE	01/2019
ICRA 2018 workshop on long-term autonomy and deployment of intelligent robots in the real world, Brisbane, AUS	08/2015
Postbank “Digi-Talk” Series, Bonn, DE	04/2018
Universitätsgesellschaft Bonn, DE	04/2018
Core-to-Core Intl. Symposium “3D Lab-Exchange Program”, Bonn, DE	03/2018
University of Pisa, IT	10/2017
25 Jahre ZALF, Müncheberg, DE	07/2017
DVW Seminar Vermessung mit unbemannten Flugsystemen, Bonn, DE	02/2016
Tag der Geodäsie 2015 (Geodesy Day 2015), Bonn, DE	05/2015
DVW Seminar on Multi-Sensor-Systems, Hamburg, DE	09/2014
Abschlusskolloquium SFB/TR-8 Spatial Cognition, Bremen, DE	09/2014
Tag der Geodäsie 2014 (Geodesy Day 2014), Bonn, DE	05/2014
University of Stuttgart, DE	02/2014
KUKA Tec Camp, Augsburg, DE	02/2014
Forum für Mathematik und Naturwissenschaften, Freiburg, DE	05/2013
Meeting of the German National Academy of Sciences Leopoldina, Section 2, DE	02/2013
Technical University of Cottbus, DE	02/2013
Radboud University Nijmegen, NL	02/2013
RUniversity of Bonn, NL	01/2013
Robotics: Science and Systems Early Carrer Spotlight, Sydney, AUS	07/2012
RSS Workshop on Stochastic Motion Planning, Sydney, AUS	07/2012
University of Stuttgart, DE	11/2011
University of Amsterdam, NL	10/2011
DGR-Tage 2011, Karlsruhe, DE	10/2011
Georgia Tech, Atlanta, GA, USA	09/2011
Int. Symposium on Robotics Research (ISRR), Flagstaff, AZ, USA	07/2011
University of Stuttgart, DE	05/2011
Università La Sapienza, Rome, IT	03/2011
PAIL Seminar, Stanford University, Palo Alto, CA	10/2010
Microsoft Research, Redmond, WA	04/2010
USC Distinguished Lecture Day of Robotics, USC, Los Angeles, CA, US	03/2010
Technical University of Munich, DE	04/2009
University of Oxford, UK	03/2009

Services for Journals

Editorial Activities

Senior Editor for the IEEE Robotics and Automation Letters (RA-L)	2015-2019
Supervising Editor for Special Issue on Precision Agricultural Robotics and Autonomous Farming Technologies of the IEEE Robotics and Automation Letters	2018
Guest Editor for the Journal of Field Robotics for the special issue on Agricultural Robotics	2018/2019
Associate Editor for the IEEE Transactions on Robotics (T-RO)	2008-2013
Guest Editor for the Journal of Field Robotics for the special issue on Visual Mapping and Navigation Outdoors	2009/2010

Reviewing

Ad Hoc Networks, 2011; Annals of Mathematics and Artificial Intelligence, 2007, 2013; Artificial Intelligence, 2013; Autonomous Robots, 2004-2008, 2010, 2011, 2014; IEEE Transactions on Autonomous Mental Development, 2012; IEEE Transactions on Mechatronics, 2012; IEEE Transactions on Robotics, 2004-2015; IEEE Transactions on Systems, Man, and Cybernetics, 2010; IEEE Sensors Journal, 2010; Int. Journal on Robotics Research, 2006, 2008, 2009, 2011-2016; Int. Journal of Pattern Recognition and Artificial Intelligence, 2007; ISPRS Journal of Photogrammetry and Remote Sensing, 2014, 2016; Journal of Artificial Intelligence Research, 2008; Journal of Geodesy, 2015; Journal of Field Robotics, 2007-2010; Robots and Autonomous Systems, 2005-2015, 2018; RSJ Advanced Robotics, 2005, 2010;

Services for Conferences

Chair Duties

General Chair Int. Conf. on Unmanned Aerial Vehicles in Geomatics (UAVg)	2017
Program Chair Int. Conf. on Unmanned Aerial Vehicles in Geomatics (UAVg)	2017
Program Chair Spatial Cognition (SC)	2012
Area Chair Robotics: Science and Systems (RSS)	2010, 2012
Area Chair Int. Joint Conf. on Artificial Intelligence (IJCAI)	2013
Associate Editor IEEE Int. Conf. on Robotics & Automation (ICRA)	2009-2015
Associate Editor IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)	2011-2017, 2020
Senior Programm Committee Int. Joint Conf. on Artificial Intelligence (IJCAI)	2017
Workshop Chair , Robotics: Science and Systems (RSS)	2011
Publicity Chair , Spatial Cognition (SC)	2012
Publicity Chair , Robotics: Science and Systems (RSS)	2007
Publication Chair , Robotics: Science and Systems (RSS)	2007
Local Arrangement Chair , Int. Conf. on Unmanned Aerial Vehicles in Geomatics (UAVg)	2017

Program Committee Memberships

AAAI 2006; AMAS 2008; ECAI 2012; ECMR, since 2007, biannual; IAS 2012; ICAR 2007-2009; INCINCO 2008; KI 2011; ROBOCOM 2007; RSS 2005-2015, 2020; SAC 2008, 2009; SC 2012, 2014;

Reviewing

AAAI 2005, 2006; CogSci 2013; CVPR 2015; ECMR, since 2003, biannual; FSR 2007; GCPR 2018; HRI 2014; IAS 2008; IAV 2004, 2007; ICAR 2005, 2007; ICCV 2015; ICRA, since 2003; ICSR 2011; IJCAI 2003, 2005, 2007, 2017; IROS, since 2002; LCN 2006; MICAI 2005; RSS, 2005-2015, 2020; Robotik 2004, 2006; SC 2004, 2006, 2008;

Workshop/Symposia Organization

ICRA Workshop on “Robotic Vision and Action in Agriculture: the future of agri-food systems and its deployment to the real-world”	2018
ICRA Workshop on “What Sucks in Robotics and How to Fix It - Lessons Learned from Building Complex Systems”	2014
ICRA Workshop on “Robotic Vision and Action in Agriculture: the future of agri-food systems and its deployment to the real-world”	2018
FAIM Workshop on Cognitive Technical Systems	2014
RSS Workshop on Robotic Exploration, Monitoring, and Information Collection	2013
ICRA Workshop on Visual Mapping and Navigation in Outdoor Environments	2009

Other Reviewing Activities

Professors – External Member of or Reviewer for Prof. Recruitment Committees (4x, blind)	2016/18/19/20
DFG – Deutsche Forschungsgemeinschaft, SFBs	2019
DFG – Deutsche Forschungsgemeinschaft, SPPs	2018
DFG – Deutsche Forschungsgemeinschaft, Sachbeihilfen	2014/16/18/19
ESPRC – Engineering, and Physical Sciences Research Council	2018
FRQ – Les Fonds de recherche du Québec, FRQNT Program	2017
NRFSA – National Research Foundation South Africa	2016
BSF – U.S.-Israel Binational Science Foundation	2015
AvH – Alexander von Humboldt Foundation, Professorships	2014/15
NWO – Netherlands Organisation for Scientific Research	2010/13
Microsoft – MS Research Faculty Fellowships	2011
Springer – STAR series books	2010

Publication List

Peer-Reviewed Journal/Magazine Articles

- [1] X. Wu, S. Aravecchia, P. Lottes, C. Stachniss, and C. Pradalier. Robotic weed control using automated weed and crop classification. *Journal of Field Robotics*, 37:322–340, 2020.
- [2] P. Lottes, J. Behley, N. Chebrolu, A. Milioto, and C. Stachniss. Robust joint stem detection and crop-weed classification using image sequences for plant-specific treatment in precision farming. *Journal of Field Robotics*, 37:20–34, 2020.
- [3] O. Vysotska and C. Stachniss. Effective Visual Place Recognition Using Multi-Sequence Maps. *IEEE Robotics and Automation Letters (RA-L)*, 4:1730–1736, 2019.
- [4] I. Sa, M. Popovic, R. Khanna, Z. Chen, P. Lottes, F. Liebis, J. Nieto, C. Stachniss, and R. Siegwart. Weedmap: A large-scale semantic weed mapping framework using aerial multispectral imaging and deep neural network for precision farming. *Remote Sensing*, 10, 2018.
- [5] N. Chebrolu, T. Laebe, and C. Stachniss. Robust Long-Term Registration of UAV Images of Crop Fields for Precision Agriculture. *IEEE Robotics and Automation Letters (RA-L)*, 2018.
- [6] P. Lottes, J. Behley, A. Milioto, and C. Stachniss. Fully convolutional networks with sequential information for robust crop and weed detection in precision farming. *IEEE Robotics and Automation Letters (RA-L)*, 3:3097–3104, 2018.
- [7] T. Naseer, W. Burgard, and C. Stachniss. Robust visual localization across seasons. *IEEE Trans. on Robotics (TRO)*, pages 1–14, 2018.
- [8] E. Palazzolo and C. Stachniss. Effective Exploration for MAVs Based on the Expected Information Gain. *Drones*, 2(1), 2018.
- [9] J. Jung, C. Stachniss, S. Ju, and J. Heo. Automated 3d volumetric reconstruction of multiple-room building interiors for as-built bim. *Advanced Engineering Informatics*, 38:811–825, 2018.
- [10] L. Nardi and C. Stachniss. User preferred behaviors for robot navigation exploiting previous experiences. In *Journal on Robotics and Autonomous Systems (RAS)*, 2017.
- [11] N. Chebrolu, P. Lottes, A. Schaefer, W. Winterhalter, W. Burgard, and C. Stachniss. Agricultural robot dataset for plant classification, localization and mapping on sugar beet fields. *The Int. Journal of Robotics Research (IJRR)*, 2017.
- [12] J. Jung, C. Stachniss, and C. Kim. Automatic room segmentation of 3d laser data using morphological processing. *ISPRS International Journal of Geo-Information*, 2017.
- [13] I. Bogoslavskyi and C. Stachniss. Efficient online segmentation for sparse 3d laser scans. *PFG – Journal of Photogrammetry, Remote Sensing and Geoinformation Science*, pages 41–52, 2017.
- [14] O. Vysotska and C. Stachniss. Improving slam by exploiting building information from publicly available maps and localization priors. *PFG – Journal of Photogrammetry, Remote Sensing and Geoinformation Science*, 85(1):53–65, 2017.
- [15] C. Merfels and C. Stachniss. Sensor fusion for self-localisation of automated vehicles. *PFG – Journal of Photogrammetry, Remote Sensing and Geoinformation Science*, 2017.
- [16] P. Lottes, M. Hoferlin, S. Sanders, and C. Stachniss. Effective vision-based classification for separating sugar beets and weeds for precision farming. *Journal of Field Robotics*, 34(6):1160–1178, 2017.
- [17] N. Abdo, C. Stachniss, L. Spinello, and W. Burgard. Organizing objects by predicting user preferences through collaborative filtering. *The Int. Journal of Robotics Research (IJRR)*, 2016.
- [18] O. Vysotska and C. Stachniss. Lazy data association for image sequences matching under substantial appearance changes. *IEEE Robotics and Automation Letters (RA-L)*, 1(1):213–220, 2016.
- [19] J. Schneider, C. Stachniss, and W. Förstner. On the accuracy of dense fisheye stereo. *IEEE Robotics and Automation Letters (RA-L)*, 1(1):227–234, 2016.

- [20] S. Osswald, M. Bennewitz, W. Burgard, and C. Stachniss. Speeding-up robot exploration by exploiting background information. *IEEE Robotics and Automation Letters (RA-L)*, 2016.
- [21] D. Perea Ström, I. Bogoslavskyi, and C. Stachniss. Robust exploration and homing for autonomous robots. *Journal on Robotics and Autonomous Systems (RAS)*, 2016. In press.
- [22] Ch. Beekmans, J. Schneider, T. Laebe, M. Lennefer, C. Stachniss, and C. Simmer. Cloud photogrammetry with dense stereo for fisheye cameras. *Atmospheric Chemistry and Physics*, 16:14231–14248, 2016.
- [23] Pratik Agarwal, Wolfram Burgard, and Cyrill Stachniss. A survey of geodetic approaches to mapping and the relationship to graph-based slam. *IEEE Robotics & Automation Magazine*, 2014.
- [24] R. Kümmerle, M. Ruhnke, B. Steder, C. Stachniss, and W. Burgard. Autonomous robot navigation in highly populated pedestrian zones. *Journal of Field Robotics*, 2014.
- [25] B. Frank, C. Stachniss, R. Schmedding, M. Teschner, and W. Burgard. Learning object deformation models for robot motion planning. *Journal on Robotics and Autonomous Systems (RAS)*, 2014.
- [26] C. Stachniss and W. Burgard. Particle filters for robot navigation. *Foundations and Trends in Robotics*, 3(4):211–282, 2012. Published 2014.
- [27] W. Burgard and C. Stachniss. Gestatten, Obelix! *Forschung – Das Magazin der Deutschen Forschungsgemeinschaft*, 1, 2013. In German, invited.
- [28] D. Maier, C. Stachniss, and M. Bennewitz. Vision-based humanoid navigation using self-supervised obstacle detection. *The Int. Journal of Humanoid Robotics (IJHR)*, 2013.
- [29] K.M. Wurm, C. Dornhege, B. Nebel, W. Burgard, and C. Stachniss. Coordinating heterogeneous teams of robots using temporal symbolic planning. *Autonomous Robots*, 2013.
- [30] K.M. Wurm, H. Kretzschmar, R. Kümmerle, C. Stachniss, and W. Burgard. Identifying vegetation from laser data in structured outdoor environments. *Journal on Robotics and Autonomous Systems (RAS)*, 2013.
- [31] A. Hornung, K.M. Wurm, M. Bennewitz, C. Stachniss, and W. Burgard. OctoMap: An efficient probabilistic 3d mapping framework based on octrees. *Autonomous Robots*, 34:189–206, 2013.
- [32] H. Kretzschmar and C. Stachniss. Information-theoretic pose graph compression for laser-based SLAM. *The Int. Journal of Robotics Research (IJRR)*, 31:1219–1230, 2012.
- [33] J. Sturm, C. Stachniss, and W. Burgard. A probabilistic framework for learning kinematic models of articulated objects. *Journal on Artificial Intelligence Reserach (JAIR)*, 41:477–526, 2011.
- [34] G. Grisetti, R. Kümmerle, C. Stachniss, and W. Burgard. A tutorial on graph-based SLAM. *IEEE Transactions on Intelligent Transportation Systems Magazine*, 2:31–43, 2010.
- [35] C. Plagemann, C. Stachniss, J. Hess, F. Endres, and N. Franklin. A nonparametric learning approach to range sensing from omnidirectional vision. *Journal on Robotics and Autonomous Systems (RAS)*, 58:762–772, 2010.
- [36] H. Kretzschmar, G. Grisetti, and C. Stachniss. Lifelong map learning for graph-based SLAM in static environments. *KI – Künstliche Intelligenz (German AI Magazine)*, 24:199–206, 2010.
- [37] K.M. Wurm, C. Stachniss, and G. Grisetti. Bridging the gap between feature- and grid-based slam. *Journal on Robotics and Autonomous Systems (RAS)*, 58(2):140 – 148, 2010.
- [38] G. Grisetti, C. Stachniss, and W. Burgard. Non-linear constraint network optimization for efficient map learning. *IEEE Transactions on Intelligent Transportation Systems*, 10(3):428–439, 2009.
- [39] R. Kümmerle, B. Steder, C. Dornhege, M. Ruhnke, G. Grisetti, C. Stachniss, and A. Kleiner. On measuring the accuracy of SLAM algorithms. *Autonomous Robots*, 27:387ff, 2009.
- [40] C. Stachniss, C. Plagemann, and A.J. Lilienthal. Gas distribution modeling using sparse gaussian process mixtures. *Autonomous Robots*, 26:187ff, 2009.
- [41] C. Stachniss, O. Martinez Mozos, and W. Burgard. Efficient exploration of unknown indoor environments using a team of mobile robots. *Annals of Mathematics and Artificial Intelligence*, 52:205ff, 2009.
- [42] B. Steder, G. Grisetti, C. Stachniss, and W. Burgard. Visual SLAM for flying vehicles. *IEEE Trans. on Robotics (TRO)*, 24(8):1088–1093, 2008.
- [43] C. Stachniss, G. Grisetti, O. Martínez-Mozos, and W. Burgard. Efficiently learning metric and topological maps with autonomous service robots. *it – Information Technology*, 49(4):232–238, 2007.
- [44] G. Grisetti, G.D. Tipaldi, C. Stachniss, W. Burgard, and D. Nardi. Fast and accurate SLAM with rao-blackwellized particle filters. *Journal on Robotics and Autonomous Systems (RAS)*, 55(1):30–38, 2007.
- [45] G. Grisetti, C. Stachniss, and W. Burgard. Improved techniques for grid mapping with rao-blackwellized particle filters. *IEEE Trans. on Robotics (TRO)*, 23(1):34–46, 2007.
- [46] D. Sonntag, S. Stachniss-Carp, C. Stachniss, and V. Stachniss. Determination of root canal curvatures before and after canal preparation (part II): A method based on numeric calculus. *Aust Endod J*, 32:16–25, 2006.
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- [3] S. Asadi, M. Reggente, C. Stachniss, C. Plagemann, and A.J. Lilienthal. *Intelligent Systems for Machine Olfaction: Tools and Methodologies*, chapter Statistical Gas Distribution Modelling using Kernel Methods, pages 153–179. IGI Global, 2011.
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- [5] W. Burgard, C. Stachniss, and D. Haehnel. *Autonomous Navigation in Dynamic Environments*, volume 35 of *STAR Springer tracts in advanced robotics*, chapter Mobile Robot Map Learning from Range Data in Dynamic Environments. Springer, 2007.
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