

STEFAN ROTH

Technische Universität Darmstadt
Department of Computer Science
Fraunhoferstr. 5
64283 Darmstadt
Germany

EMAIL: sroth@cs.tu-darmstadt.de
OFFICE PHONE: +49-6151-155668
MOBILE PHONE: (withheld)
FAX: +49-6151-155669
WEB: <http://www.visinf.tu-darmstadt.de/~sroth>

RESEARCH INTERESTS

Computer Vision, Machine Learning Techniques in Computer Vision

CURRENT POSITION

Technische Universität Darmstadt, Department of Computer Science

Darmstadt, Germany

Professor (W3)

since May 2013

Assistant Professor (Juniorprofessor, W1)

Sep. 2007 – May 2013

EDUCATION

Brown University

2001 – 2007

Providence, RI, USA

Ph.D., Computer Science, GPA 4.0/4.0, May 2007

Sc.M. (Masters degree), Computer Science, GPA 4.0/4.0, May 2003

Dissertation: High-Order Markov Random Fields for Low-Level Vision

Advisor: Michael J. Black

University of Mannheim

1996 – 2001

Mannheim, Germany

Diplom, Computer Science and Engineering,

awarded with distinction (“mit Auszeichnung (1,0)”), May 2001

Thesis: Analysis of a Deterministic Annealing Method for Graph Matching
and Quadratic Assignment Problems in Computer Vision

Advisor: Christoph Schnörr

ACADEMIC EXPERIENCE

Research Assistant, Brown University

2004 – 2007

Department of Computer Science

Teaching Assistant, Brown University

Fall 2003

Computer Science 143 – Introduction to Computer Vision

Research Assistant, Brown University

2002 – 2003

Department of Computer Science

Undergraduate Research Assistant, University of Mannheim

1997 – 1998

Department of Mathematics and Computer Science

WORK EXPERIENCE

Internship at Intel Research

Summer 2004

Santa Clara, CA, USA

Internship at Intel Research

Summer 2003

Santa Clara, CA, USA

Internship at Mitsubishi Electric Research Laboratory

Spring 2000

Cambridge, MA, USA

TEACHING EXPERIENCE

Computer Vision I Summer term 2011–2013, Winter term 2014/15
Department of Computer Science, TU Darmstadt

Advanced undergraduate/graduate class that is part of a 2 course introductory sequence in computer vision.

Computer Vision II Winter term 2007/08 – 2012/13, Summer term 2014, 2015
Department of Computer Science, TU Darmstadt

Newly developed advanced undergraduate/graduate class that is part of a 2 course introductory sequence in computer vision.

Machine Learning: Statistical Methods I Summer term 2010, 2009, 2008
Department of Computer Science, TU Darmstadt

Advanced undergraduate/graduate class that is part of a 2 course introductory sequence to statistical methods in machine learning.

Machine Learning: Statistical Methods II Winter term 2011/12–2012/13, 2014/15
Department of Computer Science, TU Darmstadt

Advanced undergraduate/graduate class that is part of a 2 course introductory sequence to statistical methods in machine learning.

Problems in Computer Graphics and Computer Vision Winter term 2010/11
Department of Computer Science, TU Darmstadt

Seminar on current problems in computer graphics and computer vision.

Advanced Topics in Computer Vision and Machine Learning Summer term 2012 – 2015
Department of Computer Science, TU Darmstadt

Seminar on current problems in computer vision and machine learning.

Advanced Topics in Machine Learning Summer term 2015
Department of Computer Science, TU Darmstadt

Seminar on current problems in machine learning.

(Advanced) Visual Computing Laboratory Winter & summer terms
Department of Computer Science, TU Darmstadt

Practical labs on current problems in computer graphics and computer vision.

PUBLICATIONS **Theses**

- [1] S. Roth, “[High-order Markov random fields for low-level vision](#),” Ph.D. Dissertation, Brown University, Department of Computer Science, Providence, Rhode Island, May 2007, **Joukowsky Family Foundation Outstanding Dissertation Award, Nominated for the ACM Doctoral Dissertation Award.**
- [2] —, “[Analysis of a deterministic annealing method for graph matching and quadratic assignment problems in computer vision](#),” Diplom thesis, University of Mannheim, Germany, May 2001.

Peer-Reviewed Journal Papers

- [3] S. R. Richter and S. Roth, “A discriminative approach to perspective shape from shading in uncalibrated illumination,” *Computers & Graphics*, 2015, to appear.

- [4] U. Schmidt, J. Jancsary, S. Nowozin, S. Roth, and C. Rother, “Cascades of regression tree fields for image restoration,” *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, 2015, to appear.
- [5] C. Vogel, K. Schindler, and S. Roth, “3D scene flow estimation with a piecewise rigid scene model,” *International Journal of Computer Vision (IJCV)*, vol. III, no. 3, 2015, to appear.
- [6] A. Milan, S. Roth, and K. Schindler, “Continuous energy minimization for multi-target tracking,” *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, vol. 36, no. 1, pp. 58–72, Jan. 2014.
- [7] D. Sun, S. Roth, and M. J. Black, “A quantitative analysis of current practices in optical flow estimation and the principles behind them,” *International Journal of Computer Vision (IJCV)*, vol. 106, no. 2, pp. 115–137, Jan. 2014.
- [8] U. Schmidt, J. Jancsary, S. Nowozin, S. Roth, and C. Rother, “Cascades of regression tree fields for image restoration,” *ArXiv:1404.2086*, 2014, accepted to TPAMI.
- [9] C. Wojek, S. Walk, S. Roth, K. Schindler, and B. Schiele, “Monocular visual scene understanding: Understanding multi-object traffic scenes,” *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, vol. 35, no. 4, pp. 882–897, Apr. 2013.
- [10] A. Kuijper, A. Schwarzkopf, T. Kalbe, C. Bajaj, S. Roth, and M. Goesele, “3D anisotropic diffusion on GPUs by closed-form local tensor computations,” *Numerical Mathematics: Theory, Methods and Applications*, vol. 6, no. 1, pp. 72–94, Feb. 2013.
- [11] M. Andriluka, S. Roth, and B. Schiele, “Discriminative appearance models for pictorial structures,” *International Journal of Computer Vision (IJCV)*, vol. 99, no. 3, pp. 259–280, Sep. 2012.
- [12] S. Baker, D. Scharstein, J. Lewis, S. Roth, M. J. Black, and R. Szeliski, “A database and evaluation methodology for optical flow,” *International Journal of Computer Vision (IJCV)*, vol. 92, no. 1, pp. 1–31, Mar. 2011.
- [13] V. Lempitsky, C. Rother, S. Roth, and A. Blake, “Fusion moves for Markov random field optimization,” *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, vol. 32, no. 8, pp. 1392–1405, Aug. 2010.
- [14] S. Roth and M. J. Black, “Fields of experts,” *International Journal of Computer Vision (IJCV)*, vol. 82, no. 2, pp. 205–229, Apr. 2009.
- [15] —, “On the spatial statistics of optical flow,” *International Journal of Computer Vision (IJCV)*, vol. 74, no. 1, pp. 33–50, Aug. 2007.
- [16] C. Schellewald, S. Roth, and C. Schnörr, “Evaluation of a convex relaxation to a quadratic assignment matching approach for relational object views,” *Image and Vision Computing (IVC)*, vol. 25, no. 8, pp. 1301–1314, Aug. 2007.

Peer-Reviewed Conference Papers

- [17] T. Plötz and S. Roth, “Registering images to untextured geometry using average shading gradients,” in *Proc. of the IEEE International Conference on Computer Vision (ICCV)*, to appear, Santiago, Chile, Dec. 2015, **oral presentation**.
- [18] S. Richter and S. Roth, “Discriminative shape from shading in uncalibrated illumination,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Boston, Massachusetts, Jun. 2015, **oral presentation**.
- [19] K. Schelten, S. Nowozin, J. Jancsary, C. Rother, and S. Roth, “Interleaved regression tree field cascades for blind image deconvolution,” in *IEEE Winter Conference on Applications of Computer Vision*, Waikoloa Beach, HI, Jan. 2015, pp. 494–501.

- [20] M. Cordts, L. Schneider, M. Enzweiler, U. Franke, and S. Roth, “Object-level priors for stixel generation,” in *Proc. of the German Conference on Pattern Recognition (GCPR)*, X. Jiang, J. Hornegger, and R. Koch, Eds., ser. LNCS, vol. 8753, Springer, 2014, pp. 172–183, **oral presentation**.
- [21] T. Scharwächter, M. Enzweiler, U. Franke, and S. Roth, “Stixmantics: A medium-level model for real-time semantic scene understanding,” in *Proc. of the European Conference on Computer Vision (ECCV)*, D. Fleet, T. Pajdla, B. Schiele, and T. Tuytelaars, Eds., ser. LNCS, vol. 8693, Springer, 2014, pp. 533–548.
- [22] C. Vogel, S. Roth, and K. Schindler, “View-consistent 3D scene flow estimation over multiple frames,” in *Proc. of the European Conference on Computer Vision (ECCV)*, D. Fleet, T. Pajdla, B. Schiele, and T. Tuytelaars, Eds., ser. LNCS, vol. 8692, Springer, 2014, pp. 263–278.
- [23] K. Schelten and S. Roth, “Localized image blur removal through non-parametric kernel estimation,” in *Proc. of the International Conference on Pattern Recognition (ICPR)*, Stockholm, Sweden, Aug. 2014, pp. 702–707.
- [24] U. Schmidt and S. Roth, “Shrinkage fields for effective image restoration,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Columbus, Ohio, Jun. 2014, pp. 2774–2781, **oral presentation**.
- [25] S. Tang, M. Andriluka, A. Milan, K. Schindler, S. Roth, and B. Schiele, “Learning people detectors for tracking in crowded scenes,” in *Proc. of the IEEE International Conference on Computer Vision (ICCV)*, Sydney, Australia, Dec. 2013, pp. 1049–1056.
- [26] C. Vogel, K. Schindler, and S. Roth, “Piecewise rigid scene flow,” in *Proc. of the IEEE International Conference on Computer Vision (ICCV)*, Sydney, Australia, Dec. 2013, pp. 1377–1384, **oral presentation, Honorable Mention for the Marr Prize**.
- [27] T. Scharwächter, M. Enzweiler, S. Roth, and U. Franke, “Efficient multi-cue scene segmentation,” in *Proc. of the German Conference on Pattern Recognition (GCPR)*, J. Weickert, M. Hein, and B. Schiele, Eds., ser. LNCS, vol. 8142, Springer, 2013, pp. 435–445, **oral presentation, GCPR Main Prize**.
- [28] C. Vogel, K. Schindler, and S. Roth, “An evaluation of data costs for optical flow,” in *Proc. of the German Conference on Pattern Recognition (GCPR)*, J. Weickert, M. Hein, and B. Schiele, Eds., ser. LNCS, vol. 8142, Springer, 2013, pp. 343–353, **oral presentation**.
- [29] A. Milan, S. Roth, and K. Schindler, “Detection- and trajectory-level exclusion in multiple object tracking,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Portland, Oregon, Jun. 2013, pp. 3682–3689.
- [30] U. Schmidt, C. Rother, S. Nowozin, J. Jancsary, and S. Roth, “Discriminative non-blind deblurring,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Portland, Oregon, Jun. 2013, pp. 604–611, **oral presentation, Best Student Paper Award**.
- [31] C. Dann, P. Gehler, S. Roth, and S. Nowozin, “Pottics – The Potts topic model for semantic image segmentation,” in *Proc. of the 34th DAGM-Symposium*, A. Pinz, T. Pock, H. Bischof, and F. Leberl, Eds., ser. LNCS, vol. 7476, Springer, 2012, pp. 397–407.
- [32] T. Franzel, U. Schmidt, and S. Roth, “Object detection in multi-view x-ray images,” in *Proc. of the 34th DAGM-Symposium*, A. Pinz, T. Pock, H. Bischof, and F. Leberl, Eds., ser. LNCS, vol. 7476, Springer, 2012, pp. 144–154, **oral presentation**.
- [33] Q. Gao and S. Roth, “How well do filter-based MRFs model natural images?” In *Proc. of the 34th DAGM-Symposium*, A. Pinz, T. Pock, H. Bischof, and F. Leberl, Eds., ser. LNCS, vol. 7476, Springer, 2012, pp. 62–72, **oral presentation, DAGM Prize**.

- [34] K. Schelten and S. Roth, “Mean field for continuous high-order MRFs,” in *Proc. of the 34th DAGM-Symposium*, A. Pinz, T. Pock, H. Bischof, and F. Leberl, Eds., ser. LNCS, vol. 7476, Springer, 2012, pp. 52–61, **oral presentation**.
- [35] A. Andriyenko, K. Schindler, and S. Roth, “Discrete-continuous optimization for multi-target tracking,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Providence, Rhode Island, Jun. 2012, pp. 1926–1933.
- [36] U. Schmidt and S. Roth, “Learning rotation-aware features: From invariant priors to equivariant descriptors,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Providence, Rhode Island, Jun. 2012, pp. 2050–2057, **oral presentation**.
- [37] C. Vogel, S. Roth, and K. Schindler, “3D scene flow estimation with a rigid motion prior,” in *Proc. of the IEEE International Conference on Computer Vision (ICCV)*, Barcelona, Spain, Nov. 2011, pp. 1291–1298.
- [38] K. Schelten and S. Roth, “Connecting non-quadratic variational models and MRFs,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Colorado Springs, Colorado, Jun. 2011, pp. 2641–2648.
- [39] U. Schmidt, K. Schelten, and S. Roth, “Bayesian deblurring with integrated noise estimation,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Colorado Springs, Colorado, Jun. 2011, pp. 2625–2632.
- [40] C. Wojek, S. Walk, S. Roth, and B. Schiele, “Monocular 3D scene understanding with explicit occlusion reasoning,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Colorado Springs, Colorado, Jun. 2011, pp. 1993–2000.
- [41] C. Wojek, S. Roth, K. Schindler, and B. Schiele, “Monocular 3D scene modeling and inference: Understanding multi-object traffic scenes,” in *Proc. of the European Conference on Computer Vision (ECCV)*, K. Daniilidis, P. Maragos, and N. Paragios, Eds., ser. LNCS, vol. 6314, Springer, 2010, pp. 467–481, **oral presentation**.
- [42] M. Andriluka, P. Schnitzspan, J. Meyer, S. Kohlbrecher, K. Petersen, O. von Stryk, S. Roth, and B. Schiele, “Vision based victim detection from unmanned aerial vehicles,” in *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Taipei, Taiwan, Oct. 2010, pp. 1740–1747, **oral presentation**.
- [43] M. Andriluka, S. Roth, and B. Schiele, “Monocular 3D pose estimation and tracking by detection,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, San Francisco, California, Jun. 2010, pp. 623–630, **oral presentation**.
- [44] U. Schmidt, Q. Gao, and S. Roth, “A generative perspective on MRFs in low-level vision,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, San Francisco, California, Jun. 2010, pp. 1751–1758, **oral presentation**.
- [45] P. Schnitzspan, S. Roth, and B. Schiele, “Automatic discovery of meaningful object parts with latent CRFs,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, San Francisco, California, Jun. 2010, pp. 121–128.
- [46] D. Sun, S. Roth, and M. J. Black, “Secrets of optical flow estimation and their principles,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, San Francisco, California, Jun. 2010, pp. 2432–2439.
- [47] J. Meyer, P. Schnitzspan, S. Kohlbrecher, K. Petersen, M. Andriluka, O. Schwahn, U. Klingauf, S. Roth, B. Schiele, and O. von Stryk, “A semantic world model for urban search and rescue based on heterogeneous sensors,” in *RoboCup 2010: Robot Soccer World Cup XIV*, J. Ruiz-del-Solar, E. Chown, and P. G. Plöger, Eds., ser. LNCS, vol. 6556, Springer, 2010, pp. 180–193, **oral presentation**.

- [48] M. Andriluka, S. Roth, and B. Schiele, “Pictorial structures revisited: People detection and articulated pose estimation,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Miami, Florida, Jun. 2009, pp. 1014–1021, **oral presentation**.
- [49] P. Schnitzspan, M. Fritz, S. Roth, and B. Schiele, “Discriminative structure learning of hierarchical representations for object detection,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Miami, Florida, Jun. 2009, pp. 2238–2245.
- [50] D. Sun, S. Roth, J. P. Lewis, and M. J. Black, “Learning optical flow,” in *Proc. of the European Conference on Computer Vision (ECCV)*, D. Forsyth, P. Torr, and A. Zisserman, Eds., ser. LNCS, vol. 5304, Springer, 2008, pp. 83–97, **oral presentation**.
- [51] M. Andriluka, S. Roth, and B. Schiele, “People-tracking-by-detection and people-detection-by-tracking,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Anchorage, Alaska, Jun. 2008, **oral presentation**.
- [52] V. Lempitsky, S. Roth, and C. Rother, “FusionFlow: Discrete-continuous optimization for optical flow estimation,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Anchorage, Alaska, Jun. 2008.
- [53] S. Baker, D. Scharstein, J. Lewis, S. Roth, M. J. Black, and R. Szeliski, “A database and evaluation methodology for optical flow,” in *Proc. of the IEEE International Conference on Computer Vision (ICCV)*, Rio de Janeiro, Brazil, Oct. 2007.
- [54] S. Roth and M. J. Black, “Steerable random fields,” in *Proc. of the IEEE International Conference on Computer Vision (ICCV)*, Rio de Janeiro, Brazil, Oct. 2007, **oral presentation**.
- [55] T. M. Moldovan, S. Roth, and M. J. Black, “Denoising archival films using a learned Bayesian model,” in *Proc. of the IEEE International Conference on Image Processing (ICIP)*, Atlanta, Georgia, Oct. 2006, pp. 2641–2644.
- [56] S. Roth and M. J. Black, “Specular flow and the recovery of surface structure,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, vol. 2, New York, New York, Jun. 2006, pp. 1869–1876.
- [57] X. Lan, S. Roth, D. P. Huttenlocher, and M. J. Black, “Efficient belief propagation with learned higher-order Markov random fields,” in *Proc. of the European Conference on Computer Vision (ECCV)*, A. Leonardis, H. Bischof, and A. Pinz, Eds., ser. LNCS, vol. 3952, Springer, 2006, pp. 269–282.
- [58] F. Wood, S. Roth, and M. J. Black, “Modeling neural population spiking activity with Gibbs distributions,” in *Advances in Neural Information Processing Systems (NIPS)*, Y. Weiss, B. Schölkopf, and J. Platt, Eds., vol. 18, 2006, pp. 1539–1546.
- [59] S. Roth and M. J. Black, “On the spatial statistics of optical flow,” in *Proc. of the IEEE International Conference on Computer Vision (ICCV)*, vol. 1, Beijing, China, Oct. 2005, pp. 42–49, **oral presentation, Honorable Mention for the Marr Prize**.
- [60] ———, “Fields of experts: A framework for learning image priors,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, vol. 2, San Diego, California, Jun. 2005, pp. 860–867, **oral presentation**.
- [61] S. Roth, L. Sigal, and M. J. Black, “Gibbs likelihoods for Bayesian tracking,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, vol. 1, Washington, DC, Jun. 2004, pp. 886–893.
- [62] L. Sigal, S. Bhatia, S. Roth, M. J. Black, and M. Isard, “Tracking loose-limbed people,” in *Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, vol. 1, Washington, DC, Jun. 2004, pp. 421–428.

- [63] C. Schellewald, S. Roth, and C. Schnörr, “Evaluation of convex optimization techniques for the weighted graph-matching problem in computer vision,” in *Proc. of the 23rd DAGM-Symposium*, B. Radig and S. Florczyk, Eds., ser. LNCS, vol. 2191, Springer, 2001, pp. 361–368.
- [64] H.-J. Bender, R. Männer, C. Poliwoda, S. Roth, and M. Walz, “Reconstruction of 3D catheter paths from 2D x-ray projections,” in *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, C. Taylor and A. C. F. Colchester, Eds., ser. LNCS, vol. 1679, Springer, 1999, pp. 981–989.

Peer-Reviewed Workshop Papers

- [65] A. Milan, K. Schindler, S. Roth, and M. Kudo, “Privacy preserving multi-target tracking,” in *Computer Vision - ACCV 2014 Workshops*, C. V. Jawahar and S. Shan, Eds., ser. LNCS, vol. 9010, Springer, 2015, pp. 519–530.
- [66] Q. Gao and S. Roth, “Texture synthesis: From convolutional RBMs to efficient deterministic algorithms,” in *IAPR Joint International Workshops on Statistical Techniques in Pattern Recognition and Structural and Syntactic Pattern Recognition*, P. Fränti, G. Brown, M. Loog, F. Escolano, and M. Pelillo, Eds., ser. Lecture Notes in Computer Science, vol. 8621, Springer, 2014, pp. 434–443.
- [67] A. Milan, K. Schindler, and S. Roth, “Challenges of ground truth evaluation of multi-target tracking,” in *Proc. of the CVPR 2013 Workshop on Ground Truth - What is a good dataset?*, Portland, Oregon, Jun. 2013, pp. 735–742.
- [68] A. Andriyenko, S. Roth, and K. Schindler, “An analytical formulation of global occlusion reasoning for multi-target tracking,” in *11th International IEEE Workshop on Visual Surveillance*, Barcelona, Spain, Nov. 2011, pp. 1839–1846.
- [69] M. Adam, C. Jung, S. Roth, and G. Brunnert, “Real-time stereo-image stitching using GPU-based belief propagation,” in *Proceedings of the Workshop on Vision, Modeling and Visualization*, Braunschweig, Germany, Nov. 2009.
- [70] B. Schiele, M. Andriluka, N. Majer, S. Roth, and C. Wojek, “Visual people detection – Different models, comparison and discussion,” in *Proc. of the ICRA 2009 Workshop on People Detection and Tracking*, K. O. Arras and O. M. Mozos, Eds., invited paper, Kobe, Japan, May 2009.

Books

- [71] M. Goesele, S. Roth, A. Kuijper, B. Schiele, and K. Schindler, Eds., *Pattern Recognition, Proceedings of the 32nd DAGM Symposium*, vol. 6376, ser. LNCS, Springer, 2010.

Book Chapters

- [72] V. Lempitsky, C. Rother, S. Roth, and A. Blake, “Fusion move optimization for MRFs with an extensive label space,” in *Advances in Markov Random Fields for Vision and Image Processing*, A. Blake, P. Kohli, and C. Rother, Eds., MIT Press, 2011, ch. 18.
- [73] S. Roth and M. J. Black, “Steerable random fields for image restoration,” in *Advances in Markov Random Fields for Vision and Image Processing*, A. Blake, P. Kohli, and C. Rother, Eds., MIT Press, 2011, ch. 24.
- [74] ———, “Fields of experts,” in *Advances in Markov Random Fields for Vision and Image Processing*, A. Blake, P. Kohli, and C. Rother, Eds., MIT Press, 2011, ch. 19.
- [75] S. Roth, V. Lempitsky, and C. Rother, “Discrete-continuous optimization for optical flow estimation,” in *Statistical and Geometrical Approaches to Visual Motion Analysis*, ser. LNCS, D. Cremers, B. Rosenhahn, A. L. Yuille, and F. R. Schmidt, Eds., vol. 5604, Springer, 2009, pp. 1–22.

Patents

- [76] G. Othmezouri, I. Sakata, M. Andriluka, S. Roth, and B. Schiele, “Monocular 3d pose estimation and tracking by detection,” patent pending, Jun. 12, 2010, Filed.

Technical Reports

- [77] D. Sun, S. Roth, and M. J. Black, “A quantitative analysis of current practices in optical flow estimation and the principles behind them,” Brown University, Department of Computer Science, Providence, Rhode Island, Tech. Rep. CS-10-03, Jan. 2013.
- [78] S. Baker, D. Scharstein, J. Lewis, S. Roth, M. J. Black, and R. Szeliski, “A database and evaluation methodology for optical flow,” Microsoft Research, Redmond, Washington, Tech. Rep. MSR-TR-2009-179, Dec. 2009.
- [79] V. Lempitsky, C. Rother, S. Roth, and A. Blake, “Fusion moves for Markov random field optimization,” Microsoft Research, Cambridge, UK, Tech. Rep. MSR-TR-2009-60, May 2009.
- [80] T. M. Moldovan, S. Roth, and M. J. Black, “Denoising archival films using a learned Bayesian model,” Brown University, Department of Computer Science, Providence, Rhode Island, Tech. Rep. CS-07-03, Sep. 2007.
- [81] C. Schellewald, S. Roth, and C. Schnörr, “Performance evaluation of a convex relaxation approach to the quadratic assignment of relational object views,” University of Mannheim, Germany, Tech. Rep. TR-2002-02, Feb. 2002.

Refereed Abstracts

- [82] M. Cordts, M. Omran, S. Ramos, T. Scharwächter, M. Enzweiler, R. Benenson, U. Franke, S. Roth, and B. Schiele, *The cityscapes dataset*, CVPR 2015 Workshop on The Future of Datasets in Computer Vision, Abstract, Boston, Massachusetts, Jun. 2015.
- [83] M. J. Black and S. Roth, *On the receptive fields of Markov random fields*, Cosyne, Salt Lake City, Utah, 2005.
- [84] S. Roth, F. Domini, and M. J. Black, “Specular flow and the perception of surface reflectance,” *Journal of Vision*, vol. 3, no. 9, 413a, 2003.

Preprints

- [8] U. Schmidt, J. Jancsary, S. Nowozin, S. Roth, and C. Rother, “Cascades of regression tree fields for image restoration,” *ArXiv:1404.2086*, 2014, accepted to TPAMI.

CITATIONS Total number of citations according to Google Scholar ≥ 6300 . h -index ≥ 30 .

HONORS & AWARDS

Outstanding Reviewer Award 2015
IEEE Conference on Computer Vision and Pattern Recognition (for the best 75 out of 1238 reviewers)

Listed in Germany’s *Top 40 under 40*, category Science 2012 & 2014
Capital Magazine

Outstanding Reviewer Award 2014
IEEE Conference on Computer Vision and Pattern Recognition (for the best 53 reviewers)

Marr Prize (Honorable Mention) 2013
IEEE International Conference on Computer Vision for the paper “Piecewise Rigid Scene Flow” (jointly with C. Vogel and K. Schindler)

<i>GCPR Main Prize</i>	2013
35th German Conference on Pattern Recognition for the paper “Efficient Multi-Cue Image Segmentation” (jointly with T. Scharwächter, M. Enzweiler and U. Franke)	
<i>CVPR 2013 Best Student Paper Award</i>	2013
IEEE Conference on Computer Vision and Pattern Recognition for the paper “Discriminative Non-Blind Deblurring” (jointly with U. Schmidt, C. Rother, S. Nowozin and J. Jancsary)	
<i>DAGM Prize</i>	2012
34th Symposium of the German Association for Pattern Recognition for the paper “How well do filter-based MRFs model natural images?” (jointly with Q. Gao)	
<i>Heinz Maier-Leibnitz-Prize</i>	2012
German Research Foundation (DFG)	
<i>Adolf Messer Prize</i>	2011
Adolf Messer Foundation & Technische Universität Darmstadt	
<i>Olympus Prize</i>	2010
German Association for Pattern Recognition DAGM (for outstanding research achievements by a young researcher)	
<i>Outstanding Reviewer Award</i>	2009
IEEE International Conference on Computer Vision (for the best 31 out of 732 reviewers)	
<i>Outstanding Reviewer Award</i>	2008
European Conference on Computer Vision (for the best 22 out of 455 reviewers)	
<i>Outstanding Reviewer Award</i>	2008
IEEE Conference on Computer Vision and Pattern Recognition (for the best 33 reviewers)	
<i>Nomination for the ACM Doctoral Dissertation Award</i>	2007
<i>Outstanding Reviewer Award</i>	2007
IEEE Conference on Computer Vision and Pattern Recognition (for the best 23 out of more than 900 reviewers)	
<i>Joukowsky Family Foundation Outstanding Dissertation Award</i>	2007
for the best dissertation in the sciences at Brown University in 2007	
<i>Marr Prize (Honorable Mention)</i>	2005
10th IEEE International Conference on Computer Vision for the paper “On the spatial statistics of optical flow” (jointly with Michael J. Black)	
<i>Sigma Xi Outstanding Graduate Student Research Award</i>	2005
<i>Sigma Xi</i> , elected Associate Member	2005
<i>Dean’s Fellowship</i> , Brown University	2001/2002
<i>Fulbright Travel Scholarship</i>	2001 – 2006
German/American Fulbright Association	

GRANTS

<i>Intel Corporation</i> , gift, 2015, \$ 10,000.
<i>European Research Council</i> , ERC Starting Grant “Visual Learning and Inference in Joint Scene Models”, 2013–2018, €1,374,000.
<i>European Union</i> , FP7, FET Open, “Harvesting Dynamic 3D Worlds from Commodity Sensor Clouds”, 2013–2016, €255,400.
<i>Deutsche Forschungsgemeinschaft (DFG)</i> , Heinz Maier-Leibnitz Prize 2012, €16,000.
<i>Adolf Messer Foundation</i> , Adolf Messer Prize 2011, €50,000.

Microsoft Research Ltd., funding from the PhD scholarship program, 2011 – 2013, €129,000.

Bundesministerium für Bildung und Forschung (BMBF), SICURA project, 2010 – 2013, €181,100.

Deutsche Forschungsgemeinschaft (DFG), PI in the research training group “Cooperative, Adaptive and Responsive Monitoring in Mixed Mode Environments” (GRK 1362), 2009–2015. Extension granted in 2011, 1 or 2 PhD scholarships.

Fraunhofer Institute for Computer Graphics Research, Jan. 2009 – Dec. 2009, project funding for optical flow research, €150,000.

Deutsche Forschungsgemeinschaft (DFG), conference travel funding, Apr. 2008, €2,200.

Fraunhofer Institute for Computer Graphics Research, Dec. 2007 – Dec. 2008, project funding for optical flow research, €200,000.

Deutsche Forschungsgemeinschaft (DFG), conference travel funding, June 2007, €1,900.

KEYNOTES AND INVITED WORKSHOP PRESENTATIONS

“*Scaling Image Restoration to Large Images*”, Data, Learning and Inference (DALI), La Palma, Spain, Apr. 2015.

“*Scaling Image Restoration to Large Images*”, Minerva Weizmann Workshop on Computational Challenges in Large Scale Image Analysis, Rehovot, Israel, Feb. 2015.

“*3D Scene Flow: Representations and Challenges*”, Scenes from Video Workshop, Barossa Valley, Australia, Dec. 2013.

“*Graphische Modelle in der Computer Vision*”, Keynote, VDI/VDE Forum Bildverarbeitung, Regensburg, Germany, Nov. 2012.

“*Learning Random Field Models of Natural Images*”, Rank Prize Symposium on Machine Learning and Computer Vision, Grasmere, UK, March 2012.

“*Probabilistic Models for Low-Level Vision*”, 33rd Annual Workshop of the Austrian Association for Pattern Recognition (ÖAGM), Stainz, Austria, May 2009.

German-Israel Workshop on Vision and Image Sciences, Haifa, Israel, Nov. 2008.

“*Steerable Random Fields*”, MRF Symposium, Cambridge, UK, Oct. 2008.

“*Discrete-Continuous Optimization for Optical Flow Estimation*”, Dagstuhl Workshop on Statistical and Geometrical Approaches to Visual Motion Analysis, Dagstuhl, Germany, July 2008.

“*High-order Markov Random Fields for Low-level Vision*”, Dagstuhl Workshop on Visual Computing, Dagstuhl, Germany, Apr. 2007.

“*Specular Flow and the Recovery of Surface Structure*”, BIRS Workshop on Mathematical Methods in Computer Vision, Banff, Canada, Oct. 2006.

“*Fields of Experts: A Framework for Learning Image Priors*”, CIAR NCAP Workshop, Vancouver, Canada, Dec. 2005.

“*On the Spatial Statistics of Optical Flow: Modeling, Learning, and Flow Estimation*”, Locomotor Workshop, Jülich, Germany, Oct. 2005.

INVITED TALKS

“*Locally Rigid Models for 3D Scene Flow*”:

- University of Freiburg, Germany, July 2014.
- Center for Machine Perception, Czech Technical University, Prague, Apr. 2014.

“*Connecting Non-Quadratic Variational Models and MRFs*”:

- Microsoft Research, Cambridge, July 2011.

“*Graphical Models in Low and High-Level Vision*”:

- Olympus Prize Lecture, DAGM 2010, Darmstadt, Germany, Sep. 2010.

“Graphical Models for Object Detection and Pose Estimation”:

- Graz Technical University, Austria, Dec. 2009.

“Discrete-Continuous Optimization for Optical Flow Estimation”:

- Harvard University, Sep. 2008.
- Universität Bonn, Germany, June 2008.

“People-Tracking-by-Detection and People-Detection-by-Tracking”:

- Microsoft Research, Cambridge, Apr. 2008.

“On the Spatial Statistics of Optical Flow”:

- TU Darmstadt, Graduate program “Cooperative, Adaptive and Responsive Monitoring in Mixed Mode Environments”, Apr. 2008.
- Massachusetts Institute of Technology, Oct. 2006.

“High-order Markov Random Fields for Low-level Vision”:

- Universität zu Lübeck, Jan. 2009.
- Gatsby Unit, University College London, Oct. 2008.
- Ecole Polytechnique Fédérale de Lausanne, Jan. 2007.
- Microsoft Research, Cambridge, Jan. 2007.
- TU Darmstadt, Jan. 2007.
- California Institute of Technology, Dec. 2006.
- Princeton University, Apr. 2006.
- University of Rochester, March 2006.

“Modeling Spatial Statistics with Fields of Experts”:

- University of Minnesota, Nov. 2005, guest lecture.

“Fields of Experts: A Framework for Learning Image Priors”:

- Forschungszentrum Jülich, Germany, Oct. 2005.
- New York University, Courant Institute, Aug. 2005.
- Brown University, Center for Computation and Visualization, Apr. 2005.
- Massachusetts Institute of Technology, March 2005.
- Brown University, Division of Applied Mathematics, Nov. 2004.

“Reconstruction of 3D Catheter Paths from 2D X-ray Projections”:

- University Clinic of Mannheim, July 2000.

TUTORIALS

Tutorial on *“Random Field Models for Natural Image and Scene Statistics”*, Pattern Recognition Symposium of the German Association for Pattern Recognition (DAGM), Frankfurt, Germany, Aug. 2011.

Tutorial on *“Modeling Natural Image Statistics for Computer Vision”*, IEEE International Conference on Computer Vision, Kyoto, Japan, Sep. 2009 (with Siwei Lyu).

OTHER TALKS

“People-Tracking-by-Detection and People-Detection-by-Tracking”. IEEE Conference on Computer Vision and Pattern Recognition, Anchorage, Alaska, June 2008.

“Steerable Random Fields”. IEEE International Conference on Computer Vision (ICCV), Rio de Janeiro, Brazil, Oct. 2007.

“Efficient Belief Propagation for MRFs in Low-level Vision”. CIAR Machine Learning Summer School, Toronto, Canada, Aug. 2006.

“On the Spatial Statistics of Optical Flow”. IEEE International Conference on Computer Vision (ICCV), Beijing, China, Oct. 2005.

“Fields of Experts: A Framework for Learning Image Priors”. IEEE Conference on Computer Vision and Pattern Recognition, San Diego, California, June 2005.

PROFESSIONAL ACTIVITIES

Conference Organization:

- General Co-Chair of VMV 2014 (19th International Workshop on Vision, Modeling and Visualization)
- Program Co-Chair of DAGM 2010 (32nd Annual Pattern Recognition Symposium of the German Association for Pattern Recognition)

Workshop Organization:

- Co-Chair of Workshop on Inverse Rendering, in conjunction with ICCV 2015
- Co-Chair of BMTT 2015 (1st Workshop of Benchmarking Multi-target Tracking), in conjunction with WACV 2015

Editorial Duties:

- PeerJ Computer Science, Editorial Board, since 2015
- IEEE Transactions on Pattern Recognition and Machine Intelligence, Associate Editor, since 2014
- International Journal of Computer Vision, Associate Editor, since 2013

Area Chair:

- European Conference on Computer Vision (ECCV) 2012, 2014
- IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2013
- IEEE International Conference on Computer Vision (ICCV) 2011

Award Committees:

- Award Committee, European Conference on Computer Vision (ECCV) 2014

Program Committees:

- IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2007 – 2012, 2014, 2015
- IEEE International Conference on Computer Vision (ICCV) 2007, 2009, 2015
- European Conference on Computer Vision (ECCV) 2008
- International Conference on Energy Minimization Methods in Computer Vision and Pattern Recognition (EMMCVPR) 2009, 2011, 2013
- IEEE International Conference on Automatic Face and Gesture Recognition 2013
- German Conference on Pattern Recognition (GCPR, former Symposium of the German Association for Pattern Recognition DAGM) 2009, 2011 – 2015
- International Workshop on Vision, Modeling, and Visualization (VMV) 2007, 2008, 2009, 2011, 2013
- IEEE Workshop on Graphical Models for Scene Understanding: Challenges and Perspectives 2013

Grant Proposal Reviewing:

- German Research Foundation (DFG) 2009, 2013, 2014, 2015
- European Research Council (ERC) 2013
- Humboldt Foundation 2013
- Fondo Nacional de Desarrollo Científico y Tecnológico, Chile (FONDECYT) 2012
- Israel Science Foundation 2008, 2010
- German Academic Exchange Association (DAAD) 2009, 2010
- Swiss National Science Foundation 2008, 2009

Journal Reviewing:

- IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI) 2005 – 2015
- International Journal of Computer Vision (IJCV) 2005 – 2012
- Journal of Mathematical Imaging and Vision (JMIV) 2013
- Journal of Machine Learning Research (JMLR) 2013
- Computer Vision and Image Understanding (CVIU) 2014
- Image and Vision Computing (IVC) 2008, 2011 – 2014

- IEEE Transactions on Image Processing (TIP) 2008, 2009, 2011, 2012
- IEEE Transactions on Signal Processing 2012
- ISPRS Journal of Photogrammetry and Remote Sensing 2012
- Journal of Real-Time Image Processing 2011
- Journal of Visual Communication and Image Representation 2009, 2010
- SIAM Journal on Imaging Sciences (SIIMS) 2007, 2008

Other Conference Reviewing:

- European Conference on Computer Vision (ECCV) 2004
- IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2004 – 2006
- IEEE International Conference on Computer Vision (ICCV) 2005, 2013
- Neural Information Processing Systems (NIPS) 2006, 2008 – 2012
- ACM SIGGRAPH 2009
- ACM SIGGRAPH Asia 2009 – 2011
- International Conference on Pattern Recognition (ICPR) 2013, 2014
- International Symposium 3D Data Processing, Visualization and Transmission (3DPVT) 2010
- AAAI Conference on Artificial Intelligence 2010
- European Signal Processing Conference (EUSIPCO) 2010

University Service:

- Senate Representative for Faculty Searches, TU Darmstadt (2014–2016)
- Scientific Council, TU Darmstadt (2014–2016)
- Head of Faculty Search Committee for ‘Mathematical and Applied Visual Computing’, TU Darmstadt (2014)
- Head of Faculty Search Committee for ‘Computational Learning for Autonomous Systems’, TU Darmstadt (2014)
- Faculty Search Committee for Theoretical Nuclear Physics, TU Darmstadt (2014)
- Fellow, Forum for Interdisciplinary Research (FiF), TU Darmstadt (2012–2014)
- Faculty Council (“Fachbereichsrat”) for Computer Science, TU Darmstadt (2011–2015)
- Budgetary Committee, Department of Computer Science, TU Darmstadt (2011–2012)
- Faculty Search Committee for Language Technology, TU Darmstadt (2010)
- Faculty Search Committee for Computer Vision, TU Darmstadt (2010)
- Coordinator, Master of Science program for Visual Computing, TU Darmstadt (since 2009)
- Curriculum and Teaching Committee, Department of Computer Science, TU Darmstadt (since 2009)
- Committee “Mathematics for Computer Science Majors”, Department of Computer Science, TU Darmstadt (2009–2010)
- Faculty Search Committee for Intelligent Systems, TU Darmstadt (2008)
- Faculty Committee for Computing, Department of Computer Science, Brown University (student representative, 2004–2007)
- Faculty Search Committee, Department of Computer Science, Brown University (student organizer, 2005)

Professional Societies:

Member of the ACM, the IEEE, the IEEE Computer Society, the DAGM, and the GI.

STUDENT ADVISING

Doctoral Students:

- Jochen Gast, TU Darmstadt, since Oct. 2014.
- Tobias Plötz, TU Darmstadt, since Apr. 2014.
- Marius Cordts, TU Darmstadt, since July 2013 (external PhD student, Daimler AG).
- Stephan Richter, TU Darmstadt, since Oct. 2012.
- Timo Rehfeld (né Scharwächter), TU Darmstadt, since March 2012 (external PhD stu-

dent, Daimler AG), defense planned for fall 2015.

- Uwe Schmidt, TU Darmstadt, since Nov. 2010, defense planned for fall 2015.

Doctoral Thesis Examiner:

- Christoph Vogel, ETH Zürich, May 2015 (co-supervisor).
- Xinchao Wang, EPFL, May 2015.
- Chen Yunjin, TU Graz, Austria, Jan. 2015.
- Kun Liu, University of Freiburg, July 2013.
- Dominik Haumann, TU Darmstadt, July 2013.
- Anton Milan (né Andriyenko), TU Darmstadt, May 2013 (primary examiner).
- Stefan Walk, TU Darmstadt, Sep. 2012 (primary examiner).
- Ulf Blanke, TU Darmstadt, Dec. 2010 (primary examiner).
- Mykhaylo Andriluka, TU Darmstadt, Oct. 2010 (primary examiner).
- Paul Schnitzspan, TU Darmstadt, Sep. 2010 (primary examiner).
- Werner Trobin, TU Graz, Austria, Dec. 2009.

BIOGRAPHIC INFORMATION

Date of Birth: March 13, 1977

Citizenship: German

Languages: German (native), English (near native), Italian (fluent), French (basic knowledge)

REFERENCES *available upon request*

Darmstadt, September 3, 2015