

2021**Journal Articles**

- [J1] J. Chui, S. Klenk and D. Cremers,
Event-Based Feature Tracking in Continuous Time with Sliding Window Optimization,
arXiv preprint, 2021.

Conference and Workshop Papers

- [C1] F. Wimbauer, N. Yang, L. von Stumberg, N. Zeller and D Cremers,
MonoRec: Semi-Supervised Dense Reconstruction in Dynamic Environments from a Single Moving Camera,
IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2021.
- [C2] M. Gladkova, R. Wang, N. Zeller and D. Cremers,
Tight Integration of Feature-based Relocalization in Monocular Direct Visual Odometry,
Proc. of the IEEE International Conference on Robotics and Automation (ICRA), 2021.
- [C3] Y. Xia, Y. Xu, S. Li, R. Wang, J. Du, D. Cremers and U. Stilla,
SOE-Net: A Self-Attention and Orientation Encoding Network for Point Cloud based Place Recognition,
IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2021, **Oral Presentation.**
- [C4] N Demmel, C Sommer, D Cremers and V Usenko,
Square Root Bundle Adjustment for Large-Scale Reconstruction,
IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2021.
- [C5] N Demmel, D Schubert, C Sommer, D Cremers and V Usenko,
Square Root Marginalization for Sliding-Window Bundle Adjustment,
IEEE International Conference on Computer Vision (ICCV), 2021.
- [C6] MW Wudenka, MG Müller, N Demmel, A Wedler, R Triebel, D Cremers and W Stuerzl,
Towards Robust Monocular Visual Odometry for Flying Robots on Planetary Missions,
International Conference on Intelligent Robots and Systems (IROS), 2021.
- [C7] S Klenk, J Chui, N Demmel and D Cremers,
TUM-VIE: The TUM Stereo Visual-Inertial Event Dataset,
International Conference on Intelligent Robots and Systems (IROS), 2021.
- [C8] L Koestler, N Yang, N Zeller and D Cremers,
TANDEM: Tracking and Dense Mapping in Real-time using Deep Multi-view Stereo,
Conference on Robot Learning (CoRL), 2021, **3DV'21 Best Demo Award.**
- [C9] S Weber, N Demmel and D Cremers,
Multidirectional Conjugate Gradients for Scalable Bundle Adjustment,
German Conference on Pattern Recognition (GCPR), 2021, **Oral Presentation.**

2020**Journal Articles**

- [J1] V. Usenko, N. Demmel, D. Schubert, J. Stueckler and D. Cremers,
Visual-Inertial Mapping with Non-Linear Factor Recovery,
IEEE Robotics and Automation Letters (RA-L) 38; *Int. Conference on Intelligent Robotics and Automation (ICRA)*, 5(2): 422-429, 2020.
- [J2] L. von Stumberg, P. Wenzel, Q. Khan and D. Cremers,
GN-Net: The Gauss-Newton Loss for Multi-Weather Relocalization,
IEEE Robotics and Automation Letters (RA-L), 5(2): 890-897, 2020.

Conference and Workshop Papers

- [C1] R. Wang, N. Yang, J. Stueckler and D. Cremers,
DirectShape: Photometric Alignment of Shape Priors for Visual Vehicle Pose and Shape Estimation,
Proc. of the IEEE International Conference on Robotics and Automation (ICRA), 2020.
- [C2] C. Sommer, V. Usenko, D. Schubert, N. Demmel and D. Cremers,
Efficient Derivative Computation for Cumulative B-Splines on Lie Groups,
IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2020, **Oral Presentation**.
- [C3] N. Yang, L. von Stumberg, R. Wang and D. Cremers,
D3VO: Deep Depth, Deep Pose and Deep Uncertainty for Monocular Visual Odometry,
IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2020, **Oral Presentation**.
- [C4] J. Du, R. Wang and D. Cremers,
DH3D: Deep Hierarchical 3D Descriptors for Robust Large-Scale 6DoF Relocalization,
European Conference on Computer Vision (ECCV), 2020, **Spotlight Presentation**.
- [C5] P. Wenzel, R. Wang, N. Yang, Q. Cheng, Q. Khan, L. von Stumberg, N. Zeller and D. Cremers,
4Seasons: A Cross-Season Dataset for Multi-Weather SLAM in Autonomous Driving,
Proceedings of the German Conference on Pattern Recognition (GCPR), 2020.
- [C6] N. Demmel, M. Gao, E. Laude, T. Wu and D. Cremers,
Distributed Photometric Bundle Adjustment,
International Conference on 3D Vision (3DV), 2020, **Oral Presentation**.
- [C7] L. von Stumberg, P. Wenzel, N. Yang and D. Cremers,
LM-Reloc: Levenberg-Marquardt Based Direct Visual Relocalization,
International Conference on 3D Vision (3DV), 2020.

2019**Conference and Workshop Papers**

- [C1] D. Schubert, N. Demmel, L. von Stumberg, V. Usenko and D. Cremers,
Rolling-Shutter Modelling for Visual-Inertial Odometry,
International Conference on Intelligent Robots and Systems (IROS), November 2019.
- [C2] F. Steidle, W. Stürzl and R. Triebel,
Visual-inertial sensor fusion with a bio-inspired polarization compass for navigation of MAVs,
11th International Micro Air Vehicle Competition and Conference (IMAV), 2019.

2018**Journal Articles**

- [J1] J. Engel, V. Koltun and D. Cremers,
Direct Sparse Odometry,
IEEE Transactions on Pattern Analysis and Machine Intelligence, mar 2018.
- [J2] N. Yang, R. Wang, X. Gao and D. Cremers,
Challenges in Monocular Visual Odometry: Photometric Calibration, Motion Bias and Rolling Shutter Effect,
In IEEE Robotics and Automation Letters (RA-L) 38; Int. Conference on Intelligent Robots and Systems (IROS), 3: 2878-2885, Oct 2018.
- [J3] P. Bergmann, R. Wang and D. Cremers,
Online Photometric Calibration of Auto Exposure Video for Realtime Visual Odometry and SLAM,
IEEE Robotics and Automation Letters (RA-L), 3: 627-634, April 2018, **ICRA'18 Best Vision Paper Award - Finalist.**
- [J4] H. Matsuki, L. von Stumberg, V. Usenko, J. Stueckler and D. Cremers,
Omnidirectional DSO: Direct Sparse Odometry with Fisheye Cameras,
IEEE Robotics and Automation Letters 38; Int. Conference on Intelligent Robots and Systems (IROS), 2018.

Conference and Workshop Papers

- [C1] C. Sommer and D. Cremers,
Joint Representation of Primitive and Non-primitive Objects for 3D Vision,
2018 International Conference on 3D Vision, 3DV 2018, Verona, Italy, September 5-8, 2018, IEEE Computer Society, 160-169, 2018.
- [C2] R Scona, M Jaimez, YR. Petillot, M Fallon and D Cremers,
StaticFusion: Background Reconstruction for Dense RGB-D SLAM in Dynamic Environments,
2018 IEEE International Conference on Robotics and Automation, ICRA 2018, Brisbane, Australia, May 21-25, 2018, IEEE, 1-9, 2018.
- [C3] L. von Stumberg, V. Usenko and D. Cremers,
Direct Sparse Visual-Inertial Odometry using Dynamic Marginalization,
International Conference on Robotics and Automation (ICRA), May 2018.

- [C4] D. Schubert, T. Goll, N. Demmel, V. Usenko, J. Stueckler and D. Cremers,
The TUM VI Benchmark for Evaluating Visual-Inertial Odometry,
International Conference on Intelligent Robots and Systems (IROS), October 2018.
- [C5] X. Gao, R. Wang, N. Demmel and D. Cremers,
LDSO: Direct Sparse Odometry with Loop Closure,
International Conference on Intelligent Robots and Systems (IROS), October 2018.
- [C6] N. Yang, R. Wang, J. Stueckler and D. Cremers,
**Deep Virtual Stereo Odometry: Leveraging Deep Depth Prediction for Mono-
cular Direct Sparse Odometry,**
European Conference on Computer Vision (ECCV), September 2018, **Oral Presentati-
on.**
- [C7] D. Schubert, N. Demmel, V. Usenko, J. Stueckler and D. Cremers,
Direct Sparse Odometry With Rolling Shutter,
European Conference on Computer Vision (ECCV), September 2018, **Oral Presentation.**
- [C8] V. Usenko, N. Demmel and D. Cremers,
The Double Sphere Camera Model,
Proc. of the Int. Conference on 3D Vision (3DV), September 2018.

2017

Conference and Workshop Papers

- [C1] G. Kuschik, A. Bozic and D. Cremers,
**Real-time variational stereo reconstruction with applications to large-scale
dense SLAM,**
IEEE Intelligent Vehicles Symposium, IV 2017, Los Angeles, CA, USA, June 11-14, 2017,
IEEE, 1348-1355, 2017.
- [C2] M. Dzitsiuk, J. Sturm, R. Maier, L. Ma and D. Cremers,
**De-noising, Stabilizing and Completing 3D Reconstructions On-the-go using
Plane Priors,**
International Conference on Robotics and Automation (ICRA), May 2017.
- [C3] L. von Stumberg, V. Usenko, J. Engel, J. Stueckler and D. Cremers,
From Monocular SLAM to Autonomous Drone Exploration,
European Conference on Mobile Robots (ECMR), September 2017.
- [C4] R. Maier, R. Schaller and D. Cremers,
**Efficient Online Surface Correction for Real-time Large-Scale 3D Reconstruc-
tion,**
British Machine Vision Conference (BMVC), London, United Kingdom, September 2017.
- [C5] A. Kasyanov, F. Engelmann, J. Stueckler and B. Leibe,
Keyframe-Based Visual-Inertial Online SLAM with Relocalization,
IEEE/RSJ Int. Conference on Intelligent Robots and Systems, IROS, 2017.

2016**Conference and Workshop Papers**

- [C1] V. Usenko, J. Engel, J. Stueckler and D. Cremers,
Direct Visual-Inertial Odometry with Stereo Cameras,
International Conference on Robotics and Automation (ICRA), May 2016.
- [C2] L. Ma, C. Kerl, J. Stueckler and D. Cremers,
CPA-SLAM: Consistent Plane-Model Alignment for Direct RGB-D SLAM,
International Conference on Robotics and Automation (ICRA), May 2016.
- [C3] J. Engel, V. Usenko and D. Cremers,
A Photometrically Calibrated Benchmark For Monocular Visual Odometry,
arXiv:1607.02555, July 2016.
- [C4] J. Engel, V. Koltun and D. Cremers,
Direct Sparse Odometry,
arXiv:1607.02565, July 2016.
- [C5] D. Bender, F. Rouatbi, M. Schikora, D. Cremers and W. Koch,
Scaling the world of monocular SLAM with INS-measurements for UAS navigation,
19th International Conference on Information Fusion, FUSION 2016, Heidelberg, Germany, July 5-8, 2016, IEEE, 1493-1500, 2016.

2015**Journal Articles**

- [J1] M. Jaimez and J. Gonzalez-Jimenez,
Fast Visual Odometry for 3-D Range Sensors,
IEEE Transactions on Robotics, 31(4): 809-822, 2015.
- [J2] D. Droschel, M. Nieuwenhuisen, M. Beul, J. Stueckler, D. Holz and S. Behnke,
Multi-Layered Mapping and Navigation for Autonomous Micro Aerial Vehicles,
Journal of Field Robotics, 2015.

Conference and Workshop Papers

- [C1] J. Engel, J. Stueckler and D. Cremers,
Large-Scale Direct SLAM with Stereo Cameras,
International Conference on Intelligent Robots and Systems (IROS), sept 2015.
- [C2] D. Caruso, J. Engel and D. Cremers,
Large-Scale Direct SLAM for Omnidirectional Cameras,
International Conference on Intelligent Robots and Systems (IROS), sept 2015.
- [C3] V. Usenko, J. Engel, J. Stueckler and D. Cremers,
Reconstructing Street-Scenes in Real-Time From a Driving Car,
Proc. of the Int. Conference on 3D Vision (3DV), oct 2015.
- [C4] C. Kerl, J. Stueckler and D. Cremers,
Dense Continuous-Time Tracking and Mapping with Rolling Shutter RGB-D Cameras,
IEEE International Conference on Computer Vision (ICCV), Santiago, Chile, 2015.

2014**Journal Articles**

- [J1] J. Engel, J. Sturm and D. Cremers,
Scale-Aware Navigation of a Low-Cost Quadrocopter with a Monocular Camera,
Robotics and Autonomous Systems (RAS), 62(11): 1646–1656, 2014.
- [J2] J. Stueckler and S. Behnke,
Multi-Resolution Surfel Maps for Efficient Dense 3D Modeling and Tracking,
Journal of Visual Communication and Image Representation, 25: 137-147, jan 2014.

Conference and Workshop Papers

- [C1] D. B. AD. CJ. C D. Weikersdorfer,
Event-based 3D SLAM with a depth-augmented dynamic vision sensor,
International Conference on Robotics and Automation (ICRA), 2014.
- [C2] F. Steinbruecker, J. Sturm and D. Cremers,
Volumetric 3D Mapping in Real-Time on a CPU,
International Conference on Robotics and Automation (ICRA), Hongkong, China, 2014.
- [C3] H. Alvarez, L.M. Paz, J. Sturm and D. Cremers,
Collision Avoidance for Quadrotors with a Monocular Camera,
Proc. of The 12th International Symposium on Experimental Robotics (ISER), 2014.
- [C4] J. Engel, T. Schöps and D. Cremers,
LSD-SLAM: Large-Scale Direct Monocular SLAM,
European Conference on Computer Vision (ECCV), September 2014, **Oral Presentation.**
- [C5] T. Schöps, J. Engel and D. Cremers,
Semi-Dense Visual Odometry for AR on a Smartphone,
International Symposium on Mixed and Augmented Reality, September 2014, **Best Short Paper Award.**
- [C6] R. Maier, J. Sturm and D. Cremers,
Submap-based Bundle Adjustment for 3D Reconstruction from RGB-D Data,
German Conference on Pattern Recognition (GCPR), Münster, Germany, September 2014, **Oral Presentation.**
- [C7] O. Dunkley, J. Engel, J. Sturm and D. Cremers,
Visual-Inertial Navigation for a Camera-Equipped 25g Nano-Quadrotor,
IROS2014 Aerial Open Source Robotics Workshop, 2014.
- [C8] D. Droschel, J. Stueckler and S. Behnke,
Local Multi-Resolution Surfel Grids for MAV Motion Estimation and 3D Mapping,
Proc. of the 13th International Conference on Intelligent Autonomous Systems (IAS), to appear, jul 2014.
- [C9] J. Stueckler, A. Gutt and S. Behnke,
Combining the Strengths of Sparse Interest Point and Dense Image Registration for RGB-D Odometry,
Proc. of the Joint 45th International Symposium on Robotics (ISR) and 8th German Conference on Robotics (ROBOTIK), to appear, jun 2014.

- [C10] D. Droschel, J. Stueckler and S. Behnke,
Local multi-resolution representation for 6D motion estimation and mapping with a continuously rotating 3D laser scanner,
Proc. of the IEEE Int. Conf. on Robotics and Automation (ICRA), 5221-5226, may 2014.

MastersThesis

- [M1] T Schöps,
Semi-dense visual SLAM on mobile devices,
Technical University Munich, Germany, May 2014.
- [M2] M. Shelley,
Monocular Visual Inertial Odometry on a Mobile Device,
Technical University Munich, Germany, Aug. 2014.
- [M3] OMW Dunkley,
Visual Inertial Control of a Nano-Quadrotor,
Technical University Munich, Germany, Sept. 2014.

2013

Journal Articles

- [J1] F. Endres, J. Hess, J. Sturm, D. Cremers and W. Burgard,
3D Mapping with an RGB-D Camera,
IEEE Transactions on Robotics (T-RO), 30(1): 177-187, 2013.

Conference and Workshop Papers

- [C1] C. Kerl, J. Sturm and D. Cremers,
Robust Odometry Estimation for RGB-D Cameras,
International Conference on Robotics and Automation (ICRA), May 2013, **Best Vision Paper Award - Finalist.**
- [C2] E. Bylow, J. Sturm, C. Kerl, F. Kahl and D. Cremers,
Real-Time Camera Tracking and 3D Reconstruction Using Signed Distance Functions,
Robotics: Science and Systems Conference (RSS), June 2013.
- [C3] E. Bylow, J. Sturm, C. Kerl, F. Kahl and D. Cremers,
Direct Camera Pose Tracking and Mapping With Signed Distance Functions,
Demo Track of the RGB-D Workshop on Advanced Reasoning with Depth Cameras at the Robotics: Science and Systems Conference (RSS), June 2013.
- [C4] C. Kerl, J. Sturm and D. Cremers,
Dense Visual SLAM for RGB-D Cameras,
Proc. of the Int. Conf. on Intelligent Robot Systems (IROS), 2013.
- [C5] J. Sturm, E. Bylow, F. Kahl and D. Cremers,
Dense Tracking and Mapping with a Quadrocopter,
Unmanned Aerial Vehicle in Geomatics (UAV-g), Rostock, Germany, September 2013.
- [C6] J. Engel, J. Sturm and D. Cremers,
Semi-Dense Visual Odometry for a Monocular Camera,
IEEE International Conference on Computer Vision (ICCV), Sydney, Australia, December 2013.

- [C7] F. Steinbruecker, C. Kerl, J. Sturm and D. Cremers,
Large-Scale Multi-Resolution Surface Reconstruction from RGB-D Sequences,
IEEE International Conference on Computer Vision (ICCV), Sydney, Australia, 2013.
- [C8] M. Schadler, J. Stueckler and S. Behnke,
Multi-resolution surfel mapping and real-time pose tracking using a continuously rotating 2D laser scanner,
Proc. of the IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR), 1-6, oct 2013.
- [C9] M. McElhone, J. Stueckler and S. Behnke,
Joint detection and pose tracking of multi-resolution surfel models in RGB-D,
Proc. of the European Conference on Mobile Robots (ECMR), IEEE, 131-137, 2013.
- [C10] J. Stueckler and S. Behnke,
Hierarchical Object Discovery and Dense Modelling From Motion Cues in RGB-D Video,
Proc. of the 23rd International Joint Conference on Artificial Intelligence (IJCAI), IJ-CAI/AAAI, 2013.

MastersThesis

- [M1] R. Maier,
Out-of-Core Bundle Adjustment for 3D Workpiece Reconstruction,
Technische Universität München, Germany, September 2013.

2012

Conference and Workshop Papers

- [C1] F. Endres, J. Hess, N. Engelhard, J. Sturm, D. Cremers and W. Burgard,
An Evaluation of the RGB-D SLAM System,
International Conference on Robotics and Automation (ICRA), St. Paul, MA, USA, May 2012.
- [C2] J. Engel, J. Sturm and D. Cremers,
Camera-Based Navigation of a Low-Cost Quadrocopter,
Proc. of the International Conference on Intelligent Robot Systems (IROS), Oct. 2012.
- [C3] J. Sturm, N. Engelhard, F. Endres, W. Burgard and D. Cremers,
A Benchmark for the Evaluation of RGB-D SLAM Systems,
Proc. of the International Conference on Intelligent Robot Systems (IROS), Oct. 2012.
- [C4] J. Engel, J. Sturm and D. Cremers,
Accurate Figure Flying with a Quadrocopter Using Onboard Visual and Inertial Sensing,
Proc. of the Workshop on Visual Control of Mobile Robots (ViCoMoR) at the IEEE/RJS International Conference on Intelligent Robot Systems (IROS), Oct. 2012.
- [C5] J. Sturm, W. Burgard and D. Cremers,
Evaluating Egomotion and Structure-from-Motion Approaches Using the TUM RGB-D Benchmark,
Proc. of the Workshop on Color-Depth Camera Fusion in Robotics at the IEEE/RJS International Conference on Intelligent Robot Systems (IROS), Oct. 2012.

- [C6] J. Stueckler and S. Behnke,
Integrating depth and color cues for dense multi-resolution scene mapping using RGB-D cameras,
Proc. of the IEEE Int. Conf. on Multisensor Fusion and Integration for Intelligent Systems (MFI), 162-167, sep 2012.
- [C7] J. Stueckler and S. Behnke,
Robust Real-Time Registration of RGB-D Images using Multi-Resolution Surface Representations,
Proc. of ROBOTIK, VDE-Verlag, 2012.

MastersThesis

- [M1] C. Kerl,
Odometry from RGB-D Cameras for Autonomous Quadcopters,
Technical University Munich, Germany, Nov. 2012.

2011

Conference and Workshop Papers

- [C1] N. Engelhard, F. Endres, J. Hess, J. Sturm and W. Burgard,
Real-time 3D visual SLAM with a hand-held camera,
Proc. of the RGB-D Workshop on 3D Perception in Robotics at the European Robotics Forum, Vasteras, Sweden, April 2011.
- [C2] J. Sturm, S. Magnenat, N. Engelhard, F. Pomerleau, F. Colas, W. Burgard, D. Cremers and R. Siegwart,
Towards a benchmark for RGB-D SLAM evaluation,
Proc. of the RGB-D Workshop on Advanced Reasoning with Depth Cameras at Robotics: Science and Systems Conf. (RSS), Los Angeles, USA, June 2011.
- [C3] F. Steinbruecker, J. Sturm and D. Cremers,
Real-Time Visual Odometry from Dense RGB-D Images,
Workshop on Live Dense Reconstruction with Moving Cameras at the Intl. Conf. on Computer Vision (ICCV), 2011.

MastersThesis

- [M1] J. Engel,
Autonomous Camera-Based Navigation of a Quadcopter,
Technical University Munich, Germany, Dec. 2011, **Distinguished with the SIEMENS award for best Master's Thesis 2012.**

2010

Conference and Workshop Papers

- [C1] J. Stühmer, S. Gumhold and D. Cremers,
Real-Time Dense Geometry from a Handheld Camera,
Pattern Recognition (Proc. DAGM), Darmstadt, Germany, 11-20, September 2010.
- [C2] J. Stühmer, S. Gumhold and D. Cremers,
Parallel Generalized Thresholding Scheme for Live Dense Geometry from a Handheld Camera,
ECCV Workshop on Computer Vision on GPUs (CVGPU), Heraklion, Greece, September 2010.

- [C3] M. Nieuwenhuisen, J. Stueckler and S. Behnke,
Improving indoor navigation of autonomous robots by an explicit representation of doors,
Proc. of the IEEE Int. Conf. on Robotics and Automation (ICRA), 4895-4901, may 2010.