Keywords: Slam

List of Publications

2022
Journal Articles

[J1] L. von Stumberg and D. Cremers,
DM-VIO: Delayed Marginalization Visual-Inertial Odometry,

Conference and Workshop Papers

[C1] D Muhle, L Koestler, N Demmel, F Bernard and D Cremers,
The Probabilistic Normal Epipolar Constraint for Frame-To-Frame Rotation Optimization under Uncertain Feature Positions,
*IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022.

[C2] S Weber, N Demmel, T Chon Chan and D Cremers,
Power Bundle Adjustment for Large-Scale 3D Reconstruction,
*submission*, 2022.

[C3] M Gladkova, N Korobov, N Demmel, A Osep, L Leal-Taixe and D Cremers,
DirectTracker: 3D Multi-Object Tracking Using Direct Image Alignment and Photometric Bundle Adjustment,

2021
Journal Articles

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

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,

[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*.
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[C4] N Demmel, C Sommer, D Cremers and V Usenko,  
Square Root Bundle Adjustment for Large-Scale Reconstruction,  

[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,  

[C7] S Klenk, J Chui, N Demmel and D Cremers,  
TUM-VIE: The TUM Stereo Visual-Inertial Event Dataset,  

[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,  

[J2] L. von Stumberg, P. Wenzel, Q. Khan and D. Cremers,  
GN-Net: The Gauss-Newton Loss for Multi-Weather Relocalization,  

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,  

[C2] C. Sommer, V. Usenko, D. Schubert, N. Demmel and D. Cremers,  
Efficient Derivative Computation for Cumulative B-Splines on Lie Groups,  

[C3] N. Yang, L. von Stumberg, R. Wang and D. Cremers,  
D3VO: Deep Depth, Deep Pose and Deep Uncertainty for Monocular Visual Odometry,  
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[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.

**4Seasons: A Cross-Season Dataset for Multi-Weather SLAM in Autonomous Driving,**

[C6] N Demmel, M Gao, E Laude, T Wu and D Cremers,
**Distributed Photometric Bundle Adjustment,**

[C7] L. von Stumberg, P. Wenzel, N. Yang and D. Cremers,
**LM-Reloc: Levenberg-Marquardt Based Direct Visual Relocalization,**

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,**

[C2] F. Steidle, W. Stürzl and R. Triebel,
**Visual-inertial sensor fusion with a bio-inspired polarization compass for navigation of MAVs,**

2018 Journal Articles

[J1] J. Engel, V. Koltun and D. Cremers,
**Direct Sparse Odometry,**

[J2] N. Yang, R. Wang, X. Gao and D. Cremers,
**Challenges in Monocular Visual Odometry: Photometric Calibration, Motion Bias and Rolling Shutter Effect,**

[J3] P. Bergmann, R. Wang and D. Cremers,
**Online Photometric Calibration of Auto Exposure Video for Realtime Visual Odometry and SLAM,**

**Omnidirectional DSO: Direct Sparse Odometry with Fisheye Cameras,**
Conference and Workshop Papers

[C1] C. Sommer and D. Cremers,  
*Joint Representation of Primitive and Non-primitive Objects for 3D Vision*,  

[C2] R Scona, M Jaimez, Y.R. Petillot, M Fallon and D Cremers,  
*StaticFusion: Background Reconstruction for Dense RGB-D SLAM in Dynamic Environments*,  

[C3] L. von Stumberg, V. Usenko and D. Cremers,  
*Direct Sparse Visual-Inertial Odometry using Dynamic Marginalization*,  

*The TUM VI Benchmark for Evaluating Visual-Inertial Odometry*,  

[C5] X. Gao, R. Wang, N. Demmel and D. Cremers,  
*LDSO: Direct Sparse Odometry with Loop Closure*,  

[C6] N. Yang, R. Wang, J. Stueckler and D. Cremers,  
*Deep Virtual Stereo Odometry: Leveraging Deep Depth Prediction for Monocular Direct Sparse Odometry*,  

[C7] D. Schubert, N. Demmel, V. Usenko, J. Stueckler and D. Cremers,  
*Direct Sparse Odometry With Rolling Shutter*,  

[C8] V. Usenko, N. Demmel and D. Cremers,  
*The Double Sphere Camera Model*,  

2017 Conference and Workshop Papers

[C1] G. Kuschk, A. Bozic and D. Cremers,  
*Real-time variational stereo reconstruction with applications to large-scale dense SLAM*,  

[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*,  
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[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 Reconstruction, 
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[C5] A. Kasyanov, F. Engelmann, J. Stueckler and B. Leibe, 
Keyframe-Based Visual-Inertial Online SLAM with Relocalization, 

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[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, 
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[C3] J. Engel, V. Usenko and D. Cremers, 
A Photometrically Calibrated Benchmark For Monocular Visual Odometry, 

[C4] J. Engel, V. Koltun and D. Cremers, 
Direct Sparse Odometry, 

[C5] D. Bender, F. Rouatbi, M. Schikora, D. Cremers and W. Koch, 
Scaling the world of monocular SLAM with INS-measurements for UAS navigation, 

2015
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[J1] M. Jaimez and J. Gonzalez-Jimenez, 
Fast Visual Odometry for 3-D Range Sensors, 

[J2] D. Droeschel, M. Nieuwenhuisen, M. Beul, J. Stueckler, D. Holz and S. Behnke, 
Multi-Layered Mapping and Navigation for Autonomous Micro Aerial Vehicles, 

Conference and Workshop Papers

[C1] J. Engel, J. Stueckler and D. Cremers, 
Large-Scale Direct SLAM with Stereo Cameras, 
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[C2] D. Caruso, J. Engel and D. Cremers,
Large-Scale Direct SLAM for Omnidirectional Cameras,

[C3] V. Usenko, J. Engel, J. Stueckler and D. Cremers,
Reconstructing Street-Scenes in Real-Time From a Driving Car,

[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,

[J2] J. Stueckler and S. Behnke,
Multi-Resolution Surfel Maps for Efficient Dense 3D Modeling and Tracking,

Conference and Workshop Papers

[C1] D. B. AD. CJ. C D. Weikersdorfer,
Event-based 3D SLAM with a depth-augmented dynamic vision sensor,

[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,

[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.
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[C7] O. Dunkley, J. Engel, J. Sturm and D. Cremers,
Visual-Inertial Navigation for a Camera-Equipped 25g Nano-Quadrotor,

[C8] D. Droeschel, J. Stueckler and S. Behnke,
Local Multi-Resolution Surfel Grids for MAV Motion Estimation and 3D Mapping,

[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. Droeschel, 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.

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[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

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[J1] F. Endres, J. Hess, J. Sturm, D. Cremers and W. Burgard,
3D Mapping with an RGB-D Camera,

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,
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MastersThesis

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

2012

Conference and Workshop Papers


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[C3] J. Sturm, N. Engelhard, F. Endres, W. Burgard and D. Cremers,
A Benchmark for the Evaluation of RGB-D SLAM Systems,

[C4] J. Engel, J. Sturm and D. Cremers,
Accurate Figure Flying with a Quadrocopter Using Onboard Visual and Inertial Sensing,

[C5] J. Sturm, W. Burgard and D. Cremers,
Evaluating Egomotion and Structure-from-Motion Approaches Using the TUM RGB-D Benchmark,

[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 Surfel Representations,

MastersThesis

[M1] C. Kerl,
Odometry from RGB-D Cameras for Autonomous Quadrocopters,
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,

Towards a benchmark for RGB-D SLAM evaluation,

[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.

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[M1] J. Engel,
Autonomous Camera-Based Navigation of a Quadrocopter,
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,
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[C2] J. Stühmer, S. Gumhold and D. Cremers,
Parallel GeneralizedThresholding 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.