

Lu Sang

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 - Germany

Personal details:

- Place of birth: *Yunnan, China*
 - Citizenship: *China*
 - Native Language: *Chinese*
 - Spoken Languages: *English* (fluent), *German* (intermediate)

Research Interests

- 3D Geometry Processing, 4D Motion Generation, Photometric Stereo, Geometric Deep Learning, Neural Rendering, Dynamic Scene Reconstruction, Computer Graphics, and Computer Vision.

Research Profile

I am a Ph.D. student in the Computer Vision Group at the Technical University of Munich (TUM), supervised by Prof. Daniel Cremers. I hold a Master's degree in Mathematics from TUM and a Bachelor's degree in Applied Mathematics from Tongji University, China. During my Master's studies, I worked as a student at FramaGmbH, where I contributed to developing the company's first RGB-D 3D scanner, focusing on algorithm integration, camera calibration, and SLAM optimization. This hands-on experience sparked my interest in computer vision and motivated me to pursue a Ph.D. to deepen my understanding of geometric modeling and visual perception. My research began with photometric stereo, image formation models, and camera pose estimation. I later shifted focus to 3D geometry processing, shape analysis, and 4D motion generation. My work has been published in top-tier venues such as ICLR, CVPR, and ECCV, with two spotlight papers at WACV 2020 and 2023. I have served as a reviewer for major conferences and journals including CVPR, ICCV, ECCV, ICLR, NeurIPS, TPAMI, and CGF. I have also mentored several Master's theses—some leading to publications—and organized and taught seminars and practical courses in 3D reconstruction, geometric learning, and deep learning.

Education

- **Technical University of Munich**, Germany – Computer Science department 12/2019 – present
Ph.D student in Computer Science *Supervised by Prof. Daniel Cremers.*
Research includes photometric stereo, image analysis, SLAM, 3D geometry, and 4D generation.
 - **Technical University of Munich**, Germany – Mathematics department 10/2016-06/2019
Master of Science.
Specializing in partial differential equations and variational methods.
 - **Tongji University**, China – Mathematics department 09/2012-06/2016
Bachelor of Science.
Specializing in functional analysis.

Working Experience

Publications by Research Topics

- Image-Based 3D Reconstruction and Camera Pose Estimation

Classical method, focusing on pose estimation and photometric alignment. Modeling surface details based on image analysis.

1. Lu Sang, Bjoern Haefner, Daniel Cremers. *Inferring super-resolution depth from a moving light-source enhanced RGB-D sensor: A variational approach*. IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2020 (Spotlight presentation)

2. Christiane Sommer*, **Lu Sang***, David Schubert, Daniel Cremers. *Gradient-sdf: A semi-implicit surface representation for 3d reconstruction*. IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2022.
 3. **Lu Sang**, Bjoern Haefner, Xingxing Zuo, Daniel Cremers *High-quality rgb-d reconstruction via multi-view uncalibrated photometric stereo and gradient-sdf*. IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2023 (Spotlight presentation)
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- **Neural Scene and Object Reconstruction**

Learning continuous 3D representations of scenes and objects, with a focus on high-fidelity surface reconstruction and computational efficiency.

1. Linus Haerenstam-Nielsen, **Lu Sang**, Abhishek Saroha, Nikita Araslanov, Daniel Cremers. *DiffCD: A Symmetric Differentiable Chamfer Distance for Neural Implicit Surface Fitting*. European Conference on Computer Vision (ECCV) 2024.
2. **Lu Sang**, Abhishek Saroha, Maolin Gao, Daniel Cremers. *Enhancing surface neural implicits with curvature-guided sampling and uncertainty-augmented representations*. DAGM German Conference on Pattern Recognition (GCPR) 2024.
3. Dávid Komorowicz*, **Lu Sang***, Ferdinand Maiwald, Daniel Cremers. *Coloring the Past: Neural Historical Monuments Reconstruction from Archival Photography*. DAGM German Conference on Pattern Recognition (GCPR) 2024.
4. Mreenav Shyam Deka*, **Lu Sang***, Daniel Cremers. *Erasing the Ephemeral: Joint Camera Refinement and Transient Object Removal for Street View Synthesis*. DAGM German Conference on Pattern Recognition (GCPR) 2024.

- **4D Generation and Motion Modeling**

Developed physically plausible, resource-efficient neural surface deformation models. Research includes velocity field estimation, deformation priors, and real-world deployment scenarios.

1. **Lu Sang**, Zehranaz Canfes, Dongliang Cao, Florian Bernard, Daniel Cremers. *Implicit Neural Surface Deformation with Explicit Velocity Fields*. The Thirteenth International Conference on Learning Representations (ICLR) 2025.
 2. **Lu Sang**, Zehranaz Canfes, Dongliang Cao, Riccardo Marin, Florian Bernard, Daniel Cremers. *4Deform: Neural Surface Deformation for Robust Shape Interpolation*. IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2025. <https://4deform.github.io/>.
 3. **Lu Sang***, Zehranaz Canfes*, Dongliang Cao, Riccardo Marin, Florian Bernard, Daniel Cremers. *TwoSquared: 4D Generation from 2D Image Pairs*. preprint 2025. <https://sangluisme.github.io/TwoSquared/>.
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Skills & Outreach

- **Programming & Tools:**
Python, Pytorch, Jax, C++, Matlab, Blender, SLAM
 - **Hobbies:**
Jogging, bouldering, climbing, painting
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Academic Activities

- **International Computer Vision Summer School** 06/2023
Attendance at the International Computer Vision Summer school in Sicily, Italy.
 - **ELLIS Winter School on Foundation Models** 03/2025
Attendance at the Winter School on Foundation Models held by European Laboratory for Learning and Intelligent Systems
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- **Attended Conference**
 - WACV; Hawaii USA, 2023
 - ECCV; Milan, Italy, 2024
 - ICLR; Singapore, 2025
 - CVPR; Nashville, USA, 2025
 - **Reviewer (Conferences)**
 - WACV; 2022-2025
 - 3DV; 2022 - 2024
 - NeurIPS; 2024-2025
 - ICLR; 2024 - 2025
 - CVPR; 2022 - 2025
 - ICCV; 2025
 - ECCV; 2022, 2024
 - SIGGRAPH Asia: 2025
 - **Reviewer (Journals)**
 - IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)
 - Computer and Graphics Journal (C&G)
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Awards & Honors

- **Spotlight Presentation, WACV** 03/2020
 - **Spotlight Presentation, WACV** 03/2023
 - **Second-Class Scholarship, Tongji University** 03/2015
Awarded for top grade student (top 5%).
 - **Third-Class Scholarship, Tongji University** 03/2014
Awarded for top grade student (top 10%).
 - **Honorable Mention, Mathematical Contest in Modeling (MCM), COMAP** 2013
 - **Third-Class Scholarship, Tongji University** 03/2013
Awarded for top grade student (top 10%).
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Teaching

- **Differential Geometry** 10/2015-04/2016
Tutor; Tongji University.
Lecturer: Prof. Lingjun Zhou, *Shanghai, China.*
- **Numerical Algorithms in Computer Vision and Machine Learning** 10/2020-04/2021
Tutor; Technical University of Munich.
Lecturer: Prof. Florian Bernard, *Munich, Germany.*
- **Seminar: An Overview of Methods for Accurate Geometry Reconstruction** 10/2021-04/2022
Organizer; Technical University of Munich.
Seminar for Master's students. Munich, Germany.
- **Seminar: Advanced topics on 3D Reconstruction** 04/2022-10/2022
Organizer; Technical University of Munich.
Seminar for Master's students. Munich, Germany.
- **practical course: Geometric Scene Understanding** 04/2023-10/2023
Organizer; Technical University of Munich.
Practical course for Master's students. Munich, Germany.
- **Practical Course: Expert-Level Deep Learning** 10/2023-04/2024
Organizer; Technical University of Munich.
Practical course for Master's students. Munich, Germany.