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Shaohui Liu

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RESEARCH INTEREST

My research interests span the area of 3D computer vision, with strong connections to robotics, graphics, and computational photography. In particular, I am interested in developing automatic localization/positioning and mapping algorithms/systems for visual images/videos and their applications to real-world practice.

EDUCATION

ETH Zurich, Department of Computer Science　　　　　　　　　　　　　　　　Oct 2022 – Present
PhD student in Computer Science, Advised by Prof. Marc Pollefeys

ETH Zurich, Department of Computer Science　　　　　　　　　　　　　　　　Sep 2020 – Sep 2022
Master's in computer science

Tsinghua University, Department of Electronic Engineering　　　　　　　　　Aug 2015 – Jun 2020
Bachelor of Engineering in Electronic Engineering　　　　Top 10% (GPA: 3.75/4.0)

EXPERIENCE

Google – Zurich, Switzerland　　　　　　　　　　　　　　　　　　　　　　Jul 2024 – Dec 2024
[Student Researcher] Visual Mapping Group at Google Geo.
· Topic: Quantizing / Tokenizing 3D Neural Maps for Memory-Efficient Visual Localization.

ByteDance Inc. – Beijing, China　　　　　　　　　　　　　　　　　　　　　Jan 2020 – Sep 2021
[Research Intern] Group "SLAM & 3D Vision".
· Topic: plane-assisted multi-view stereo, multiple plane detection, segmentation, and estimation for daily videos. [7] [8]

ETH Zurich - Zurich, Switzerland　　　　　　　　　　　　　　　　　　　　Jul 2019 – Nov 2019
[Academic Guest] Computer Vision and Geometry Group (CVG). Led by Prof. Marc Pollefeys.
· Topic: 3D reconstruction (structure-from-motion, differentiable rendering) [5]

Microsoft Research Asia - Beijing, China　　　　　　　　　　　　　　　　　Dec 2018 – May 2019
[Research Intern] Visual Computing Group.
· Topic: Deep learning for Object recognition, detection and segmentation. [3]

University of Pennsylvania [Remote] – Philadelphia, PA, United States / Beijing, China　　Jul 2018 – Feb 2019
GRASP Lab. Advised by Prof. Jianbo Shi.
· Topic: Deep learning for 3D vision & generative modeling [2]

Tsinghua University – Beijing, China　　　　　　　　　　　　　　　　　　　Sep 2017 – Sep 2018
Intelligent Vision Group (IVG). Advised by Prof. Jiwen Lu.
· Topic: Deep learning for 3D vision & generative modeling [1]

Sensetime – Beijing, China　　　　　　　　　　　　　　　　　　　　　　　Jun 2017 – Mar 2018
[Research Intern] Group "Video Intelligence" (camera department).
· Major developer of a complete online real-time system for face identification in the wild (already been applied to market products). This involves video object detection, visual tracking, and face analysis.

PUBLICATIONS & HONORS

[Selected Projects]: Please refer to https://b1ueber2y.me/academic.html for details.
[Publications]: (* indicates equal contribution)   [GitHub] [Google Scholar]

[15] Yifan Yu, **Shaohui Liu**, Rémi Pautrat, Marc Pollefeys, Viktor Larsson, "Relative Pose Estimation through Affine Corrections of Monocular Depth Priors". In CVPR 2025 (Highlight).

[14] Siyan Dong*, Shuzhe Wang*, **Shaohui Liu**, Lulu Cai, Qingnan Fan, Juho Kannala, Yanchao Yang, "Reloc3r: Large-Scale Training of Relative Camera Pose Regression for Generalizable, Fast, and Accurate Visual Localization". In CVPR, 2025.

[13] **Shaohui Liu***, Yidan Gao*, Tianyi Zhang*, Rémi Pautrat, Johannes Schönberger, Viktor Larsson, Marc Pollefeys, "Robust Incremental Structure-from-Motion with Hybrid Features". In ECCV, 2024.

[12] Lei Li, Songyou Peng, Zehao Yu, **Shaohui Liu**, Rémi Pautrat, Xiaochuan Yin, Marc Pollefeys, "3D Neural Edge Reconstruction". In CVPR, 2024.

[11] Petr Hruby, **Shaohui Liu**, Rémi Pautrat, Marc Pollefeys, Daniel Barath, "Handbook on Leveraging Lines for Two-View Relative Pose Estimation". In 3DV, 2024 (Spotlight).

[10] Rémi Pautrat, **Shaohui Liu**, Petr Hruby, Marc Pollefeys, Daniel Barath, "Vanishing Point Estimation in Uncalibrated Images with Prior Gravity Direction". In ICCV, 2023.

[9] **Shaohui Liu**, Yifan Yu, Rémi Pautrat, Marc Pollefeys, Viktor Larsson, "3D Line Mapping Revisited". In CVPR, 2023 (Highlight).

[8] Wang Zhao, **Shaohui Liu**, Hengkai Guo, Wenping Wang, Yong-Jin Liu, "PartcileSfM: Exploiting Dense Point Trajectories for Localizing Moving Cameras in the Wild". In ECCV, 2022.

[7] Wang Zhao*, **Shaohui Liu***, Yi Wei, Hengkai Guo, Yong-Jin Liu, "A Confidence-based Iterative Solver of Depths and Surface Normals for Deep Multi-view Stereo". In ICCV, 2021.

[6] Yi Wei, **Shaohui Liu**, Yongming Rao, Wang Zhao, Jiwen Lu, and Jie Zhou, "NerfingMVS: Guided Optimization of Neural Radiance Fields for Indoor Multi-view Stereo". In ICCV, 2021 (Oral).

[5] **Shaohui Liu**, Yinda Zhang, Songyou Peng, Boxin Shi, Marc Pollefeys and Zhaopeng Cui, "DIST: Rendering Deep Implicit Signed Distance Function with Differentiable Sphere Tracing". In CVPR, 2020.

[4] Wang Zhao, **Shaohui Liu**, Yezhi Shu and Yong-Jin Liu, "Towards Better Generalization: Joint Depth-Pose Learning without PoseNet". In CVPR, 2020.

[3] Ze Yang*, **Shaohui Liu***, Han Hu, Liwei Wang and Stephen Lin, "RepPoints: Point Set Representation for Object Detection", In ICCV, 2019.

[2] **Shaohui Liu***, Xiao Zhang*, Jianqiao Wangni and Jianbo Shi, "Normalized Diversification", In CVPR, 2019.

[1] Yi Wei*, **Shaohui Liu***, Wang Zhao*, Jiwen Lu and Jie Zhou, "Conditional Single-view Shape Generation for Multi-view Stereo Reconstruction", In CVPR, 2019.

· **Open-sourcing - Active maintainer/contributor of the following libraries:**
> colmap – the most popular structure-from-motion software.
> limap – mapping and localization support for lines and structural image features.
> particle-sfm – global structure-from-motion support for dense optical flow correspondences.
> pyceres – Python binding support for non-linear optimization.
> PoseLib – A collection of minimal solvers for camera pose estimation.

· **Honors:**   Outstanding reviewer (ECCV 2022)
          Direct Doctorate Scholarship (2020)
          Qualcomm Scholarship (2017)
          Sensetime Undergraduate Scholarship (2017)

TECHNICAL SKILLS

Programming: C/C++, CUDA, Python, MATLAB, R, HTML/CSS, JavaScript, SQL, Verilog, LᴬTᴇX, Linux/Unix
Language: Mandarin (native), English (fluent)