Daniel Barath

Curriculum Vitae

ETH Zürich
Dept. of Computer Science
Computer Vision and Geometry Group,
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Education

- **Eötvös Loránd University,** Doctor of Philosophy (PhD),
  Computer Science, September 2014 – February 2020, Grade: Summa Cum Laude
- **Eötvös Loránd University,** Master's degree,
  Computer Science, September 2012 – June 2014, Grade: 5
- **Eötvös Loránd University,** Bachelor's degree,
  Computer Science, September 2008 – June 2012, Grade: 5

Professional Experience

- **Visiting Researcher at Google Zurich** (part time), from December 2024
- **Established Researcher at ETH Zürich**, Computer Vision and Geometry Group, Switzerland, Zürich, from Sept. 2023
- **Postdoc at ETH Zürich**, Computer Vision and Geometry Group, Switzerland, Zürich, Febr. 2021 - Sept. 2023
- **Facebook Reality Labs**, Redmond, intern, April 2019 – June 2019
- **Researcher at Center of Machine Perception**, Czech Technical University,
  Prague, Czech Republic, September 2017 – February 2021
- **Researcher at HUN-REN Institute for Computer Science and Control, Machine Perception Research Laboratory,**
  Budapest, Hungary, September 2014 – February 2021

Programming Languages

- C++, Python, HTML, PHP, Javascript, C#, MySQL

Awards & Grants & Fundings

- **CVPR Best Paper Award candidate** with paper Wei, T., Tolias, G., Matas, J. and Barath, D., 2026. Global-Aware Edge Prioritization for Pose Graph Initialization. In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (pp. 28642-28651).
- **Career Seed Award**, 30k CHF, PI, September 2024 – August 2025
- **ETH RobotX** project funding 125K CHF (co-PI), 2024 - 2026
- **Hasler Stiftung** project funding 40K CHF (PI)
- **ETH RobotX** project funding 125K CHF (co-PI), 2022 - 2024
- **Publication Prize**, HUN-REN Institute for Computer Science and Control, 2023, Hungary
- **Farkas Gyula Memorial Price**, November 2022, Hungary.
  Given to young researchers with outstanding mathemetical results.
- **ETH Postdoc Fellowship**, 2021 – 2023, Switzerland
- **Scholarship for Young Researchers**, September 2014 – September 2017, Hungary
- **Kuba Attila Prize**, February 2017, KEPAF conference, Hungary
  Given to PhD students with exceptional work.
- **New National Excellence Program,** September 2017 – September 2018, Hungary
- **Best PhD Student** in HUN-REN Institute for Computer Science and Control, January 2018, Hungary
- **Excellent Researcher**, Eötvös Loránd University, April 2018, Hungary
- **Publication Prize,** HUN-REN Institute for Computer Science and Control, May 2019, Hungary
- **Award of the Institute,** HUN-REN Institute for Computer Science and Control, April 2020, Hungary

- **Best Presentation Award,** Computer Vision Winter Workshop, February 2020, Czech Republic
- **PhD Award**, January 2020, KEPAF conference, Hungary
  Given to recently finished PhDs with exceptional work.

Invited Speaker & Events

- Invited Speaker at the Mathematics of 3D Reconstruction 2026 workshop organized by ICERM
- Co-organizer of the 1st Generative 3D Reconstruction CVPR 2026 workshop.
- Invited Speaker at the 3rd Workshop on Urban Scene Modeling at CVPR 2026.
- Co-organizer of the „RANSAC in 2025" tutorial at ICCV 2025.
- Invited Lecturer at MARSS 2025 (https://www.medicalaugmentedreality.org/mar2025.html)
- Invited Speaker at the AI Symposium 2025 (https://hun-ren.hu/ai-symposium-2025/)
- Co-organizer of the „Camera Geometry Problems in Computer Vision" ICCV 2023 and 3DV 2024 tutorial
- Co-organizer of the „Affine Correspondences and their Applications" tutorial at CVPR 2022 and 3DV 2022
- Invited lecturer at the RobotX Summer School 2022, 2023, 2024, 2025
- Co-organizer of the „RANSAC in 2020" full-day tutorial at CVPR 2020.
- Co-organizer of the „Multiple Parametric Model Fitting" half-day tutorial at ICPR 2020.
- Invited speaker at EECVC 2020
- Invited speaker at *The 39th Pattern Recognition and Computer Vision Colloquium*, 2016

Professional Service

- **Board member** of the Hungarian Association for Image Analysis and Pattern Recognition.
- **Reviewer** for major computer vision (CVPR, ICCV, ECCV, BMVC, 3DV) and robotics (IROS, ICRA) conferences, and journals (PAMI, IJCV, CVIU, TIP).
- **Demo chair** of 3DV 2022.
- **Social media chair** of 3DV 2024
- **Program Chair** for the KEPAF 2025 conference (https://kepaf.njszt.hu/kepaf2025/committee.php)
- **Member** of the ELLIS Community.
- **Area Chair** for IROS 2025, CVPR 2025, ICRA 2026, and ECCV 2026.
- **Session Chair** for CVPR 2025
- **Program Chair** for the AI Symposium 2025 (https://hun-ren.hu/ai-symposium/)

Publications

Over the past five years, I have made significant contributions to the fields of computer vision and robotics, publishing over 50 papers in peer-reviewed conferences and journals. I am the first author on 35 of these papers, 18 of which were published in top-tier venues such as CVPR, ECCV, ICCV, or PAMI. According to Google Scholar, my work has received more than 2,800 citations, with an h-index of 24 and an i10-index of 52. In my field (computer vision, machine learning, robotics, signal processing), top-tier conference publications are considered highly prestigious and impactful, holding more weight than journal publications.

Recently, at the prestigious European Conference on Computer Vision (ECCV) 2024, I was ranked among the top 25 researchers with the highest number of accepted papers (9 in total), as noted on https://papercopilot.com/paper-list/eccv-paper-list/eccv-2024-paper-list/. Notably, all researchers ahead of me on this ranking are professors (or similar level), highlighting the significant impact of my work at this early stage of my career.

Journal Publications

- **D. Barath**, On making sift features affine covariant, International Journal of Computer Vision, 2023
- B. Guan, J. Zhao, **D. Barath**, F. Fraundorfer, Minimal solvers for Relative Pose Estimation of Multi-Camera Systems using Affine Correspondences, International Journal of Computer Vision 2022 (IF 13.369)
- **D. Barath**, J. Noskova, J. Matas, Marginalizing sample consensus, IEEE Transactions on Pattern Analysis and Machine Intelligence 2021 (IF 24.31)

- **D. Barath**, J. Matas, Graph-cut RANSAC: local optimization on spatially coherent structures, IEEE Transactions on Pattern Analysis and Machine Intelligence 2021 (IF 24.31)
- **D. Barath**, I. Eichhardt, L. Hajder, Optimal multi-view surface normal estimation using affine correspondences, IEEE Transactions on Image Processing 2019 (IF 10.86)
- **D. Barath**, L. Hajder, Efficient recovery of essential matrix from two affine correspondences, IEEE Transactions on Image Processing 2018 (IF 10.86)
- **D. Barath**, Efficient Energy-based Outlier Filtering, Computer Vision and Image Understanding, September 2018 (IF 3.876)
- **D. Barath** and L. Hajder: A theory for point-wise homography estimation, Pattern Recognition Letters, July 2017 (IF 2.81)

A* Conference Publications (CVPR / ICCV / ECCV / ICRA)

- N. Damblon, O. Vysotska, F. Tombari, M. Pollefeys, **D. Barath**, SG2Loc: Sequential Visual Localization on 3D Scene Graphs, ICML 2026
- Wei, T., Tolias, G., Matas, J. and **Barath, D.**, 2026. Global-Aware Edge Prioritization for Pose Graph Initialization. CVPR 2026 (*oral*, *award candidate, within top 0.4% of the submitted papers*)
- Li, M., Zhu, Z., Pollefeys, M. and **Barath, D.,** 2026. DROID-SLAM in the Wild. CVPR 2026
- Deng, Z., Tombari, F., Pollefeys, M., Wald, J. and **Barath, D.**, 2026. OVI-MAP: Open-Vocabulary Instance-Semantic Mapping. CVPR 2026 (highlight, within top 3.6% of submitted papers)
- Delitzas, A., Zhang, C., Gavryushin, A., Di Mario, T., Sun, B., Dabral, R., Guibas, L., Theobalt, C., Pollefeys, M., Engelmann, F. and **Barath, D.**, 2026. FUN REC* Reconstructing Functional 3D Scenes from Egocentric Interaction Videos. CVPR 2026.
- Ye, B., Chen, B., Xu, H., **Barath, D.** and Pollefeys, M., 2025. YoNoSplat: You Only Need One Model for Feedforward 3D Gaussian Splatting. ICLR 2026
- Wüest, M., Engelmann, F., Miksik, O., Pollefeys, M. and **Barath, D.**, 2025. UnLoc: Leveraging Depth Uncertainties for Floorplan Localization. ICLR 2026
- G. Di Lorenzo, F. Tombari, M. Pollefeys, and **D. Barath**. "Object-X: Learning to Reconstruct Multi-Modal 3D Object Representations." NeurIPS 2025
- H. Xu, S. Peng, F. Wang, H. Blum, **D. Barath**, A. Geiger, M. Pollefeys, DepthSplat: Connecting Gaussian Splatting and Depth, CVPR 2025
- C. Tzamos, V. Kocur, Y. Ding, **D. Barath**, Z. B. Haladova, T. Sattler, Z. Kukelova, Practical solutions to the relative pose of three calibrated cameras, CVPR 2025
- S. D. Sarkar, O. Miksik, M. Pollefeys, **D. Barath**, I. Armeni, CrossOver: 3D Scene Cross-Modal Alignment, CVPR 2025
- N. Damblon, M. Pollefeys, **D. Barath**, Learning to Filter Outlier Edges in Global SfM, CVPR 2025
- P. Sun, B. Guan, Z. Yu, Y. Shang, Q. Yu, **D. Barath**, Learning Affine Correspondences by Integrating Geometric Constraints, CVPR 2025
- Y. Miao, F. Engelamann, O. Vysotksa, F. Tombari, M. Pollefeys, **D. Barath**, SceneGraphLoc: CrossModal Coarse Visual Localization on 3D Scene Graphs, ECCV 2024
- Jiaqi Chen, **D. Barath**, I. Armeni, M. Pollefeys, Hermann Blum, "Where am I?" Scene Retrieval with Language, ECCV 2024
- Jianhao Zheng, **D. Barath**, M. Pollefeys, I. Armeni, MAP-ADAPT: Real-Time Quality-Adaptive Semantic 3D Maps, ECCV 2024
- P. Hubry, M. Pollefeys, **D. Barath**, Semicalibrated Relative Pose from an Affine Correspondence and Monodepth, ECCV 2024
- L. Pan, J. Schönberger, **D. Barath**, M. Pollefeys, Global Structure-from-Motion Revisited, ECCV 2024
- L. Pan, M. Pollefeys, **D. Barath**, Gravity-aligned Rotation Averaging with Circular Regression, ECCV 2024
- **D. Barath**, D. Mishkin, L. Cavalli, P-E. Sarlin, P. Hubry, M. Pollefeys, StereoGlue: Joint Feature Matching and Robust Estimation, ECCV 2024
- S. Kim, M. Pollefeys, **D. Barath**, Learning to Find Sub-Pixel Accurate Keypoints, ECCV 2024

- L. Di Giammarino, B. Sun, M. Pollefeys, G. Grisetti, H. Blum, **D. Barath**, Learning Where to Look: Selfsupervised Viewpoint Selection for Active Localization using Geometrical Information, ECCV 2024
- O. Ilter, I. Armeni, M. Pollefeys, **D. Barath**, Semantically Guided Feature Matching for Visual SLAM, ICRA 2024
- T. Wei, Y. Patel, A. Shekhovtsov, J. Matas, **D. Barath**, Generalized Differentiable RANSAC, ICCV 2023
- T. Wei, J. Matas, **D. Barath**, Adaptive Reordering Sampler with Neurally Guided MAGSAC, ICCV 2023
- L. Hajder, **D. Barath**, L. Lóczi, Fast Globally Optimal Surface Normal Estimation from an Affine Correspondence, ICCV 2023
- J. Ventura, Z. Kukelova, T. Sattler, **D. Barath**, P1AC: Revisiting Absolute Pose From a Single Affine Correspondence, ICCV 2023
- S. D. Sarkar, O. Miksik, M. Pollefeys, **D. Barath**, I. Armeni, SGAligner: 3D Scene Alignment with Scene Graphs, ICCV 2023
- S. Wang, J. Kannala, M. Pollefeys, **D. Barath**, Guiding Local Feature Matching with Surface Curvature, ICCV 2023
- R. Pautrat, S. Liu, P. Hruby, M. Pollefeys, **D. Barath**, Vanishing Point Estimation in Uncalibrated Images with Prior Gravity Direction, ICCV 2023
- **D Barath**, D Rozumnyi, I Eichhardt, L Hajder, J Matas, Finding Geometric Models by Clustering in the Consensus Space, CVPR 2023
- G. Zhang, V. Larsson, **D. Barath**, Revisiting Rotation Averaging: Uncertainties and Robust Losses, CVPR 2023
- **D. Barath**, D. Mishkin, M. Polic, W. Förstner, J. Matas, A Large-Scale Homography Benchmark, CVPR 2023
- R. Pautrat, **D. Barath**, V. Larsson, M. R. Oswald, M. Pollefeys, DeepLSD: Line segment detection and refinement with deep image gradients, CVPR 2023
- L. Cavalli, M. Pollefeys, **D. Barath**, *NeFSAC: Neurally Filtered Minimal Samples*, ECCV 2022
- **D. Barath**, Z. Kukelova, *Relative Pose from SIFT Features*, ECCV 2022
- **D. Barath**, Gabor Valasek, Space-Partitioning RANSAC, ECCV 2022
- L. Cavalli, M. Pollefeys, **D. Barath**, *Learning To Find Good Models in RANSAC*, CVPR 2022
- Y. Ding, **D. Barath**, J. Yang, Z. Kukelova, *Relative Pose From a Calibrated and an Uncalibrated Smartphone Image*, CVPR 2022
- M. Ivashechkin, **D. Barath**, J. Matas, *VSAC: Efficient and Accurate Estimator for H and F*, ICCV 2021
- S. Bhayani, T. Sattler, **D. Barath**, P. Beliansky, J Heikkila, Z Kukelova, *Calibrated and Partially Calibrated Semi-Generalized Homographies*, ICCV 2021
- B. Guan, J. Zhao, **D. Barath**, F. Fraundorfer, *Relative pose estimation for multi-camera systems from affine correspondences*, ICCV 2021
- Y. Ding, **D. Barath**, Z Kukelova, *Minimal solutions for panoramic stitching given gravity prior*, ICCV 2021
- **D. Barath**, D. Mishkin, I. Eichhardt, I. Shipachev, J. Matas, *Efficient Initial Pose-graph Generation for Global SfM*, CVPR 2021.
- Y. Ding, **D. Barath**, J. Yang, H. Kong, Z. Kukelova, *Globally Optimal Relative Pose Estimation with Gravity Prior*, CVPR 2021.
- B. Guan, J. Zhao, **D. Barath**, F. Fraundorfer, *Efficient Recovery of Multi-Camera Motion from Two Affine Correspondences*, ICRA 2021
- I. G. Gal, **D. Barath**, L. Hajder, *Pose Estimation for Vehicle-mounted Cameras via Horizontal and Vertical Planes*, ICRA 2021
- **D. Barath,** M. Polic, W. Förstner, T. Sattler, T. Pajdla, Z. Kukelova, *Making Affine Correspondences Work in Camera Geometry Computation*, ECCV 2020
- I. Eichhardt, **D. Barath:** *Relative Pose from Deep Learned Depth and a Single Affine Corr.*, ECCV 2020
- **D. Barath**, J. Noskova, M. Ivashechkin, J. Matas**:** *MAGSAC++, a fast, reliable and accurate robust estimator***,** CVPR 2020; ORAL

- T. Hodan, **D. Barath**, J. Matas**:** *EPOS: Estimating 6D Pose of Objects with Symmetries***,** CVPR, 2020;
- L. Hajder**, D. Barath:** *Relative planar motion for vehicle-mounted cameras from a single affine correspondence***,** ICRA 2020
- L. Hajder**, D. Barath***: Least-squares Opt. Relative Planar Motion for Vehicle-mounted Cameras***,** ICRA 2020
- **D. Barath,** Z. Kukelova: *Homography from two orientation-and scale-covariant features*, ICCV, 2019
- **D. Barath,** J. Matas: *Progressive-X: Efficient, Anytime, Multi-Model Fitting Algorithm*, ICCV 2019;
- **D. Barath** and J. Matas: *Multi-Class Model Fitting by Energy Minimization and Mode-Seeking*, ECCV 2018
- **D. Barath** and J. Matas: *Graph-Cut RANSAC*, CVPR 2018;
- **D. Barath**: Five-point Fundamental Matrix Estimation for Uncalibrated Cameras CVPR 2018;
- **D. Barath**, T. Tóth, L. Hajder: *A Minimal Solution for Two-view Focal-length Estimation using Two Affine Correspondences*. CVPR 2017;

Other Conference Publications

- J. Zheng, G. Valasek, **D. Barath**, I. Armeni, Multi-HexPlanes: A Lightweight Map Representation for Rendering and 3D Reconstruction, WACV, 2025, Tucson, US, **ORAL**
- T. Wei, P. Lindenberger, J. Matas, **D. Barath**, Breaking the Frame: Visual Place Recognition by Overlap Prediction, WACV, 2025, Tucson, US
- P. Hruby, S. Liu, R. Pautrat, M. Pollefeys, **D. Barath**, Handbook on Leveraging Lines for Two-View Relative Pose Estimation, 3DV, 2024, Davos, Switzerland
- S. Jin, **D. Barath**, M. Pollefeys, I. Armeni, Q-REG: End-to-End Trainable Point Cloud Registration with Surface Curvature, 3DV, 2024, Davos, Switzerland
- **D. Barath**, I. Eichhardt, J. Noskova, J. Matas, Pose-graph via Adaptive Image Re-ordering, British Machine Vision Conference, 2022, London, England
- **D. Barath,** C. Sweeney, Relative Pose Solvers using Monocular Depth, International Conference on Pattern Recognition, 2022, Montreal, Canada
- **D. Barath**, J. Molnar, L. Hajder: Novel methods for estimating surface normals from affine transformations. 03/2015, DOI:10.1007/978-3-319-29971-6-17
- **D. Barath**: P-HAF: Homography Estimation Using Partial Local Affine Frames. 12th International Conference on Computer Vision Theory and Applications; 02/2017
- **D. Barath**, L. Hajder: Energy-based Topological Outlier Filtering. 23rd International Conference on Computer Vision, Cancún, Mexico; 12/2016
- **D. Barath**, J. Matas, L. Hajder: Multi-H: Efficient Recovery of Tangent Planes in Stereo Images. 27th British Machine Vision Conference, England, York; 09/2016, DOI:10.13140/RG.2.1.2381.5927
- **D. Barath**, J. Matas, L. Hajder: Accurate Closed-form Estimation of Local Affine Transformations Consistent with the Epipolar Geometry. 27th British Machine Vision Conference, England, York; 09/2016, DOI:10.13140/RG.2.1.2066.2001
- **D. Barath**, I. Eichhardt: A Novel Technique for Point-wise Surface Normal Estimation. The 11th International Conference on Computer Vision Theory and Applications, Rome; 02/2016, DOI:10.13140/RG.2.1.3295.9126
- **D. Barath**, L. Hajder: Novel Ways to Estimate Homography from Local Affine Transformations. 11th International Conference on Computer Vision Theory and Application, Rome; 02/2016
- **D. Barath**, I. Eichhardt: A Novel Technique for Point-wise Surface Normal Estimation. International Conference on Computer Vision Theory and Applications; 01/2016, DOI:10.5220/0005776406860693
- **D. Barath**, L. Hajder: Novel Ways to Estimate Homography from Local Affine Transformations. International Conference on Computer Vision Theory and Applications; 01/2016, DOI:10.5220/0005674904320443

- L. Hajder, **D. Barath**, J. Molnar: Optimal Surface Normal from Affine Transformation. VISAPP2015; 03/2015, DOI:10.5220/0005303703050316
- **D. Barath**, J. Molnár, L. Hajder: Novel Methods for Estimating Surface Normals from Affine Transformations. Computer Vision, Imaging and Computer Graphics Theory and Applications, Edited by José Braz, Julien Pettré, Paul Richard, Andreas Kerren, Lars Linsen, Sebastiano Battiato, Francisco Imai, 03/2016: pages 316-337; Springer International Publishing., ISBN: ISBN 978-3-319-29971-6, DOI:10.1007/978-3-319-29971-6_17