Sudipta N. Sinha – Curriculum Vitae

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Researcher in Computer Vision, Robotics and Computer Graphics.

Education

◇ **University of North Carolina**, Chapel Hill, USA

Ph.D. in Computer Science, August 2009.

- Thesis: Silhouettes for calibration and reconstruction from multiple views
- Advisor: Prof. Marc Pollefeys

M.S. in Computer Science, May 2005.

◇ **Indian Institute of Technology**, Kanpur, India

Bachelor of Technology in Computer Science and Engineering, May 2000.

Experience

◇ **Principal Researcher**, Nov 2019 – present
Microsoft Mixed Reality and HoloLens

Member of teams responsible for CV and ML-based algorithms and software for (a) on-device SLAM enabling AR experiences on Microsoft HoloLens, and (b) cloud-based visual mapping and localization enabling spatially grounded AI interactions. Technical contributions include:

- R&D on in-the-wild sensor calibration methods in visual inertial SLAM.
- visual 3D scene mesh reconstruction (digital twins) from HMDs and smartphones.
- visual SLAM, mapping and localization evaluation and benchmarks.
- cross-team explorations on improving vision technologies in real world use cases.

◇ **Principal Researcher (previously Researcher)**, Nov 2009 – Nov 2019
Microsoft Research Redmond

Pursued fundamental research in 3D computer vision. Main highlights include:

- Co-authored 70+ peer-reviewed research papers (53 conference papers, 11 journal papers, and 7 workshop papers), 5 book chapters, and 27 patents on multiple topics including structure from motion, dense 3d reconstruction, optic flow, scene flow, visual odometry, visual localization, novel view synthesis, path planning.
- Co-invented techniques for immersive 3D visualization of images & videos; tech transfers led to Microsoft Photosynth [2009-13] & Microsoft Hyperlapse Pro [2015].
- Mentored 30+ PhD research interns; led cross-disciplinary research collaborations.
- Advised product teams: Bing Maps, Bing Streetside, Microsoft HoloLens.
- Developed drone-based 3D aerial photogrammetry software for Microsoft FarmBeats, a research platform for precision agriculture and AI technologies.

◇ **Postdoctoral Researcher**, Microsoft Research, Redmond Sep 2008 – Oct 2009

◇ **Visiting Scholar**, Institute for Visual Computing, ETH Zurich May 2008 – Jun 2008

◇ **Research Assistant**, Dept. of Computer Science, UNC Chapel Hill Aug 2002 – Aug 2008
Worked on camera network calibration and synchronization, active pan-tilt zoom cameras, multi-view stereo, and GPU-based computer vision algorithms.

- **Research intern**, Microsoft Live Labs, Redmond — Jun 2007 – Aug 2007
  Developed an interactive system for sketch-based 3D modeling from images.
- **Research intern**, Siemens Corporate Research, Princeton — Jun 2005 – Aug 2005
  Implemented a new method for efficient SIFT feature extraction on GPUs.
- **Research intern**, Siemens Corporate Research, Princeton — May 2004 – Jul 2004
  Investigated active Pan-Tilt-Zoom camera calibration and image stitching.
- **Systems Analyst**, Deloitte Consulting, New York — Oct 2000 – Apr 2002
  Designed middleware software for finance applications.
- **Intern**, Institute for Informatik, Univerity of Zurich, — Jul 2000 – Sep 2000
  Developed a web-based distance learning software platform.
- **Intern**, Computer Graphics Lab, EPFL, Lausanne, — May 1999 – Jul 1999
  Developed a networking library for distributed virtual reality.

Teaching

- **Speaker**, Large Scale Visual Localization, CVPR 2023 conference tutorial. — Jun 2023
- **Speaker**, Large Scale Visual Localization, ICCV 2021 conference tutorial. — Oct 2021
- **Speaker**, Computer Vision Summer School, Basics of Modern AI, IIIT-H, India. — Jul 2018
- **Speaker**, Computer Vision on Microsoft HoloLens, IROS 2017 tutorial. — Sep 2017
- **Speaker**, Computer Vision on Microsoft HoloLens, CVPR 2017 tutorial. — Jul 2017
- **Speaker**, Geometric and Semantic 3D Reconstruction, CVPR 2017 tutorial. — Jul 2017
- **Speaker**, Structured and Semantic 3D Modeling, 3DV 2016 conference tutorial. — Oct 2016
- **Instructor**, Introduction to Scientific Programming (Comp116) — Aug – Dec 2006
  (Taught a full semester undergraduate class of 32 students).

Honors

- Best paper award recipient, *"Low-Cost Aerial Imaging for Small Holder Farmers"*, ACM SIGCAS Conf. on Computing and Sustainable Societies (ACM COMPASS) 2019.
- Best paper finalist, *"Revealing Scenes by Inverting Structure from Motion Reconstructions"*, CVPR 2019.
- Best demo award recipient (UNC Chapel Hill team), *"UrbanScape: Real-Time 3D Urban Mapping System"*, CVPR 2007.
- Outstanding Reviewer, Computer Vision and Pattern Recognition (CVPR), 2013, 2019.
- Outstanding Reviewer, European Conference on Computer Vision (ECCV), 2016.
- Outstanding Reviewer, Asian Conference on Computer Vision (ACCV), 2010, 2014.
- Recipient of the National Talent Scholarship, India, 1994 – 2000.

Journal Papers

- Q. Huang, J. DeGol, V. Fragoso, S. N. Sinha and John J. Leonard, "Optimizing Fiducial Marker Placement for Improved Visual Localization", IEEE Robotics and Automation Letters (**RA-L**), 2023, to be presented at IROS 2023.
- A. Shariati, C. Holz and S. N. Sinha, "Towards Privacy-Preserving Ego-Motion Estimation using an Extremely Low-Resolution Camera", IEEE Robotics and Automation Letters (**RA-L**), January 2020, to be presented at ICRA 2020.
- G. Ananthanarayanan, P. Bahl, P. Bodík, K. Chintalapudi, M. Philipose, L. Ravindranath and S. N. Sinha, "Real-Time Video Analytics: The Killer App for Edge Computing", Vol. 50 (10), (**IEEE Computer**), DOI: 10.1109/MC.2017.3641638, October 2017.

- S. You, Y. Matsushita, S. N. Sinha, Y. Bou, K. Ikeuchi, "Multiview Rectification of Folded Documents", IEEE Transactions on Pattern Analysis and Machine Intelligence, (**TPAMI**), DOI: 10.1109/TPAMI.2017.2675980, February 2017.
- J. Park, S. N. Sinha, Y. Matsushita, Y. W. Tai, I. S. Kweon, "Robust Multiview Photometric Stereo using Planar Mesh Parameterization", IEEE Transactions on Pattern Analysis and Machine Intelligence, (**TPAMI**), DOI: 10.1109/TPAMI.2016.2608944, September 2016.
- H. Lim, S. N. Sinha, M.F. Cohen, M. Uyttendaele and H. Jin Kim, "Real-time monocular image-based 6-DoF localization", International Journal of Robotics Research, (**IJRR**), 34(4-5): pp. 476–492 (2015).
- S. N. Sinha, J.-M.Frahm, M. Pollefeys and Y. Genc, "Feature Tracking and Matching in Video Using Programmable Graphics Hardware", Machine Vision and Applications, (**MVA**), 22(1): pp. 207–217 (2011).
- S. N. Sinha and M. Pollefeys, "Camera Network Calibration and Synchronization from Silhouettes in Archived Video", International Journal of Computer Vision, (**IJCV**), 87(3): pp. 266–283 (2010)
- M. Pollefeys, D. Nister, J.-M. Frahm, A. Akbarzadeh, P. Mordohai, B. Clipp, C. Engels, D. Gallup, S.-J. Kim, P. Merrell, C. Salmi, S. N. Sinha, B. Talton, L. Wang, Q. Yang, H. Stewénius, R. Yang, G. Welch, H. Towles, "Detailed Real-Time Urban 3D Reconstruction from Video", International Journal of Computer Vision, (**IJCV**), 78(2-3): pp. 143–167 (2008).
- P. Mordohai, J.-M. Frahm, A. Akbarzadeh, B. Clipp, C. Engels, D. Gallup, P. Merrell, C. Salmi, S. N. Sinha, B. Talton, L. Wang, Q. Yang, H. Stewénius, H. Towles, G. Welch, R. Yang, M. Pollefeys and D. Nister, "Real-time video-based reconstruction of urban environments", **ISPRS Working Group** 4 (2007).
- S. N. Sinha and M. Pollefeys, "Pan-Tilt-Zoom Camera Calibration and High-Resolution Mosaic Generation", Computer Vision and Image Understanding, (**CVIU**), Special issue on Omnidirectional Vision and Camera Networks, 103(3): pp. 170–183, (2006).

Conference Papers

- T. Do and S. N. Sinha, "Improved Scene Landmark Detection for Camera Localization", *International Conference on 3D Vision* (**3DV**), 2024.
- A. Islam, B. Lundell, H. Sawhney, S. N. Sinha, P. Morales and R. Radke, "Self-supervised Learning with Local Contrastive Loss for Detection and Semantic Segmentation", *IEEE Winter Conference on Applications of Computer Vision* (**WACV**), 2023.
- T. Do, O. Miksik, J. DeGol and H.S. Park, "Learning to Detect Scene Landmarks for Camera Localization", *CVF/IEEE Conf. on Computer Vision and Pattern Recognition* (**CVPR**) 2022.
- S. Jha, Y. Li, S. Noghabi, V. Ranganathan, P. Kumar, A. Nelson, M. Toelle, S. N. Sinha, R. Chandra, A. Badam, "Visage: Enabling Timely Analytics for Drone Imagery", *ACM International Conference On Mobile Computing And Networking* (**MobiCom**) 2021.
- M. Dusmanu, J. L. Schönberger, S. N. Sinha and M. Pollefeys, "Privacy-Preserving Image Features via Adversarial Affine Subspace Embeddings", *CVF/IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR**) 2021.
- J. Y. Lee, J. DeGol, V. Fragoso and S. N. Sinha, "PatchMatch-Based Neighborhood Consensus for Semantic Correspondence", *CVF/IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR**) 2021.
- P. Ghosh, V. Vineet, L. S. Davis, A. Shrivastava, S. N. Sinha and N. Joshi, "Depth Completion using a View-constrained Deep Prior", *International Conference on 3D Vision* (**3DV**), 2020.

- V. Fragoso and S. N. Sinha, "Generalized Pose-and-Scale Estimation using 4-Point Congruence Constraints", *International Conference on 3D Vision* (**3DV**), 2020.
- S. Kiciroglu, H. Rhodin, S. N. Sinha, M. Salzmann and P. Fua, "ActiveMoCap: Optimized Viewpoint Selection for Active Human Motion Capture", *CVF/IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR**) 2020.
- P. Speciale, J. Schönberger, S. N. Sinha and M. Pollefeys, "Privacy Preserving Image Queries for Camera Localization", *IEEE International Conference on Computer Vision* (**ICCV**) 2019.
- T. Hodan, V. Vineet, R. Gal, E. Shalev, J. Hanzelka, T. Connell, P. Urbina, S.N. Sinha and B. Guenter, "Photorealistic Image Synthesis for Object Instance Detection", *IEEE International Conference on Image Processing* (**ICIP**) 2019.
- V. N. Swamy, R. Chandra, Z. Kapetanovic, D. Vasisht, M. Swaminathan, R. Sharma, A. U. Nambi, S. N. Sinha, G. Ranade, A. Badam, R. Patil, A. Kumar and A. Jain, "Low-Cost Aerial Imaging for Small Holder Farmers", *ACM SIGCAS Conference on Computing and Sustainable Societies* (**ACM COMPASS**) 2019.
- P. Speciale, J. Schönberger, S. B. Kang, S. N. Sinha and M. Pollefeys, "Privacy Preserving Image-based Localization", *IEEE/CVF Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2019.
- F. Pittaluga, S. J. Koppal, S. B. Kang and S. N. Sinha, "Revealing Scenes by Inverting Structure from Motion Reconstructions", *IEEE/CVF Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2019.
- J. Schönberger, S. N. Sinha and M. Pollefeys, "Learning to Fuse Proposals from Multiple Scanline Optimizations in Semi-Global Matching", *European Conference on Computer Vision* (**ECCV**), 2018.
- B. Hepp, D. Dey, S. N. Sinha, A. Kapoor, N. Joshi and O. Hilliges, "Learn-to-Score: Efficient 3D Scene Exploration by Predicting View Utility", *European Conference on Computer Vision* (**ECCV**), 2018.
- J. Dong, B. Boots, F. Dellaert, R. Chandra and S. N. Sinha, "Learning to Align Images using Weak Geometric Supervision", *International Conference on 3D Vision* (**3DV**), 2018.
- B. Tekin, S. N. Sinha and P. Fua, "Real-Time Seamless Single Shot 6D Object Pose Prediction", *IEEE/CVF Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2018.
- M. Roberts, D. Dey, A. Truong, S. N. Sinha, S. Shah, A. Kapoor, P. Hanrahan, N. Joshi, "Submodular Trajectory Optimization for Aerial 3D Scanning", *IEEE International Conference on Computer Vision* (**ICCV**), 2017.
- D. Scharstein, T. Taniai and S. N. Sinha, "Semi-Global Stereo Matching with Surface Orientation Priors", *International Conference on 3D Vision* (**3DV**), 2017.
- A. Rozantsev, S. N. Sinha, D. Dey and P. Fua, "Flight Dynamics-based Recovery of a UAV Trajectory using Ground Cameras", *IEEE/CVF Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2017.
- T. Taniai, S. N. Sinha and Y. Sato, "Fast Multi-frame Stereo Scene Flow with Motion Segmentation", *IEEE/CVF Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2017.
- D. Vasisht, Z. Kapetanovic, J. Won, X. Jin, R. Chandra, A. Kapoor, S. N. Sinha, M. Sudarshan and S. Stratman, "FarmBeats: An IoT Platform for Data-Driven Agriculture", *14th USENIX Symposium on Networked Systems Design and Implementation* (**NSDI**), 2017.

- J. Park, Y. W. Tai, S. N. Sinha and I. S. Kweon, "Efficient and Robust Color Consistency for Community Photo Collections", *IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2016.
- T. Taniai, S. N. Sinha and Y. Sato, "Joint Recovery of Dense Correspondence and Cosegmentation in Two Images", *IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2016.
- H. Lim and S. N. Sinha, "Monocular Localization of a Moving Person Onboard a Quadrotor MAV", *IEEE International Conference on Robotics and Automation* (**ICRA**), 2015.
- J. Park, S. N. Sinha, Y. Matsushita, Y. W. Tai, I. S. Kweon, "Calibrating a non-isotropic near point light source using a plane", *IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2014.
- S. N. Sinha, D. Scharstein and R. Szeliski, "Efficient High-Resolution Stereo Matching using Local Plane Sweeps", *IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2014.
- K. Ramnath, S. Baker, L. Vanderwende, M. El-Saban, S. N. Sinha, A. Kannan, N. Hassan, M. Galley, Y. Yang, D. Ramanan, A. Bergamo and L. Torresani, "AutoCaption: Automatic Caption Generation for Personal Photos", *IEEE Winter Conference on Applications of Computer Vision* (**WACV**), 2014.
- K. Ramnath, S. N. Sinha, R. Szeliski and E. Hsiao, "Car make and model recognition using 3d curve alignment", *IEEE Winter Conf. on Applications of Computer Vision* (**WACV**), 2014.
- J. Park, S. N. Sinha, Y. Matsushita, Y.W. Tai, I.S. Kweon, "Multiview Photometric Stereo using Planar Mesh Parameterization", *IEEE International Conference on Computer Vision* (**ICCV**), 2013.
- A. Bergamo, S. N. Sinha and L. Torresani, "Leveraging Structure from Motion to Learn Discriminative Codebooks for Scalable Landmark Classification", *IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2013.
- A. Kowdle, S. N. Sinha and R. Szeliski, "Multiple View Object Cosegmentation using Appearance and Stereo Cues", *European Conference on Computer Vision* (**ECCV**), 2012.
- S. N. Sinha, K. Ramnath and R. Szeliski, "Detecting and Reconstructing 3D Mirror Symmetric Objects", *European Conference on Computer Vision* (**ECCV**), 2012.
- S. N. Sinha, J. Kopf, M. Goesele, D. Scharstein and R. Szeliski, "Image-Based Rendering for Scenes with Reflections", *ACM Transactions on Graphics* (**SIGGRAPH**), 31(4), 2012.
- H. Lim, S. N. Sinha, M. Cohen and M. Uyttendaele, "Real-time Image-based 6-DOF Localization in Large-Scale Environments", *IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2012.
- A. Cohen, C. Zach, S. N. Sinha and M. Pollefeys, "Discovering and exploiting 3D symmetries in structure from motion", *IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2012.
- R. Roberts, S. N. Sinha, R. Szeliski and D. Steedly, "Structure from motion for scenes with large duplicate structures", *IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2011.
- M. Bleyer, C. Rother, P. Kohli, D. Scharstein and S. N. Sinha, "Object Stereo - Joint Stereo Matching and Object Segmentation", *IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2011.
- K. Srijan, S. Ahsan, S. N. Sinha and C.V. Jawahar, "Image-based walkthroughs from incremental and partial scene reconstructions", *British Machine Vision Conference* (**BMVC**), 2010.

- S. N. Sinha, D. Steedly and R. Szeliski, "Piecewise Planar Stereo for Image-based Rendering", *IEEE International Conference on Computer Vision* (**ICCV**), 2009.
- S. N. Sinha, D. Steedly, R. Szeliskli, M. Agarwala and M. Pollefeys, "Interactive 3D Architectural Modeling from Unordered Photo Collections", *ACM Transactions on Graphics*, (**SIGGRAPH Asia**), 27(5), 2008.
- S. N. Sinha, P. Mordohai and M. Pollefeys, "Multi-View Stereo via Graph Cuts on the Dual of an Adaptive Tetrahedral Mesh", *International Conference on Computer Vision* (**ICCV**), 2007.
- L. Guan, S. N. Sinha, J. S. Franco and M. Pollefeys, "Visual Hull Construction in the Presence of Partial Occlusion", *International Symposium on 3D Data Processing, Visualization and Transmission* (**3DPVT**), 2006.
- A. Akbarzadeh, J.-M. Frahm, P. Mordohai, B. Clipp, C. Engels, D. Gallup, P. Merrell, M. Phelps, S. N. Sinha, B. Talton, L. Wang, Q. Yang, H. Stewenius, R. Yang, G. Welch, H. Towles, D. Nister and M. Pollefeys, "Towards Urban 3D Reconstruction From Video", *International Symposium on 3D Data Processing, Visualization and Transmission* (**3DPVT**), 2006.
- S. N. Sinha and M. Pollefeys, "Multi-view Reconstruction using Photo-consistency and Exact Silhouette Constraints: A Maximum-Flow Formulation", *IEEE International Conference on Computer Vision* (**ICCV**), 2005.
- S. N. Sinha M. Pollefeys and S.J. Kim, "High Resolution Multiscale Panoramic Mosaics from Pan-Tilt-Zoom Cameras", *Indian Conf. on Vision, Graphics & Image Proc.* (**ICVGIP**), 2004.
- S. N. Sinha and M. Pollefeys, "Visual-Hull Reconstruction from Uncalibrated and Unsynchronized Video Streams", *International Symposium on 3D Data Processing, Visualization and Transmission* (**3DPVT**), 2004.
- S. N. Sinha and M. Pollefeys, "Calibrating a network of cameras from live or archived video", *Advanced Concepts for Intelligent Systems* (**ACIVS**), 2004.
- S. N. Sinha and M. Pollefeys, "Synchronization and Calibration of Camera Networks from Silhouettes", *International Conference on Pattern Recognition* (**ICPR**), 2004.
- M. Pollefeys and S. N. Sinha, "Iso-disparity surfaces for general stereo configurations", *European Conference on Computer Vision* (**ECCV**), 2004.
- S. N. Sinha, M. Pollefeys and L. McMillan, "Camera Network Calibration from Dynamic Silhouettes", *IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2004.
- N. Kelshikar, X. Zabulis, K. Daniilidis, V. Sawant, S. N. Sinha, T. Sparks, S. Larsen, H. Towles, K. M.-Patel, H. Fuchs, J. Urbanic, K. Benninger, R. Reddy, and G. Huntoon, "Real-time Terascale Impementation of Tele-immersion," *International Conference on Computational Science* (**ICCS**), 2003.
- S. Paul, S. N. Sinha and A. Mukerjee, "Virtual Kathakali: Gesture Driven Metamorphosis", *International Conference on Knowledge Based Computer Systems* (**KBCS**), 1998.

Workshop Papers

- Z. Wang, V. Vineet, F. Pittaluga, S.N. Sinha, O. Cossairt, S.B. Kang, "Privacy-Preserving Action Recognition using Coded Aperture Videos", *Workshop on Challenges and Opportunities for Privacy and Security (CV-COPS)*, CVPR Workshop, 2019.
- V. Hedau, S. N. Sinha, C. L. Zitnick and R. Szeliski, "A Memory Efficient Discriminative approach for Location aided Recognition", *Workshop on Visual Analysis and Geo-Localization of Large-Scale Imagery*, (ECCV Workshop), 2012.

- H. Lim and S. N. Sinha, "Towards Real-Time Semantic Localization", *Workshop on Semantic Perception and Mapping*, (ICRA Workshop), 2012.
- S. N. Sinha, D. Steedly and R. Szeliski, "A multi-stage linear approach to structure from motion", *Workshop on Reconstruction and Modeling of Large-Scale 3D Virtual Environments*, (ECCV Workshop), 2010.
- S. N. Sinha, J.-M. Frahm, M. Pollefeys and Y. Genc, "GPU-based Video Feature Tracking and Matching", *Workshop on Edge Computing using New Commodity Architectures*, (EDGE), Chapel Hill, 2006.
- S. N. Sinha and M. Pollefeys, "Towards Calibrating a Pan-Tilt-Zoom Camera Network", *Workshop on Omnidirectional Vision and Camera Networks*, (OMNIVIS), 2004.
- H. Towles, S.U. Kum, T. Sparks, S. N. Sinha, S. Larsen and N. Beddes, "Transport and Rendering Challenges of Multi-Stream 3D Tele-Immersion Data", *Workshop on Collaborative Virtual Reality and Visualization* (CVRV), 2003.

Book Chapters

- S. N. Sinha, V. Hedau, C. L. Zitnick and R. Szeliski, "A Memory Efficient Discriminative Approach for Location-Aided Recognition", *Visual Analysis and Geo-Localization of Large Scale Imagery*, Springer, 2016 (expected).
- S. N. Sinha, "Multiview stereo", *Encyclopedia of Computer Vision*, K. Ikeuchi, M. Hebert and L. Quan (Eds.), Springer, 2014.
- S. N. Sinha, "Pan/Tilt/Zoom (PTZ) camera setup", *Encyclopedia of Computer Vision*, K. Ikeuchi, M. Hebert and L. Quan (Eds.), Springer, 2014.
- M. Pollefeys, S. N. Sinha, L. Guan, J.-S. Franco, "Multiview Calibration Synchronization and Dynamic Scene Reconstruction", *Multi-Camera Networks: Principles and Applications*, H. Aghajan and A. Cavallaro (Eds.), ELSEVIER, May 2009, ISBN-13: 978-0-12-374633-7.
- M. Pollefeys, S. N. Sinha and J. Yan, "Calibration and Shape Recovery from Videos of Dynamic Scenes", *Computational Vision in Neural and Machine Systems,* L. Harris and M. Jenkins (Eds.), Cambridge University Press, 2007.

Patents

- "Camera Localization", with T. Do, O. Miksik, and J. DeGol, *Patent App. 17/592500.*
- "Rapid target acquisition using gravity and north vectors", with R.K. Price, M. Bleyer, C.D. Edmonds, *Patent No. 11636645.*
- "Low motion to photon latency rapid target acquisition", with M. Bleyer, R.K. Price, C.D. Edmonds, *Patent No. 20230076331.*
- "Systems and methods for continuous image alignment of separate cameras", with M Bleyer, R.K. Price, C.D. Edmonds, M.E. Samples, M.B. Karr, *Patent No. 20220028095.*
- "Systems and methods for reducing a search area for identifying correspondences between images", with R.K. Price, M. Bleyer, C.D. Edmonds, *Patent No. 20220028093.*
- "Spatially Consistent Representation of Hand Motion", with B. Tekin, F. Bogo, H. Sawhney and M. Pollefeys, *Patent No. 20200311397.*
- "Camera Pose Estimation using Obfuscated Features", with M. Pollefeys and P. Speciale and S.B. Kang, *Patent No. 20200126256.*
- "Device Pose Estimation using 3D Line Clouds", with M. Pollefeys and P. Speciale and S.B. Kang, *Patent No. 20200005486.*
- "Scene reconstruction from bursts of image data", with N. Joshi and M.P. Vo, *Patent No. 20180225836.*
- "IoT Gateway For Weakly Connected Settings", with R. Chandra and others, *Patent No. 20190007505.*

- "Aerial imaging of a region using above ground aerial camera platform", with R. Chandra and others, *Patent No. 20180213187.*
- "Low-cost, long-term aerial imagery", with R. Chandra and others, *Patent No. 20180213186.*
- "Generating Real-Time Sensor Maps From Videos And In-Ground Sensor Data", with R. Chandra and others, *Patent No. 10089716.*
- "Polarized gaze tracking", with V. Thukral, V. Pradeep and others, *Patent App. 14/191305.*
- "Panorama Packet", with B. Arcas, M. Unger, E. J. Stollnitz and others, *Patent App. 13/804895.*
- "Image capture and ordering", with B. Arcas, M. Unger and others, *Patent App. 13/826091.*
- "Synth Packet For Interactive View Navigation Of A Scene", with M. Unger, B. Arcas, R. Szeliski and M. Uyttendaele, *Patent App. 13/826423.*
- "Translated View Navigation For Visualizations", with M. Unger, B. Arcas, D. Barnett, C. Messer, E. Stollnitz, T. Pylvaenaeinen, *Patent App. 13/804543.*
- "Object identification using 3-d curve matching", with E. Hsiao, K. Ramnath, S. Baker, C. L. Zitnick and R. Szeliski, *US Patent 9111349 B2, August 2015.*
- "Location-aided Recognition", with V. Hedau, C. L. Zitnick and R. Szeliski, *US Patent 9152882 B2, October 2015.*
- "Three Dimensional Object Browsing in Documents", with J. Kopf, E. Stollnitz, G. Zweig and R. Szeliski, *US Patent 9025860 B2, February 2015.*
- "Navigation Model To Render Centered Objects Using Images", with J. Kopf, E. Stollnitz and R. Szeliski, *US Patent 8675049, March 2014.*
- "Image Based Localization", with H. Lim, M. Cohen and M. Uyttendaele, *US Patent 8798357 B2, August, 2014.*
- "Performing Structure from Motion for Unordered Images Of a Scene With Multiple Object Instances", with R. Roberts, R. Szeliski and D. Steedly, *US Patent 8620095, December 2013.*
- "Multi-stage Linear Structure from Motion", with D. Steedly and R. Szeliski, *US Patent 8837811, September 2014.*
- "Piecewise Planar Rendering Of Three-Dimensional Scenes", with D. Steedly and R. Szeliskli, *US Patent 8933925, January 2015.*
- "Using Photo Collections for Three Dimensional Modeling", with D. Steedly, R. Szeliski and M. Agarwala, *US Patent 9001120, April 2015.*

Unrefereed Articles

- S. N. Sinha, "Calibration of a heterogeneous network of color and depth cameras", *Canesta Design Contest (Phase I)* winner, January 2005.
- S. N. Sinha, "Graph Cut Algorithms in Vision, Graphics and Machine Learning", *Research survey paper*, UNC Chapel Hill, December, 2004.

Professional Activities

- **Ph.D. Dissertation Committee member:**

  J. Dong, Georgia Tech, 2018.

  J. DeGol, Univ. of Illinois Urbana-Champaign (UIUC), 2018.

  B. Tekin, Ecole polytechnique federale de Lausanne (EPFL), 2018.

- **General:**

  Area Editor, Computer Vision and Image Understanding (CVIU) Journal, 2018 – 2023.

  Area Chair, International Conference on 3D Vision (3DV), 2022.

  Area Chair, International Conference on 3D Vision (3DV), 2020.

Area Chair, International Conference on 3D Vision (3DV), 2019.

Area Chair, International Conference on 3D Vision (3DV), 2018.

Program Co-chair "International Conference on 3D Vision (3DV)", 2017.

Co-organizer "Special Session on Geometry and Optimization in Computer Vision", American Mathematical Society (AMS) Spring Sectional Meeting, 2017.

Area Chair, International Conference on Computer Vision (ICCV), 2017.

Area Chair, International Conference on 3D Vision (3DV), 2016.

Industry and Demo Chair, 3rd Joint 3DIM/3DPVT Conference (3DV 2013).

◇ **Conference Program Committee Member:**

Senior PC, International Joint Conferences on Artificial Intelligence (IJCAI) 2021.

Senior PC, International Joint Conferences on Artificial Intelligence (IJCAI-PRICAI) 2020.

IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2009–2024.

IEEE International Conference on Computer Vision (ICCV) 2009–2023.

International Conference on Learning Representations (ICLR) 2024, 2025.

European Conference on Computer Vision (ECCV) 2008–2024.

Conference on Artificial Intelligence (AAAI), 2018, 2019.

3D Processing, Visualization and Transmission (3DPVT 2012, 3DV 2013–2015, 2023, 2024).

Asian Conference on Computer Vision (ACCV) 2009–2018.

British Machine Vision Conference (BMVC) 2017–2019.

Indian Conference on Vision, Graphics and Image Processing (ICVGIP) 2010–2016.

Conf. on Computer Vision, Pattern Recognition, Image Proc.& Graphics(NCVPRIPG 2011).

ACM Multimedia Conference 2016.

◇ **Workshop Program Committee Member:**

Photogrammetric Computer Vision Workshop (CVPR 2019).

Workshop on Performance Metrics for Correspondence Problems (CVPR 2015).

Ground Truth - What is a good dataset ? (CVPR 2013 Workshop).

Workshop on Unsolved Problems in Optic Flow and Stereo Estimation (ECCV 2012).

Consumer Depth Cameras for Computer Vision (ECCV 2012 Workshop).

Vision and Graphics Computing for Multimedia Communications (ICME 2011 Workshop).

Reconstruction and Modeling of Large-Scale 3D Virtual Environments (ECCV 2010 Workshop).

Computer Vision on GPUs (CV-GPU) (ECCV 2010 Workshop).

Dynamic 3D Imaging (DAGM 2009 Workshop).

Time of Flight Camera-based Computer Vision (TOF–CV), (CVPR 2008 Workshop).

◇ **Conference Reviewer:**

CVPR 2006–08, ICCV 2007, ECCV 2006, WACV 2008, SIGGRAPH 2008–14, 2017–19, SIGGRAPH Asia 2009–12, 2016–2018, EuroGraphics 2012, 2014–16, ICRA 2015–16, IROS 2016.

◇ **Journal Reviewer:**

ACM Transaction on Graphics (ToG),

International Journal of Computer Vision (IJCV),

IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI),

IEEE Transactions on Visualization and Computer Graphics (TVCG),

IEEE Transactions of Image Processing (TIP),
IEEE Transactions of Computational Imaging (TCI),
IEEE IEEE Transactions on Multimedia (TMM),
Computer Vision and Image Understanding (CVIU),
Journal of Visual Communication and Image Representation (JVCI),
Machine Vision and Applications (MVA),
Image and Visual Computing (IVC).
IEEE Signal Processing Letters.
IEEE Pervasive Computing.
Optics Express.

Invited Talks

- *Privacy-Preserving Camera Localization in Pre-Mapped Environments*, Workshop on Privacy-Preserving Computer Vision, WACV 2024.
- *Towards Storage Efficient and Privacy Preserving Camera Localization in Premapped Environments*, Workshop on Visual Odometry and Computer Vision Applications based on Location Clues, CVPR 2022 workshop.
- *Towards Privacy-Preserving Spatial AI*, Advancing AI summit, Washington State Univ. 2020.
- *Project FarmBeats: Aerial Mapping for Agricultural Farms and Beyond*, The 1st Intl. Workshop on Agriculture-Vision, CVPR 2020.
- *Privacy-Preserving Image-based Localization*, Osaka Univ, 2019.
- *Recovering Image Correspondence: New Methods and Applications*, Shonan meeting on Optimization Methods in Geometric Vision, NII Shonan, 2019.
- *Recent Progress in Stereo, Scene Flow and Object Pose Estimation*, Georgia Tech 2018.
- *Efficient and Accurate 3D Scene Reconstruction and Object Pose Prediction*, UIUC 2018.
- *FarmBeats: AI and IoT for Agriculture*, Computational Sustainability Virtual Seminar, 2018.
- *Flexible priors for robust dense stereo matching*, Intl. Workshop on Lines, Planes and Manhattan Models for 3-D Mapping (LPM 2017), IROS workshop, 2017.
- *Towards exploiting image correspondence for weakly supervised visual recognition*, Microsoft Research Asia Faculty Summit, Yonsei Univ., 2016.
- *Correspondence Estimation in Images: New Techniques and Applications*, GRAIL seminar, University of Washington, 2016.
- *Efficient high-resolution stereo matching using local plane sweeps*, CVPR Workshop on Registration of Very Large Images, 2014.
- *Recent work in image-based rendering from unstructured image collections and remaining challenges*, Dynamic Maps Dagstuhl Seminar, 2010.
- *Parallel Computer Vision Algorithms*, (with Rick Szeliski and Sameer Agarwal), UPCRC Multicore Applications Workshop, Microsoft Research, 2009.
- *Multi-view approaches for camera calibration and image-based modeling*, Microsoft Research, 2008.
- *Silhouettes for calibration and reconstruction from multiple views*, Indian Institute of Information Technology, (IIIT) Hyderabad, 2007.
- *Computer Vision using GPUs*, *guest lecture*, UNC Chapel Hill, 2007.
- *Feature tracking and matching*, *guest lecture*, UNC Chapel Hill, 2006.
- *Graph Cuts for Discrete Optimization*, *guest lecture*, UNC Chapel Hill, 2005.

Skills

- C, C++, Python, MATLAB.

Tools/Libs

- OpenCV, OpenGL, Eigen, Ceres, PyTorch, Git, Latex.