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## Prof. Yu-Kun Lai

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### Education

- 09/2006 – 07/2008, PhD in Computer Science, Tsinghua University, Beijing, China
- 09/2003 – 07/2006, Master in Computer Science, Tsinghua University, Beijing, China
- 09/1999 – 07/2003, Bachelor in Computer Science, Tsinghua University, Beijing, China

### Academic Employment

- 2020 – present, Cardiff University, Wales, UK
  - Professor, School of Computer Science and Informatics
  - Responsibilities: Teaching and Research
  - Areas of Interest: Computer Graphics, Geometry Processing, Computer Vision
- 2018 – 2020, Cardiff University, Wales, UK
  - Reader, School of Computer Science and Informatics
- 2016 – 2018, Cardiff University, Wales, UK
  - Senior Lecturer, School of Computer Science and Informatics
- 2009 – 2016, Cardiff University, Wales, UK
  - Lecturer in Visual Computing, School of Computer Science and Informatics
- 2008 – 2009, Tsinghua University, Beijing, China
  - Research Fellow at Visual Media Research Center, Dept. of Computer Science and Technology

### Academic Visit

- 10/2007 – 04/2008, Computer Science Department, Stony Brook University, Stony Brook, NY, USA

### Teaching Activities

- 21/22, 20/21, 19/20, 17/18, 16/17, 15/16 Spring CM1208 Maths for Computer Science
- 21/22, 20/21, 19/20 CMT307 Applied Machine Learning (shared with Dr. Y. Qin/Dr. Y. Li)
- 21/22, 20/21 CMT316 Applications of Machine Learning (shared with Dr. Y. Qin/Dr. Y. Li)
- 21/20 CMT219 Algorithms, Data Structures and Programming (shared with Dr. Y. Li/M. Morgan)
- 20/19, 17/18, 16/17, 15/16, 14/15, 13/14, 12/13 Spring CMT205 Object-Oriented Development with Java (shared with Dr. Y. Li/M. Morgan)
- 17/18, 16/17, 15/16 Spring CM2208 Scientific Computing (shared with Prof. A.D. Marshall)
- 17/18, 16/17, 15/16 Autumn CM2104 Computational Mathematics (shared with Prof. A. D. Marshall)

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- 14/15, 13/14, 12/13, 11/12 Spring CM1203: Fundamentals of Computing with Java (shared with M. Morgan)
  - 14/15, 13/14, 12/13, 11/12 Spring CM2202: Scientific Computing and Multimedia Applications (shared with Prof. A. D. Marshall and Dr. S. Schockaert)
  - 11/12, 10/11, 09/10 Autumn & Spring CMT912: Programming (shared with Prof. R. R. Martin)
  - 10/11 Autumn: CM0340: Multimedia
  - 10/11, 09/10 Spring CM0268: Data audio graphics & image signal processing with MATLAB (shared with Prof. A. D. Marshall)
  - 09/10 Spring CMT502: Data Structures and Algorithms (shared with Dr. X. Sun)

## Research Projects

- Intelligent shape editing with robust feature analysis, EPSRC, 12/2010-7/2012, PI
- Using mosaicing for finite element meshing, 10/2010-10/2013, Airbus (PhD Studentship), CoI
- Small items of research equipment at Cardiff University, EPSRC, 11/2012-3/2013, CoI
- Intrinsic Voronoi/Delaunay structure on manifold mesh and its applications in visual computing. Royal Society Newton Advanced Fellowship, 3/2016-2/2020, UK lead.
- Data-driven realistic human motion reconstruction. Royal Society Newton Mobility Grant, 4/2016-3/2018, UK lead.
- Perceptual shape optimisation for 3D printing. Royal Society. 3/2018-3/2022, PI.
- Structural analysis of stereoscopic 360-degree video for mixed reality. Royal Society, 9/2018-8/2022, PI.
- Data driven geometric reconstruction from single images. Natural Science Foundation of China, 1/2019-12/2020, PI.
- Deep Representations for Analysis and Reconstruction of 3D Shapes with Complex Structure and Rich Details, Newton Advanced Fellowship (12/2019-5/2023), UK lead.
- China-UK Workshop on Visual Signal Cognition and Understanding, PI (1/2020-12/2021), British Council and NSF China.

## Publications

### *Edited Book*

1. “RGB-D Image Analysis and Processing”, editors P.L. Rosin, **Y.-K. Lai**, L. Shao, Y. Liu, Springer, ISBN 978-3-030-28603-3, 2019.

### *Journal Articles*

1. R. Yi, Y.-J. Liu, **Y.-K. Lai**, P. L. Rosin, “Quality metric guided portrait line drawing generation from unpaired training data”, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, to appear.
2. Q. Tan, L.-X. Zhang, J. Yang, **Y.-K. Lai**, L. Gao, “Mesh-based variational autoencoders for localized deformation component analysis”, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, to appear.
3. J. Liu, B. Hui, K. Li, Y. Liu, **Y.-K. Lai**, Y. Zhang, Y. Liu, J. Yang, “Geometry-guided dense perspective network for speech-driven facial animation”, *IEEE Transactions on*

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- Visualization and Computer Graphics*, to appear.
4. Y. He, Y.-T. Liu, Y.-H. Jin, S.-H. Zhang, **Y.-K. Lai**, S.-M. Hu, “Context-consistent generation of indoor virtual environments based on geometry constraints”, *IEEE Transactions on Visualization and Computer Graphics*, to appear.
  5. J. Yang, L. Gao, Q. Tan, Y.-H. Huang, S. Xia, **Y.-K. Lai**, “Multiscale mesh deformation component analysis with attention-based autoencoders”, *IEEE Transactions on Visualization and Computer Graphics*, to appear.
  6. Z. Ye, M. Xia, Y. Sun, R. Yi, M. Yu, J. Zhang, **Y.-K. Lai**, Y.-J. Liu, “3D-CariGAN: an end-to-end solution to 3D caricature generation from normal face photos”, *IEEE Transactions on Visualization and Computer Graphics*, to appear.
  7. Y. Shu, R. Yi, M. Xia, Z. Ye, W. Zhao, Y. Chen, **Y.-K. Lai**, Y.-J. Liu, “GAN-based multi-style photo cartoonization”, *IEEE Transactions on Visualization and Computer Graphics*, to appear.
  8. Y.-L. Qiao, **Y.-K. Lai**, H. Fu, L. Gao, “Synthesizing mesh deformation sequences with bidirectional LSTM”, *IEEE Transactions on Visualization and Computer Graphics*, to appear.
  9. X. Yang, Z. Ji, J. Wu, **Y.-K. Lai**, C. Wei, G. Liu, R. Setchi, “Hierarchical reinforcement learning with universal policies for multi-step robotic manipulation”, *IEEE Transactions on Neural Networks and Learning Systems*, to appear.
  10. Z. Ye, M. Xia, R. Yi, J. Zhang, **Y.-K. Lai**, X. Huang, G.-X. Zhang, Y.-J. Liu, “Audio-driven talking face video generation with dynamic convolution kernels”, *IEEE Transactions on Multimedia*, to appear.
  11. X. Du, C. Ma, G. Zhang, J. Li, **Y.-K. Lai**, G. Zhao, X. Deng, Y.-J. Liu, H. Wang, “An efficient LSTM network for emotion recognition from multichannel EEG signals”, *IEEE Transactions on Affective Computing*, to appear.
  12. P. L. Rosin, **Y.-K. Lai**, D. Mould, R. Yi, I. Berger, L. Doyle, S. Lee, C. Li, Y.-J. Liu, A. Semmo, A. Shamir, M. Son, H. Winnemöller, “NPRportrait 1.0: a three-level benchmark for non-photorealistic rendering of portraits”, *Computational Visual Media*, to appear.
  13. R. Yi, Y. Weng, M. Yu, **Y.-K. Lai**, Y.-J. Liu, “Lesion region segmentation via weakly supervised learning”, *Quantitative biology*, to appear.
  14. Y.-L. Qiao, L. Gao, J. Yang, P. L. Rosin, **Y.-K. Lai**, X. Chen, “Learning on 3D meshes with Laplacian encoding and pooling”, *IEEE Transactions on Visualization and Computer Graphics*, vol. 28(2), pp. 1317-1327, 2022.
  15. K. Maher, Z. Huang, J. Song, X. Deng, **Y.-K. Lai**, C. Ma, H. Wang, Y.-J. Liu, H. Wang, “E-ffective: a visual analytic system for exploring the emotion and effectiveness of inspirational speeches”, *IEEE Transactions on Visualization and Computer Graphics (VIS 2021)*, vol. 28(1), pp. 508-517, 2022.
  16. Y. Tang, Y. Zhang, X. Han, F.-L. Zhang, **Y.-K. Lai**, R. Tong, “3D corrective nose reconstruction from a single image”, *Computational Visual Media*, vol. 8(2), pp. 225-237, 2022.
  17. D. George, X. Xie, **Y.-K. Lai**, G. K.L. Tam, “A deep learning driven active framework for segmentation of large 3D shape collections”, *Computer-Aided Design*, vol. 144, 103179, 2022.
  18. S.-Y. Chen, F.-L. Liu, **Y.-K. Lai**, P. L. Rosin, C. Li, H. Fu, L. Gao, “DeepFaceEditing:

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- deep face generation and editing with disentangled geometry and appearance control”, *ACM Transactions on Graphics (ACM SIGGRAPH)*, vol. 40(4), pp. 90:1-15, 2021.
19. Z. Liu, X. Han, Y. Zhang, X. Chen, **Y.-K. Lai**, E. L. Dubrovski, E. Whiting, C. C.L. Wang, “Knitting 4D garments with elasticity controlled for body motion”, *ACM Transactions on Graphics (ACM SIGGRAPH)*, vol. 40(4), pp. 62:1-16, 2021.
  20. L. Gao, T. Wu, Y.-J. Yuan, M.-X. Lin, **Y.-K. Lai**, H. Zhang, “TM-NET: deep generative networks for textured meshes”, *ACM Transactions on Graphics (ACM SIGGRAPH Asia)*, vol. 40(6), pp. 263:1-15, 2021.
  21. R. Yi, M. Xia, Y.-J. Liu, **Y.-K. Lai**, P. L. Rosin, “Line drawings for face portraits from photos using global and local structure based GANs”, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 43(10), pp. 3462-3475, 2021.
  22. R. Yi, Z. Ye, W. Zhao, M. Yu, **Y.-K. Lai**, Y.-J. Liu, “Feature-aware uniform tessellations on video manifold for content-sensitive supervoxels”, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 43(9), pp. 3183-3195, 2021.
  23. Q. Xie, **Y.-K. Lai**, J. Wu, Z. Wang, Y. Zhang, K. Xu, J. Wang, “Vote-based 3D Object Detection with Context Modeling and SOB-3DNMS”, *International Journal of Computer Vision*, vol. 129(6), pp. 1857-1874, 2021.
  24. X. Wu, J. Chang, **Y.-K. Lai**, J. Yang, Q. Tian, “BiSPL: bidirectional self-paced learning for recognition from web data”, *IEEE Transactions on Image Processing*, vol. 30, pp. 6512-6527, 2021.
  25. H. Hou, J. Huo, J. Wu, **Y.-K. Lai**, Y. Gao, “MW-GAN: multi-warping GAN for caricature generation with multi-style geometric exaggeration”, *IEEE Transactions on Image Processing*, vol. 30, pp. 8644-8657, 2021.
  26. K. Li, H. Wen, Y. Zhang, X. Li, J. Huang, C. Yuan, **Y.-K. Lai**, Y. Liu, “Image-guided human reconstruction via multi-scale graph transformation networks”, *IEEE Transactions on Image Processing*, vol. 30, pp. 5239-5251, 2021.
  27. L. Gao, L.-X. Zhang, H.-Y. Meng, Y.-H. Ren, **Y.-K. Lai**, L. Kobbelt, “PRS-Net: planar reflective symmetry detection net for 3D models”, *IEEE Transactions on Visualization and Computer Graphics*, vol. 27(6), pp. 3007-3018, 2021.
  28. Y. Zhang, **Y.-K. Lai**, F.-L. Zhang, “Content-preserving image stitching with piecewise rectangular boundary constraints”, *IEEE Transactions on Visualization and Computer Graphics*, vol. 27(7), pp. 3198-3212, 2021.
  29. X. Yao, S. Zhao, **Y.-K. Lai**, D. She, J. Liang, J. Yang, “APSE: attention-aware polarity sensitive embedding for emotion-based image retrieval”, *IEEE Transactions on Multimedia*, vol. 23, pp. 4469-4482, 2021.
  30. L. Gao, **Y.-K. Lai**, J. Yang, L.-X. Zhang, S. Xia, L. Kobbelt, “Sparse data driven mesh deformation”, *IEEE Transactions on Visualization and Computer Graphics*, vol. 27(3), pp. 2085-2100, 2021.
  31. Y.-J. Liu, B.-J. Li, **Y.-K. Lai**, “Sparse MDMO: learning a discriminative feature for micro-expression recognition”, *IEEE Transactions on Affective Computing*, vol. 12(1), pp. 254-261, 2021.
  32. L. Yang, J. Wu, J. Huo, **Y.-K. Lai**, Y. Gao, “Learning 3D face reconstruction from a single sketch”, *Graphical Models*, vol. 115, 101102, 2021.
  33. S. Zhang, Z. Han, **Y.-K. Lai**, M. Zwicker, H. Zhang, “Active arrangement of small

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- objects in 3D indoor scenes”, *IEEE Transactions on Visualization and Computer Graphics*, vol. 27(4), pp. 2250-2264, 2021.
34. Z. Jiang, H. Yue, **Y.-K. Lai**, J. Yang, Y. Hou, C. Hou, “Deep edge map guided depth super resolution”, *Signal Processing: Image Communication*, vol. 90, 116040, 2021.
  35. J. Huang, S. Yang, Z. Zhao, **Y.-K. Lai**, S.-M. Hu, “ClusterSLAM: a SLAM backend for simultaneous rigid body clustering and motion estimation”, *Computational Visual Media*, vol. 7, pp. 87-101, 2021.
  36. S. Yang, B.-C. Li, Y.-P. Cao, H. Fu, **Y.-K. Lai**, L. Kobbelt, S.-M. Hu, “Noise-resilient reconstruction of panoramas and 3D scenes using robot-mounted unsynchronized commodity RGB-D cameras”, *ACM Transactions on Graphics*, vol. 39(5), 152, 2020.
  37. Y.-J. Liu, Y. Han, Z. Ye, **Y.-K. Lai**, “Ranking-preserving cross-source learning for image retargeting quality assessment”, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 42(7), pp. 1798-1805, 2020.
  38. K. Li, J. Zhang, Y. Liu, **Y.-K. Lai**, Q. Dai, “PoNA: pose-guided non-local attention for human pose transfer”, *IEEE Transactions on Image Processing*, vol. 29, pp. 9584-9599, 2020.
  39. B. Li, **Y.-K. Lai**, P. L. Rosin, “Sparse graph regularized mesh color edit propagation”, *IEEE Transactions on Image Processing*, vol. 29, pp. 5408-5419, 2020.
  40. J. Yang, J. Xu, K. Li, **Y.-K. Lai**, H. Yue, J. Lu, H. Wu, Y. Liu, “Learning to reconstruct and understand indoor scenes from sparse views”, *IEEE Transactions on Image Processing*, vol. 29, pp. 5753-5766, 2020.
  41. S. Yang, B. Li, M. Liu, **Y.-K. Lai**, L. Kobbelt, S.-M. Hu, “HeteroFusion: dense scene reconstruction integrating multi-sensors”, *IEEE Transactions on Visualization and Computer Graphics*, vol. 26(11), pp. 3217-3230, 2020.
  42. S.-M. Hu, J.-X. Cai, **Y.-K. Lai**, “Semantic Labeling and Instance Segmentation of 3D Point Clouds using Patch Context Analysis and Multiscale Processing”, *IEEE Transactions on Visualization and Computer Graphics*, vol. 26(7), pp. 2485-2498, 2020.
  43. J. Zhang, C. Li, Q. Song, L. Gao, **Y.-K. Lai**, “Automatic 3D tooth segmentation using convolutional neural networks in harmonic parameter space”, *Graphical Models*, vol. 109, 101071, 2020.
  44. J. Yang, X. Guo, K. Li, M. Wang, **Y.-K. Lai**, F. Wu, “Spatio-temporal reconstruction for 3D motion recovery”, *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 30(6), pp. 1583-1596, 2020.
  45. D. She, J. Yang, M.-M. Cheng, **Y.-K. Lai**, P. L. Rosin, L. Wang, “WSCNet: weakly supervised coupled networks for visual sentiment classification and detection”, *IEEE Transactions on Multimedia*, vol. 22(5), pp. 1358-1371, 2020.
  46. M.-M. Cheng, X.-C. Liu, J. Wang, S.-P. Lu, **Y.-K. Lai**, P. L. Rosin, “Structure-preserving neural style transfer”, *IEEE Transactions on Image Processing*, vol. 29, pp. 909-920, 2020.
  47. M.-Y. Cui, S.-P. Lu, M. Wang, Y.-L. Yang, **Y.-K. Lai**, P. L. Rosin, “3D computational modeling and perceptual analysis of kinetic depth effects”, *Computational Visual Media*, vol. 6(3), pp. 265-277, 2020.
  48. F. Langenfeld, Y. Peng, **Y.-K. Lai**, P. L. Rosin, et al. “SHREC2020 track: multi-domain protein shape retrieval challenge”, *Computers and Graphics*, vol. 91, pp. 189-198, 2020.

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49. R. M Dyke, **Y.-K. Lai**, P. L. Rosin, S. Zappala, S. Dykes, D. Guo, K. Li, R. Martin, S. Melzi, J. Yang, "SHREC'20: shape correspondence with non-isometric deformations", *Computers and Graphics*, vol. 92, pp. 28-43, 2020.
  50. H. M. Htike, T. Margrain, **Y.-K. Lai**, P. Elsambolchilar, "Ability of head-mounted display technology to improve mobility in people with low vision: a systematic review", *Translational Vision Science & Technology*, vol. 9, 26, 2020.
  51. Y.-P. Xiao, **Y.-K. Lai**, F.-L. Zhang, C. Li, L. Gao, "A survey on deep geometry learning: from a representation perspective", *Computational Visual Media*, vol. 6(2), pp. 113-133, 2020.
  52. S. Xu, **Y.-K. Lai**, "Simultaneous multi-attribute image-to-image translation using parallel latent transform networks", *Computer Graphics Forum*, vol. 39(7), pp. 531-542, 2020.
  53. H.-H. Zhao, P. L. Rosin, **Y.-K. Lai**, Y.-N. Wang, "Automatic semantic style transfer using deep convolutional neural networks and soft masks", *The Visual Computer*, vol. 36, pp. 1307-1324, 2020.
  54. H.-H. Zhao, P. L. Rosin, **Y.-K. Lai**, J.-H. Zheng, Y.-N. Wang, "Adaptive gradient-based block compressive sensing with sparsity for noisy images", *Multimedia Tools and Applications*, vol. 79, pp. 14825-14847, 2020.
  55. L. Gao, J. Yang, T. Wu, Y.-J. Yuan, H. Fu, **Y.-K. Lai**, H. Zhang, "SDM-NET: Deep generative network for structured deformable mesh", *ACM Transactions on Graphics (SIGGRAPH Asia 2019)*, vol. 38(6), pp. 243, 2019.
  56. K. Li, J. Yang, **Y.-K. Lai**, D. Guo, "Robust non-rigid registration with reweighted position and transformation sparsity", *IEEE Transactions on Visualization and Computer Graphics*, vol. 25(6), pp. 2255-2269, 2019.
  57. K. Li, J. Yang, D. Guo, Z. Wu, **Y.-K. Lai**, "Global 3D non-rigid registration of deformable objects using a single RGB-D camera", *IEEE Transactions on Image Processing*, vol. 28(10), pp. 4746-4761, 2019.
  58. B. Li, **Y.-K. Lai**, M. John, P. L. Rosin, "Automatic example-based image colorization using location-aware cross-scale matching", *IEEE Transactions on Image Processing*, vol. 28(9), pp. 4606-4619, 2019.
  59. H.-H. Zhao, P. L. Rosin, **Y.-K. Lai**, "Block compressive sensing for solder joint images with wavelet packet thresholding", *IEEE Transactions on Components, Packaging and Manufacturing Technology*, vol. 9(6), pp. 1190-1199, 2019.
  60. K. Li, J. Liu, **Y.-K. Lai**, J. Yang, "Generating 3D faces using multi-column graph convolutional networks", *Computer Graphics Forum*, vol. 38(7), pp. 215-224, 2019.
  61. E. Krumhuber, **Y.-K. Lai**, P. L. Rosin, K. Hugenberg, "When facial expressions do and do not signal minds: The role of face inversion, expression dynamism, and emotion type", *Emotion*, vol. 19(4), pp. 746-750, 2019.
  62. J.-X. Cai, T.-J. Mu, **Y.-K. Lai**, S.-M. Hu, "Deep point-based scene labelling with depth mapping and geometric patch feature encoding", *Graphical Models*, vol. 104, 2019.
  63. Y.-J. Yuan, **Y.-K. Lai**, T. Wu, S. Xia, L. Gao, "Data-driven weight optimization for real-time mesh deformation", *Graphical Models*, vol. 104, 2019.
  64. T. Wang, D. George, **Y.-K. Lai**, X. Xie, G. K.L. Tam, "Consistent segment-wise matching with multi-layer graphs", *Computer Aided Geometric Design*, vol. 70, pp.

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65. R. Dyke, **Y.-K. Lai**, P. L. Rosin, G. K.L. Tam, “Non-rigid registration under anisotropic deformations”, *Computer Aided Geometric Design*, vol. 71, pp. 142-156, 2019.
  66. S. Zhang, Z. Han, **Y.-K. Lai**, M. Zwicker, H. Zhang, “Stylistic scene enhancement GAN: mixed stylistic enhancement generation for 3D indoor scenes”, *The Visual Computer*, vol. 35(6-8), pp. 1157-1169, 2019.
  67. Y. Zhang, **Y.-K. Lai**, F.-L. Zhang, “Stereoscopic image stitching with rectangular boundaries”, *The Visual Computer*, vol. 35(6-8), pp. 823-835, 2019.
  68. Y. Liu, **Y.-K. Lai**, Z. Wang, H. Yan, “A new learning approach to malware classification using discriminative feature extraction”, *IEEE Access*, vol. 7, pp. 13015-13023, 2019.
  69. H.-H. Zhao, P. L. Rosin, **Y.-K. Lai**, M.-G. Lin, Q.-Y. Liu, “Image neural style transfer with global and local optimization fusion”, *IEEE Access*, vol. 7, pp. 85573-85580, 2019.
  70. L. Gao, J. Yang, Y.-L. Qiao, **Y.-K. Lai**, P. L. Rosin, W. Xu, S. Xia. “Automatic unpaired shape deformation transfer”, *ACM Transactions on Graphics*, vol. 37(6), pp. 237:1-15, 2018.
  71. P. L. Rosin, **Y.-K. Lai**, C. Liu, G. R. Davies, D. Mills, G. Tuson, Y. Russell, “Virtual recovery of content from X-ray microtomography scans of damaged historic scrolls”, *Scientific Reports*, Article No. 11901, 2018.
  72. J. Yang, X. Sun, **Y.-K. Lai**, L. Zheng, M.-M. Cheng, “Recognition from Web Data: A Progressive Filtering Approach”, *IEEE Transactions on Image Processing*, vol. 27(11), pp. 5303-5315, 2018.
  73. J. Yang, L. Gao, **Y.-K. Lai**, P. L. Rosin, S. Xia, “Bi-harmonic deformation transfer with automatic key point selection”, *Graphical Models*, vol. 98, pp. 1-13, 2018.
  74. L. Wan, Y. Xiao, N. Dou, C.-S. Leung, **Y.-K. Lai**. “Scribble-based gradient mesh recoloring”, *Multimedia Tools and Applications*, vol. 77(11), pp. 13753-13771, 2018.
  75. C. Liu, P. L. Rosin, **Y.-K. Lai**, W. Hu, “Robust Virtual Unrolling of Historical Parchment XMT Images”, *IEEE Transactions on Image Processing*, vol. 27(4), pp. 1914-1926, 2018.
  76. B. Li, R. Liu, J. Cao, J. Zhang, **Y.-K. Lai**, X. Liu, “Online low-rank representation learning for joint multi-subspace recovery and clustering”, *IEEE Transactions on Image Processing*, vol. 27(1), pp. 335-348, 2018.
  77. Y. Liang, F. Xu, S.-H. Zhang, **Y.-K. Lai**, T. Mu. “Knowledge graph construction with structure and parameter learning for indoor scene design”, *Computational Visual Media*, vol. 4(2), pp. 123-137, 2018.
  78. B. Li, F. Zhao, Z. Su, X. Liang, **Y.-K. Lai**, P. L. Rosin, “Example-based image colorization using locality consistent sparse representation”, *IEEE Transactions on Image Processing*, vol. 26(11), pp. 5188-5202, 2017.
  79. K. Li, J. Yang, L. Liu, R. Boulic, **Y.-K. Lai**, Y. Liu, Y. Li, E. Molla. “SPA: Sparse Photorealistic Animation Using a Single RGB-D Camera”, *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 27(4), pp. 771-783, 2017.
  80. L. Gao, S.-Y. Chen, **Y.-K. Lai**, S. Xia, “Data-Driven Shape Interpolation and Morphing Editing”, *Computer Graphics Forum*, vol. 36(8), pp. 19-31, 2017.
  81. S.-Y. Chen, L. Gao, **Y.-K. Lai**, S. Xia, “Rigidity Controllable As-Rigid-As-Possible Shape Deformation”, *Graphical Models*, vol. 91, pp. 13-21, 2017.

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82. B. Yan, Z. Wang, A. L. Parker, **Y.-K. Lai**, P. J. Thomas, L. Yue, J. N. Monks. Superlensing Microscope Objective Lens, *Applied Optics*, vol. 56(11), pp. 3142-3147, 2017.
  83. S. Xia, L. Gao, **Y.-K. Lai**, M. Yuan, J. Chai. “A survey on human performance capture and animation”, *Journal of Computer Science and Technology*, vol. 32(3), 536-554, 2017.
  84. B. Li, **Y.-K. Lai**, P. L. Rosin. “Example-based image colorization via automatic feature selection and fusion”, *Neurocomputing*, vol. 266, pp. 687-698, 2017.
  85. L. Gao, **Y.-K. Lai**, D. Liang, S. Chen, S. Xia. “Efficient and Flexible Deformation Representation for Data-Driven Surface Modeling”, *ACM Transactions on Graphics*, vol. 35(5), 158:1-17, 2016.
  86. S. Lin, Y. Chen, **Y.-K. Lai**, R. R. Martin, Z.-Q. Cheng, “Fast Capture of Textured Full-Body Avatar with RGB-D Cameras”, *The Visual Computer*, vol. 32(6-8), pp. 681-691, 2016.
  87. S. Lin, **Y.-K. Lai**, R. R. Martin, S. Jin, Z.-Q. Cheng, “Color-aware surface registration”, *Computers & Graphics*, vol. 58, pp. 31-42, 2016.
  88. F. M. Anuar, R. Setchi, **Y.-K. Lai**, “Semantic retrieval of trademarks based on conceptual similarity”, *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, vol. 46(2), pp. 220-233, 2016.
  89. A. Abdulmunem, **Y.-K. Lai**, X. Sun, “Saliency guided local and global descriptors for effective action recognition”, *Computational Visual Media*, vol. 2(1), pp. 97-106, 2016.
  90. K. Chen, **Y.-K. Lai**, S.-M. Hu, “3D indoor scene modeling from RGB-D data: a survey”, *Computational Visual Media*, vol. 1(4), pp. 267-278, 2015.
  91. L. Gao, Y.-P. Cao, **Y.-K. Lai**, H.-Z. Huang, L. Kobbelt, S.-M. Hu, “Active exploration of large 3D model repositories”, *IEEE Transactions on Visualization and Computer Graphics*, vol. 21(12), pp. 1390-1402, 2015.
  92. J. Yang, K. Li, K. Li, **Y.-K. Lai**, “Sparse non-rigid registration of 3D shapes”, *Computer Graphics Forum*, vol. 34(5), pp. 89-99, 2015.
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  94. K. Chen, **Y.-K. Lai**, Y.-X. Wu, R. Martin, S.-M. Hu, “Automatic semantic modeling of indoor scenes from low-quality RGB-D data using contextual information”, *ACM Transactions on Graphics*, vol. 33(6), 208:1-12, 2014.
  95. M. Wang, **Y.-K. Lai**, Y. Liang, R. Martin, S.-M. Hu, “Bigger picture: data-driven image extrapolation using graph matching”, *ACM Transactions on Graphics*, vol. 33(6), 173:1-13, 2014.
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106. Z.-Q. Cheng, Y. Chen, R. R. Martin, **Y.-K. Lai**, A. Wang. “SuperMatching: feature matching using supersymmetric geometric constraints”, *IEEE Transactions on Visualization and Computer Graphics*, vol. 19(11), pp. 1885-1894, 2013.
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### **Conference Papers**

1. M.-X. Lin, J. Yang, H. Wang, **Y.-K. Lai**, R. Jia, B. Zhao, L. Gao, “Single image 3D shape retrieval via cross-modal instance and category contrastive learning”, IEEE International Conference on Computer Vision (ICCV), 2021.
2. J. Huo, S. Jin, W. Li, J. Wu, **Y.-K. Lai**, Y. Gao, “Manifold alignment for semantically aligned style transfer”, IEEE International Conference on Computer Vision (ICCV), 2021 (oral).
3. Z. Wang, Q. Xie, **Y.-K. Lai**, J. Wu, K. Long, J. Wang, “MLVSNet: multi-level voting Siamese network for 3D visual tracking”, IEEE International Conference on Computer Vision (ICCV), 2021.
4. Q. Xie, **Y.-K. Lai**, J. Wu, Z. Wang, D. Lu, M. Wei, J. Wang, “VENet: voting enhancement network for 3D object detection”, IEEE International Conference on Computer Vision (ICCV), 2021.
5. J. Zhang, K. Li, **Y.-K. Lai**, J. Yang, “PISE: Person Image Synthesis and Editing with

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- Decoupled GAN”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2021.
6. D. She, **Y.-K. Lai**, G. Yi, K. Xu, “Hierarchical Layout-Aware Graph Convolutional Network for Unified Aesthetics Assessment”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2021.
  7. P. Eslambolchilar, H. Htike, T. Margrain, **Y.-K. Lai**, “Augmented Reality Glasses as a Mobility Aid for People with Low Vision: a Feasibility Study of Experiences and Requirements”, ACM Conference on Human Factors in Computing Systems (CHI) 2021.
  8. X. Yang, Z. Ji, J. Wu, **Y.-K. Lai**, “An open-source multi-goal reinforcement learning environment for robotic manipulation with Pybullet”, Towards Autonomous Robotic Systems Conference (TAROS), 2021.
  9. R. Yi, Y.-J. Liu, **Y.-K. Lai**, P. L. Rosin, “Unpaired portrait drawing generation via asymmetric cycle mapping”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2020.
  10. Q. Xie, **Y.-K. Lai**, J. Wu, Z. Wang, Y. Zhang, K. Xu, J. Wang, “MLCVNet: multi-level context VoteNet for 3D object detection”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2020.
  11. F. Liu, C. Zou, X. Deng, R. Zuo, **Y.-K. Lai**, C. Ma, Y.-J. Liu, H. Wang, “SceneSketcher: fine grained image retrieval with scene sketches”, European Conference on Computer Vision (ECCV), 2020.
  12. Y.-J. Yuan, **Y.-K. Lai**, J. Yang, Q. Duan, H. Fu, L. Gao, “Mesh variational autoencoders with edge contraction pooling”, CVPR Workshop, 2020.
  13. H.-Y. Meng, L. Gao, **Y.-K. Lai**, D. Manocha, “VV-Net: voxel VAE net with group convolutions for point cloud segmentation”, IEEE International Conference on Computer Vision (ICCV), 2019.
  14. X. Wu, N. Wen, J. Liang, **Y.-K. Lai**, D. She, M.-M. Cheng, J. Yang, “Joint acne image grading and counting via label distribution learning”, IEEE International Conference on Computer Vision (ICCV), 2019.
  15. X. Yao, D. She, S. Zhao, J. Liang, **Y.-K. Lai**, J. Yang, “Attention-aware polarity sensitive embedding for affective image retrieval”, IEEE International Conference on Computer Vision (ICCV), 2019.
  16. J. Huang, S. Yang, Z. Zhao, **Y.-K. Lai**, S.-M. Hu, “ClusterSLAM: a SLAM backend for simultaneous rigid body clustering and motion estimation”, IEEE International Conference on Computer Vision (ICCV), 2019.
  17. R. Yi, Y.-J. Liu, **Y.-K. Lai**, P. L. Rosin, “APDrawingGAN: generating artistic portrait drawings from face photos with hierarchical GANs”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2019 (oral).
  18. X. Wu, C. Zhan, **Y.-K. Lai**, M.-M. Cheng, J. Yang, “IP102: a large-scale benchmark dataset for insect pest recognition”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2019 (oral).
  19. F. Liu, X. Deng, **Y.-K. Lai**, Y.-J. Liu, C. Ma, H. Wang, “SketchGAN: joint sketch completion and recognition with generative adversarial network”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2019.
  20. S. Yang, Z.-F. Kuang, Y.-P. Cao, **Y.-K. Lai**, S.-M. Hu, “Probabilistic projective

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- association and semantic guided relocalization for dense reconstruction”, International Conference on Robotics and Automation (ICRA), 2019.
21. Z. Wu, K. Li, **Y.-K. Lai**, J. Yang, “Global as-conformal-as-possible non-rigid registration of multi-view scans”, ICME 2019.
  22. C. Yuan, K. Li, **Y.-K. Lai**, Y. Liu, J. Yang, “3D face representation and reconstruction with multi-scale graph convolutional autoencoder”, ICME 2019.
  23. R. M. Dyke, C. Stride, **Y.-K. Lai**, P. L. Rosin, et al. “SHREC’19: Shape Correspondence with Isometric and Non-Isometric Deformations”, *Eurographics Workshop on 3D Object Retrieval*, 2019.
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  25. Y. Qiao, L. Gao, **Y.-K. Lai**, F.-L. Zhang, M. Yuan, S. Xia, “SF-Net: Learning scene flow from RGB-D images with CNNs”, *British Machine Vision Conference (BMVC)*, 2018.
  26. J. Yang, D. She, **Y.-K. Lai**, P. L. Rosin, M.-H. Yang, “Weakly supervised coupled networks for visual sentiment analysis”, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018 (spotlight).
  27. R. Yi, Y.-J. Liu, **Y.-K. Lai**, “Content-sensitive supervoxels via uniform tessellations on video manifolds”, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018.
  28. Y. Chen, **Y.-K. Lai**, Y.-J. Liu, “CartoonGAN: generative adversarial networks for photo cartoonization”, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018.
  29. Q. Tan, L. Gao, **Y.-K. Lai**, S. Xia, “Variational autoencoders for deforming 3D mesh models”, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018.
  30. Q. Wu, J. Zhang, **Y.-K. Lai**, J. Zheng, J. Cai, “Alive caricature from 2D to 3D”, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018 (spotlight).
  31. R. Yi, Y.-J. Liu, **Y.-K. Lai**, “Evaluation on the compactness of supervoxels”, *IEEE International Conference on Image Processing (ICIP)*, 2018.
  32. Y. Han, B. Li, **Y.-K. Lai**, Y.-J. Liu, “CFD: a collaborative feature difference method for spontaneous micro-expression spotting”, *IEEE International Conference on Image Processing (ICIP)*, 2018.
  33. Q. Tan, L. Gao, **Y.-K. Lai**, J. Yang, S. Xia, “Mesh-based autoencoders for localized deformation component analysis”, *AAAI 2018 (spotlight)*.
  34. J. Yang, D. She, **Y.-K. Lai**, M.-H. Yang, “Retrieving and classifying affective images via deep metric learning”, *AAAI 2018 (oral)*.
  35. S.-Y. Chen, L. Gao, **Y.-K. Lai**, P. L. Rosin, S. Xia, “Real-time 3D face reconstruction and gaze tracking for virtual reality”, *IEEE Conference on Virtual Reality and 3D User Interfaces*, 2018 (poster).
  36. F. Langenfeld, et al. “SHREC 2018 – protein shape retrieval”, *EG Workshop on 3D Object Retrieval*, 2018.
  37. T. Wang, D. George, **Y.-K. Lai**, X. Xie, G. K.L. Tam, “Consistent segment-wise matching with multi-layer graphs”, *Computer Graphics & Visual Computing*, 2018 (poster).

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  39. H.-H. Zhao, P. L. Rosin, **Y.-K. Lai**, J.-H. Zheng, Y.-N. Wang, “Adaptive block compressive sensing for noisy images”, *International Symposium on Artificial Intelligence and Robotics (ISAIR)*, 2018.
  40. Y. Chen, Y.-J. Liu, **Y.-K. Lai**, “Learning to Rank Retargeted Images”, CVPR 2017.
  41. Y. Chen, **Y.-K. Lai**, Y.-J. Liu, “Transforming Photos to Comics using Convolutional Neural Networks”, ICIP 2017.
  42. X. Liu, M.-M. Cheng, **Y.-K. Lai**, P. L. Rosin, “Depth-aware neural style transfer”, *Expressive* 2017.
  43. P. L. Rosin, D. Mould, I. Berger, J. Collomosse, **Y.-K. Lai**, C. Li, H. Li, A. Shamir, M. Wand, T. Wang, H. Winnemoeller, “Benchmarking non-photorealistic rendering of portraits”, *Expressive* 2017.
  44. K. Li, M. Wang, **Y.-K. Lai**, J. Yang, F. Wu, “3-D Motion Recovery via Low Rank Matrix Restoration on Articulation Graphs”, *ICME* 2017.
  45. D. Guo, K. Li, **Y.-K. Lai**, J. Yang, “Global alignment for deformable objects captured by a single RGB-D camera”, *ICME* 2017.
  46. P. L. Rosin, **Y.-K. Lai**, “Watercolour Rendering of Portraits”, *PSIVT workshop on Vision meets Graphics*, 2017.
  47. C. Liu, P. L. Rosin, **Y.-K. Lai**, G. R. Davis, D. Mills, C. Norton. “Recovering historical film footage by processing microtomographic images”. In: *Proceedings of World Cultural Heritage Conference*, 2016.
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  49. A. Abdulmunem, **Y.-K. Lai**, X. Sun, “3D GLOH Features for Human Action Recognition”. In: *Proceedings of International Conference on Pattern Recognition*, 2016.
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  54. Y. Chen, **Y.-K. Lai**, Z.-Q. Cheng, R. R. Martin, S.-Y. Jin, “A data-driven approach to efficient character articulation”. In: *Proceedings of CAD/Graphics*, pp. 32-37, 2013.
  55. J. A. Quinn, F. C. Langbein, **Y.-K. Lai**, R. R. Martin, “Fast low-discrepancy sampling of parametric surfaces and meshes”. In: *Proceedings of Mathematics of Surfaces XIV*, 2013.
  56. P. L. Rosin, **Y.-K. Lai**, “Non-photorealistic rendering with spot colour”. In: *Proceedings of Computational Aesthetics*, pp. 67-76, 2013.
  57. F. M. Anuar, R. Setchi, **Y.-K. Lai**, “A conceptual model of trademark retrieval based on

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- conceptual similarity”, *Knowledge-based and Intelligent Information and Engineering Systems (KES), Procedia Computer Science*, vol. 22, pp. 450-459, 2013.
58. G.-X. Zhang, **Y.-K. Lai**, S.-M. Hu, “Efficient solid texture synthesis using gradient solids”, In: *Proceedings of Computational Visual Media*, pp. 67-74, 2012 (Best Paper Award).
  59. O. Samko, **Y.-K. Lai**, D. Marshall, P. L. Rosin, “Segmentation of parchment scrolls for virtual unrolling”. In: *Proceedings of British Machine Vision Conference*, 2011.
  60. P. L. Rosin, **Y.-K. Lai**, “Towards artistic minimal rendering”. In: *Proceedings of ACM Symposium on Non-Photorealistic Animation and Rendering*, pp. 119-127, 2010.
  61. **Y.-K. Lai**, S.-M. Hu and T. Fang, "Robust principal curvatures using feature adapted integral invariants". In: *Proceedings of SIAM/ACM Joint Conference on Geometric and Physical Modeling*, pp. 325-330, 2009.
  62. **Y.-K. Lai**, L. Kobbelt and S.-M. Hu, “An incremental approach to feature aligned quad dominant remeshing”. In: *Proceedings of ACM Symposium on Solid and Physical Modeling*, pp. 137-145, 2008.
  63. **Y.-K. Lai**, S.-M. Hu, R. R. Martin and P. L. Rosin, “Fast mesh segmentation using random walks”. In *Proceedings of ACM Symposium on Solid and Physical Modeling*, pp. 183-191, 2008.
  64. **Y.-K. Lai**, Y.-J. Liu, Y. Zang and S.-M. Hu, “Fairing wireframes in industrial surface design”. In: *Proceedings of IEEE International Conference on Shape Modeling and Applications*, pp. 29-38, 2008.
  65. Y. Zang, Y.-J. Liu and **Y.-K. Lai**, “Note on industrial applications of Hu’s surface extension algorithm”, *Geometric Modeling and Processing*, pp. 304-314, 2008.
  66. W. Zeng, X. Yin, Y. Zeng, **Y.-K. Lai**, X. Gu, D. Samaras, “3D face matching and registration based on hyperbolic Ricci flow”, *CVPR Workshop on 3D Face Processing*, pp.1-8, 2008.
  67. Y.-J. Liu, **Y.-K. Lai** and S.-M. Hu, “Developable strip approximation of parametric surfaces with global error bounds”, *Pacific Graphics*, pp.441-444, 2007.
  68. **Y.-K. Lai**, S.-M. Hu and R. R. Martin, “Feature sensitive mesh segmentation”. In: *Proceedings of ACM Symposium on Solid and Physical Modeling*, pp. 7-16, 2006.
  69. Y.-L. Yang, **Y.-K. Lai**, S.-M. Hu and H. Pottmann, “Robust principal curvatures on multiple scales”, *Eurographics Symposium on Geometry Processing*, pp. 223-226, 2006.
  70. **Y.-K. Lai**, S.-M. Hu, X. Gu and R. R. Martin, “Geometric texture synthesis and transfer via geometry images”. In: *Proceedings of ACM Symposium on Solid and Physical Modeling*, pp. 15-26, 2005.

### **Book Chapters**

1. **Y.-K. Lai**, P. L. Rosin, “Non-photorealistic rendering with reduced colour palettes”. In: *Image and Video-based Artistic Stylisation, Computational Imaging and Vision* series, vol. 42(2), pp. 211-236, Springer, 2013.

### **Patents**

1. Method and system for rapidly vectorizing image by gradient meshes based on parameterization, S. Hu and Y. Lai, US Patent No. 9,508,162 (Awarded 29/11/2016).

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## Honours and Awards

- Computers & Graphics Valuable Reviewer Award 2013-2014
- National Excellent Doctoral Dissertation of China Award, 2010.
- First-Class Excellent Doctoral Thesis, Tsinghua University, 2008
- Excellent PhD Graduate, Dept. of Computer Science and Technology, Tsinghua University, 2008.
- Microsoft Research Asia Fellowship, 2007.
- First-class Scholarship for Excellent Students in Tsinghua University (Morgan Stanley Scholarship), 2006.
- First-class Scholarship for Excellent Students in Tsinghua University (Sony Scholarship), 2002.
- Gold medal in National Olympiad in Informatics (NOI) of China, 1998.

## Admin. Roles

- 2019- present: Director of Research
- 2017-2019: Deputy Director of Research
- 2017-2018: Deputy Director of PGR Studies
- 2017-2018: School Seminar Co-ordinator
- 2009-2017: Year 2 Tutor

## Other Activities

- Welsh Crucible 2015 participant

## Professional Activities

Journal editorial board member

- Computer Graphics Forum (since Jul. 2019)
- The Visual Computer (since Nov. 2012)

Conference Co-Chair

- Computational Visual Media 2016
- Eurographics Symposium on Geometry Processing 2014

Workshop Co-Chair:

- ACCV workshop on RGB-D sensing and understanding via combined colour and depth (2018)
- BMVA technical meeting on analysis and processing of RGBD data (2017)
- PSIVT workshop on Vision meets Graphics (2017)

Program Co-Chair

- 3D Object Retrieval Workshop (3DOR) 2021

Program committee member

- IJCAI 2021 SPC
- British Machine Vision Conference (BMVC) Reviewer (2015, 2016, 2017) Area Chair (2018, 2019, 2020, 2021)
- ACM Symposium on Solid and Physical Modeling, SIAM Conference on Geometric & Physical Modeling (SPM 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021)

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- Eurographics Symposium on Geometry Processing (SGP 2014, 2015, 2017, 2018, 2019, 2020, 2021)
  - Geometric Modeling and Processing (GMP 2012, 2014, 2015, 2016, 2017, 2018)
  - Computer Graphics International (CGI 2018, 2019, 2020, 2021)
  - Pacific Graphics (PG 2012, 2015, 2016, 2017, 2018, 2021)
  - International Symposium on Visual Computing (ISVC 2018, 2019, 2020, 2021)
  - MultiMedia Modeling (MMM 2020)
  - SIGGRAPH Asia Briefs and Posters 2014, 2015, 2016
  - Expressive 2014, 2015, 2016, 2018, 2019
  - Computational Visual Media (CVM 2012, 2013, 2015, 2017, 2018, 2019, 2020)
  - IEEE Computer-Aided Design and Computer Graphics (CAD/Graphics 2011, 2013, 2015, 2017)
  - Eurographics 2011 Short Papers
  - Intl. Conf. on Computer Animation and Social Agents (CASA 2010)
  - Computer Graphics & Visual Computing (CGVC 2014-2020)
  - PSIVT Workshop on Vision meets Graphics (2015)

Member of EPSRC Peer Review College.

Reviewer for proposals for EPSRC, Welsh government, Swiss NSF, Canadian research council.

Reviewer for major journals and conferences, including ACM Transactions on Graphics, IEEE Transactions on Pattern Analysis and Machine Intelligence, International Journal of Computer Vision (IJCV), IEEE Transactions on Image Processing, IEEE Transactions on Visualization and Computer Graphics, IEEE Transactions on Affective Computing, SIGGRAPH, SIGGRAPH Asia, Eurographics (EG), Pacific Graphics (PG), CVPR, ICCV, ECCV, NeurIPS, Artificial Intelligence Review, Neurocomputing, Computer-Aided Design, Computer Aided Geometric Design, Computer Graphics Forum, The Visual Computer, Computers & Graphics, Graphical Models, Journal of Computational and Applied Mathematics, IET Computer Vision, Multimedia Tools and Applications, etc.