

ANGELA YAO

Dean's Chair Assistant Professor
School of Computing, National University of Singapore
<https://www.comp.nus.edu.sg/~ayao>

RESEARCH INTERESTS

video understanding, human activity recognition, 3D human modelling
deep regression, sequence & time series modelling

EDUCATION

| | |
|-------------|---|
| 2008 - 2012 | Doctor of Sciences , ETH Zurich |
| 2006 - 2008 | MSc Biomedical Engineering , ETH Zurich |
| 2001 - 2006 | BASc Engineering Science , University of Toronto Biomedical Option + Professional Experience Year (Co-op) 2003-04 |

ACADEMIC EXPERIENCE

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|----------------|--|
| 2022 - present | Dean's Chair Assistant Professor |
| 2018 - 2021 | Assistant Professor School of Computing, National University of Singapore |
| 2015 - 2018 | W1 Junior-Professor Institute of Computer Science, University of Bonn, Germany |
| 2008 - 2012 | Research Assistant , ETH Zurich, Switzerland |
| 03 - 07.2012 | Research Intern , Microsoft Research Cambridge, UK |
| 08 - 12.2010 | Research Intern , Toyota Technology Institute at Chicago, USA |

INDUSTRY EXPERIENCE

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| 2015 - present | Board advisor , Parquery AG , Zurich, Switzerland |
| 2012 - 2014 | CTO & Co-Founder Computer vision solutions for parking occupancy monitoring and smart mobility |

AWARDS & SCHOLARSHIPS

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|-------------------------|---|
| 2021-22; 20-21 | NUS School of Computing Faculty Teaching Excellence Award |
| 2018 | German Pattern Recognition Award <i>German Association for Pattern Recognition (DAGM)</i> Awarded yearly to a researcher 35 years or younger for outstanding, internationally prominent research in pattern recognition, computer vision and machine learning. |
| 2013 - 2014 150k CHF | Pioneer Fellowship <i>ETH Zurich</i> |
| 2009 - 2012 63k CAD | NSERC Postgraduate Scholarship - Doctoral (PGS D) <i>Natural Sciences and Engineering Research Council of Canada</i> |

RESEARCH GRANTS

7.4M SGD (5.3M USD) as individual PI; 1.0M SGD (0.7M USD) as co-PI in consortium

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| 2022 - 2025 250k SGD | “Small Data’ AI with Synthesis and Augmentation” <i>Singapore Ministry of Education (MOE) Tier 1</i> |
| 2021 - 2024 800k SGD | “Vision-based 3D Hand Pose Estimation in the Wild” <i>Singapore Ministry of Education (MOE) Tier 2</i> |
| 2021 - 2025 630k SGD (total 10M SGD) | “Visual-Linguistic Situation Understanding” <i>AI Singapore Research Programme</i> co-PI within Consortium “The ‘Other Me’: Human-Centered AI Assistance In Situ” |
| 2020 - 2024 350k USD | “Multimodal Human Activity Recognition” <i>Facebook Technologies, LLC</i> |
| 2020 - 2024 1.34M SGD | “Deep Learning for Video Processing” <i>HiSilicon Technologies Co. (Huawei)</i> |
| 2019 - 2024 2.64M SGD | “Efficient Modelling and Learning for Video Understanding” <i>Singapore National Research Foundation (NRF) Fellowship</i> |
| 2019 - 2022 180k SGD | “Multi-Granular Anticipation of Human Activities” <i>Singapore Ministry of Education (MOE) Tier 1</i> |
| 2018 - 2021 400k SGD | “Bottom-Up & Top-Down Everyday Action & Object Understanding from Visual Inputs” NUS Startup Grant |
| 2018 945k EUR (declined) | “Real-time 3D Hand Pose Estimation ‘in-the-Wild’ ” <i>German Research Foundation (DFG)</i> Emmy Noether Programme |
| 2017 - 2020 242k EUR (total 1.9M EUR) | “Activity Prediction at Varying Time Scales” <i>German Research Foundation (DFG)</i> co-PI within Research Unit 2535 - Anticipating Human Behaviour. |

TEACHING

National University of Singapore

| | | |
|---------|---|-------------|
| CS 6244 | Advanced Topics in Robotics | 2023 |
| CS 4243 | Computer Vision & Pattern Recognition | 2019 - 2023 |
| CS 5242 | Introduction to Neural Networks & Deep Learning | 2019 - 2021 |
| CS6212 | Advanced Topics in Machine Learning | 2018 |

University of Bonn

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|-------------|--|-------------|
| MA-INF 2313 | Deep Learning for Visual Recognition | 2016 - 2018 |
| MA-INF 2117 | Markov Random Fields for Vision & Graphics | 2015 - 2018 |
| MA-INF 4315 | Probabilistic Graphical Models | 2015 - 2017 |

ADVISED STUDENTS & RESEARCHERS

At National University of Singapore unless otherwise indicated.

Post-Doctoral Research Fellows

| | |
|----------------|---|
| 2020 - present | Guodong Ding |
| 2021 - 2022 | Guyue Hu <i>Placement: Research Fellow at NTU</i> |
| 2020 - 2021 | Fuhai Chen <i>Placement: Research Fellow at University of Hong Kong</i> |
| 2019 - 2020 | Shaohui Lin <i>Placement: Research Faculty at East China Normal University</i> |

PhD Students

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|----------------|--|
| 2023 - present | Ha Linh Nguyen |
| 2022 - present | Md Salman Shamil, Kai Xu, Fengyuan Yang |
| 2021 - present | Zhanzong Pang, Yuhui Wang, Haipeng Xiong, Shihao Zhang |
| 2020 - present | Rongyu Chen, Kerui Ge, Bo Ji, Qiuxia Lin, Yuehan Zhang |
| 2019 - present | Dipika Singhania, Ziwei Yu |
| 2018 - 2022 | Linlin Yang (University of Bonn) <i>Thesis: 3D Hand Pose Estimation from Single RGB Images with Auxiliary Information</i> <i>Placement: Research Fellow at NUS</i> |
| 2017 - 2021 | Moritz Wolter (University of Bonn) <i>Thesis: Frequency Domain Methods in Recurrent Neural Networks for Sequential Data</i> <i>Placement: Research engineer at Fraunhofer Center for Machine Learning and SCAI</i> |
| 2016 - 2021 | Soumajit Majumder (University of Bonn) <i>Thesis: Maximizing Information from User-Clicks for Efficient Instance Segmentation</i> <i>Placement: Senior AI researcher at Huawei Munich Research Center</i> |
| 2016 - 2021 | Fadime Sener (University of Bonn) <i>Thesis: Modelling Complex Activities from Visual and Textual Data</i> <i>Placement: Researcher at Meta Reality Labs, Zurich</i> |
| 2015 - 2019 | Chengde Wan (ETH Zurich, co-advised with L. Van Gool) <i>Thesis: Towards Accurate and Data-Efficient 3D Hand Pose Estimation Algorithms</i> <i>Placement: Research Scientist at Meta Reality Labs, Seattle</i> |
| 2015 - 2018 | Jun Li (University of Bonn, co-advised with R. Klein) <i>Thesis: Fine-Scaled 3D Geometry Recovery from Single RGB Images</i> |

PHD EXAMINATION COMMITTEE

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|------|--|
| 2023 | Yaser Souri, University of Bonn |
| 2023 | You Xie, TU Munich |
| 2022 | Wei Mao, Australian National University |
| 2022 | Evangelos Kazakos, University of Bristol |
| 2021 | Shile Li, TU Munich |

SELECT SERVICE

General & Program Chair

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|---|------|
| Asian Conference for Computer Vision (ACCV) | 2024 |
| ACM International Conference on Multimedia Retrieval (ICMR) | 2023 |

Tutorial & Workshop Organizer

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|--|---------------|
| Action Localization & Segmentation in Untrimmed Videos (at ECCV) | 2022 |
| Observing & Understanding Hands in Action (at ECCV / ICCV) | 2023,22,19,18 |
| Uncertainty Estimation for Computer Vision (at ICCV) | 2023 |
| Human Body, Hands, & Activities from Egocentric and Multi-view Cameras (at ECCV) | 2022 |
| A Comprehensive Tutorial on Video Modeling (at CVPR) | 2021 |
| Interactive & Adaptive Learning in an Open World (at ECCV) | 2018 |

Area Chair / Senior Program Committee

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| Int. Conference on Learning Representations (ICLR) | 2021, 2023 |
| IEEE Conference on Computer Vision and Pattern Recognition (CVPR) | 2021, 2022 |
| European Conference on Computer Vision (ECCV) | 2020, 2022 |
| Int. Conference on Computer Vision (ICCV) | 2021, 2023 |
| Neural Information Processing Systems (NeurIPS) | 2019, 2020 |

Outstanding Reviewer Award

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|---|------------|
| IEEE Conference on Computer Vision and Pattern Recognition (CVPR) | 2020 |
| Int. Conference on Computer Vision (ICCV) | 2017, 2019 |
| Neural Information Processing Systems (NeurIPS) | 2018 |
| European Conference on Computer Vision (ECCV) | 2016, 2018 |

Others

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| Singapore Vision Day - Organizer | 2023 |
| 3DV - Demo & Exhibition Chair | 2022 |
| Virtual Seminar Series on 3D Geometry & Vision (3DGV) | 2020-21 |

SELECT INVITED TALKS

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| Research Week at Google <i>"Is Classification All You Need for Computer Vision?"</i> | 30.01.2023 Bangalore, India |
| ECCV Tutorial on Action Localization and Segmentation in Video <i>"Temporal Action Segmentation"</i> | 24.10.2022 Tel Aviv, Israel |
| Video Understanding Symposium 2022 <i>"Segmenting Actions in Procedural Videos"</i> | 08.09.2022 Amsterdam, Netherlands |
| CVPR Workshop on Large-Scale Holistic Video Understanding <i>"Segmenting and Anticipating Actions from Video"</i> | 20.06.2022 New Orleans, USA |
| ICCV Workshop on Ego- Perception, Interaction & Computing <i>Actions in Egocentric Video: Hands & Objects Over Time</i> | 11.10.2021 virtual |
| ICCV Workshop on Observing & Understanding Hands in Action <i>"Data and Label-Efficient Hand Pose Estimation"</i> | 28.10.2019 Seoul, Korea |
| BMVA Symposium on Video Understanding <i>"Complex Activity Anticipation"</i> | 25.09.2019 London, UK |

PUBLICATIONS

My advised students are underlined, my name in **bold**.

- Citations: 3970, h-Index: 29 (from [Google Scholar](#), 24.04.2023)
- 8 premium journal articles (TPAMI, IJCV, TMM, PR)
31 Tier 1 Computer Vision conference proceedings (CVPR, ICCV, ECCV)
9 Tier 1 machine learning conference proceedings (NeurIPS, ICLR, AAAI, IJCAI)
- CPVR 2019 Best Paper Finalist [C18]

Journal Articles

- J.12 K. Gu, L. Yang, M. Bi and **A. Yao**. “Bias-Compensated Integral Regression for Human Pose Estimation”. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*. DOI:10.1109/TPAMI.2023.3264742 2023.
- J.11 G. Ding & **A. Yao**. “Temporal Action Segmentation with High-level Complex Activity Labels”. *IEEE Transactions on Multimedia (TMM)*. DOI: 10.1109/TMM.2022.3231099 2022.
- J.10 F. Sener, R. Saraf & **A. Yao**. “Transferring Knowledge from Text to Video: Zero-Shot Anticipation for Procedural Actions”. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*. DOI: 10.1109/TPAMI.2022.3218596 2022.
- J.9 A. Rai, F. Sener & **A. Yao**. “Transformed ROIs for Capturing Visual Transformations in Videos”. *Computer Vision and Image Understanding (CVIU)*. 224:103558, 2022.
- J.8 Y. Hu, N. Belkhir, J. Angulo, **A. Yao** & G. Franchi. “Learning Deep Morphological Networks with Neural Architecture Search”. *Pattern Recognition (PR)*, 131:108893, 2022.
- J.7 G. Franchi, A. Fehri, & **A. Yao**. “Deep morphological networks”, *Pattern Recognition (PR)*, 102:107246, 2020.
- J.6 J. Li, C. Yuce, R. Klein & **A. Yao**. “A two-streamed network for estimating fine-scaled depth maps from single RGB images”, *Computer Vision and Image Understanding (CVIU)*, 186:25-36, 2019.
- J.5 B. Krüger, A. Vögele, T. Willig, **A. Yao**, R. Klein & A. Weber. “Efficient unsupervised temporal segmentation of motion data”, *IEEE Trans Multimedia(TMM)*, 19(4):797–812, 2017.
- J.4 J. Peng, J. Shen, **A. Yao** & X. Li. “Superpixel optimization using higher-order energy”, *IEEE Transactions on Circuits and Systems for Video Technology (TCSVT)*, 26(5):917–927, 2016.
- J.3 **A. Yao**, J. Gall & L. Van Gool. “Coupled action recognition and pose estimation from multiple views”, *International Journal of Computer Vision (IJCV)*, 100(1):16–37, 2012.
- J.2 J. Gall, **A. Yao**, N. Razavi, L. Van Gool and V. Lempitsky. “Hough forests for object detection, tracking, and action recognition”, *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 33(11):2188 – 2202, 2011.
- J.1 **A. Yao** & W. Einhäuser. “Colour aids late but not early stages of rapid natural scene recognition”, *Journal of Vision (JOV)*, 8(16):12, 1-13, 2008.

Refereed Conference Proceedings

2023

- C.55 Q. Lin, L. Yang and **A. Yao**. Cross-domain 3D hand pose estimation with dual modalities. CVPR 2023.
- C.54 Q. He, L. Yang, K. Gu, Q. Lin and **A. Yao**. Analyzing and diagnosing pose estimation with attributions. CVPR 2023.
- C.53 Z. Yu, L. Chen, L. Yang, X. Zheng, M. Bi, G. Lee and **A. Yao**. Overcoming the trade-off between accuracy and plausibility in 3D hand shape reconstruction. CVPR 2023.
- C.52 S. Zhang, L. Yang, M. Bi, X. Zheng and **A. Yao**. Improving deep regression with ordinal entropy. ICLR 2023.
- C.51 J. Chen, K. Xu, Y. Wang, Y. Cheng and **A. Yao**. DropIT: Dropping intermediate tensors for memory-efficient DNN training. ICLR 2023.

2022

- C.50 Z. Yu, L. Yang, Y. Xie, P. Chen & **A. Yao**. UV-based 3D hand-object reconstruction with grasp optimization. BMVC 2022.
- C.49 G. Ding & **A. Yao**. Leveraging action affinity and continuity for semi-supervised temporal action segmentation. ECCV 2022.
- C.48 H. Xiong & **A. Yao**. Discrete-constrained regression for local counting models. ECCV 2022.
- C.47 R. Rahaman, D. Singhania, A. Thiery & **A. Yao**. A generalized and robust framework for timestamp supervision in temporal action segmentation. ECCV 2022.
- C.46 Y. Zhang, B. Ji, J. Hao & **A. Yao**. Perception-distortion balanced ADMM optimization for single-image super-resolution. ECCV 2022.
- C.45 B. Ji & **A. Yao**. Multi-scale memory-based video deblurring. CVPR 2022.
- C.44 K. Xu & **A. Yao**. Efficient video object segmentation with compressed video. CVPR 2022
- C.43 Y. Xie, H. Mao, **A. Yao** & N. Thuerey. TemporalUV: Capturing loose clothing with temporally coherent UV coordinates. CVPR 2022.
- C.42 F. Sener, D. Chatterjee, D. Shelepov, K. He, D. Singhania, R. Wang & **A. Yao**. Assembly101: A large-scale multi-view video dataset for understanding procedural activities. CVPR 2022.
- C.41 K. Gu, L. Yang, & **A. Yao**. Dive deeper into integral pose regression. ICLR 2022.
- C.40 J. Xiao, **A. Yao**, Z. Liu, Y. Li, W. Ji & T.S. Chua. Video as a conditional graph hierarchy for multi-granular question answering. AAAI 2022
- C.39 C. Chen, Y. Xie, S. Lin, **A. Yao**, G. Jiang, W. Zhang, Y. Qu, R. Qia, B. Ren & L. Ma. Comprehensive regularization in a bi-directional predictive network for video anomaly detection. AAAI 2022
- C.38 D. Singhania, R. Rahaman & **A. Yao**. Iterative contrast-classify for semi-supervised temporal action segmentation. AAAI 2022.

2021

- C.37 H. Zhang, F. Chen & A. Yao. Weakly-supervised dense action anticipation. BMVC 2021.
- C.36 Z. Yu, L. Yang, S. Chen & A. Yao. Local and global point cloud reconstruction for 3D hand pose estimation. BMVC 2021.
- C.35 G. Franchi, N. Belkhir, M.L. Ha, Y. Hu, A. Bursuc, V. Blanz & A. Yao. Reliable semantic segmentation with superpixel-mix. BMVC 2021.
- C.34 K. Gu, L. Yang, & A. Yao. Removing the bias of integral pose regression. ICCV 2021.
- C.33 L. Yang, S. Chen, & A. Yao. SemiHand: Semi-supervised hand pose estimation with consistency. ICCV 2021.
- C.32 Y. Wang, S. Lin, Y. Qu, H. Wu, Z. Zhang, Y. Xie & A. Yao. Towards compact single image super-resolution via contrastive self-distillation. IJCAI 2021.
- C.31 J. Xiao, X. Shang, A. Yao & T.S. Chua. NEXt-QA: Next phase of question-answering to explaining temporal actions. CVPR 2021.

2020

- C.30 S. Majumder, A. Khurana, A. Raj & A. Yao. Multi-stage fusion for one-click segmentation. GCPR/DAGM 2020.
- C.29 S. Majumder, A. Raj, A. Khurana & A. Yao. Two-in-one refinement for interactive segmentation. BMVC 2020.
- C.28 M. Wolter, S. Lin & A. Yao. Neural network compression via learnable wavelet transforms, ICANN 2020.
- C.27 M. Wolter, J. Gall & A. Yao. Sequence prediction using spectral RNNs, ICANN 2020.
- C.26 A. Armagan *et al.* Measuring generalisation to unseen viewpoints, articulations, shapes and objects for 3D hand pose estimation under hand-object interaction, ECCV 2020.
- C.25 F. Sener, D. Singhania & A. Yao. Temporal aggregate representations for long term video understanding, ECCV 2020.
- C.24 C. Wan, T. Probst, L. Van Gool & A. Yao. Dual grid net: Hand mesh vertex regression from single depth maps, ECCV 2020.
- C.23 M. Wolter, A. Yao & S. Behnke. Object-centered Fourier motion estimation and segment transformation prediction, ESANN 2020.

2019

- C.22 F. Sener & A. Yao. Zero-shot anticipation for instructional activities, ICCV 2019.
- C.21 L. Yang, S. Li, D. Lee, & A. Yao. Aligning latent spaces for 3D hand pose estimation, ICCV 2019.
- C.20 S. Majumder & A. Yao. Localized interactive instance segmentation, GCPR/DAGM 2019.
- C.19 S. Majumder & A. Yao. Scale-aware multi-level guidance for interactive instance segmentation, CVPR 2019.
- C.18 C. Wan, T. Probst, L. Van Gool & A. Yao. Self-supervised 3D hand pose estimation through training by fitting (oral, Best Paper finalist), CVPR 2019.
- C.17 L. Yang & A. Yao. Disentangling latent hands for image synthesis and pose estimation, CVPR 2019.

2018

- C.16 M. Wolter & A. Yao. Gated complex recurrent neural networks, NeurIPS 2018.
- C.15 D. Aggarwal, E. Valiyev, F. Sener, & A. Yao. Learning style compatibility for furniture, GCPR/DAGM 2018.
- C.14 G. Franchi, A. Yao & A. Kolb. Supervised deep Kriging for single-image super-resolution” (oral), GCPR/DAGM 2018.
- C.13 F. Sener & A. Yao. Unsupervised discovery and segmentation of complex activities” (spotlight), CVPR 2018.
- C.12 C. Wan, T. Probst, L. Van Gool & A. Yao. Dense 3D regression for hand pose estimation, CVPR 2018.

2017

- C.11 J. Li, R. Klein & A. Yao. A two-streamed network for estimating fine-scaled depth maps from single RGB images, ICCV 2017.
- C.10 S. Majumder, H. Chen & A. Yao. Data-driven synthesis of hand grasps from 3D object models, VMV 2017.
- C.9 C. Wan, T. Probst, L. Van Gool & A. Yao. Crossing nets: Combining GANs and VAEs with a shared latent space for hand pose estimation (spotlight), CVPR 2017.

2016 and older

- C.8 C. Wan, A. Yao & L. Van Gool. Hand pose estimation from local surface normals, ECCV 2016
- C.7 A. Yao, L. Van Gool & P. Kohli. Gesture recognition portfolios for personalization, CVPR 2014.
- C.6 A. Yao, J. Gall, C. Leistner & L. Van Gool. Interactive object detection, CVPR 2012.
- C.5 A. Yao, J. Gall, L. Van Gool & R. Urtasun. Learning probabilistic non-linear latent variable models for tracking complex activities, NeurIPS 2011.
- C.4 A. Yao, J. Gall, G. Fanelli & L. Van Gool. Does human action recognition benefit from pose estimation? BMVC 2011.
- C.3 A. Yao, D. Uebersax, J. Gall & L. Van Gool. Tracking in broadcast sports, GCPR/DAGM 2010.
- C.2 J. Gall, A. Yao & L. Van Gool. 2D action recognition serves 3D human pose estimation, ECCV 2010
- C.1 A. Yao, J. Gall & L. Van Gool. A Hough transform-based voting framework for action recognition, CVPR 2010.