

# XIAOWEI HU

Email: [xwhu@cse.cuhk.edu.hk](mailto:xwhu@cse.cuhk.edu.hk) ◇ Homepage: <https://xw-hu.github.io/>

Address: Room 1024, SHB, The Chinese University of Hong Kong, Shatin, Hong Kong.

## ACADEMIC QUALIFICATIONS

<b>Ph.D. in Computer Science and Engineering</b> The Chinese University of Hong Kong (CUHK) Advisors: Prof. Pheng-Ann Heng & Prof. Chi-Wing Fu ★ Awardee of the Hong Kong Ph.D. Fellowship Scheme (HKPFS)	08/2016 - 07/2020
<b>B.Eng. in Computer Science and Technology</b> South China University of Technology (SCUT) GPA: 3.95/4.0 ( <b>rank 1<sup>st</sup></b> in All-English-Teaching Union Class) ★ Selected by SCUT for a special class for the most promising students	09/2012 - 07/2016

## EMPLOYMENT

<b>Postdoctoral Fellow</b> , The Chinese University of Hong Kong	08/2020 - Present
--	-------------------

## RESEARCH INTERESTS

My research interests cover **computer vision** and **deep learning**, with special emphasis on **low-level vision**. Specifically, I am dedicated to designing learning algorithms to solve vision problems under adverse weather and lighting conditions (e.g., shadow image analysis, rain/haze removal), and I am also interested in exploring learning methods with less human supervision for image recognition and restoration.

## HONORS AND AWARDS

Hong Kong Ph.D. Fellowship (the <b>highest</b> scholarship for students studying in Hong Kong)	2016 - 2020
CVPR Doctoral Consortium Award (31 awardees <b>globally</b> )	2020
Best Oral Presentation Award of Hong Kong Computer Vision Workshop (the <b>only</b> winner)	2019
ICCV Outstanding Reviewer Award (top <b>3.6%</b> )	2019
Excellent Teaching Assistant at CSE Department, CUHK	2018
Top 10 Outstanding Students at SCUT ( <b>rank 1<sup>st</sup></b> , the <b>highest</b> award for students at SCUT)	2016
Gold Award of Pan-Pearl-River-Delta University IT Project Competition in China	2016
Google Excellence Scholarship (one of 58 winners in <b>China</b> )	2015
Tencent Outstanding Scholarship (the <b>only</b> undergraduate winner at SCUT)	2015
National Scholarship (the <b>highest</b> national wide scholarship for undergraduate students in China)	2013
First Prize of Adolescents Science & Technology Innovation Contest in Hebei Province	2011

## PUBLICATION HIGHLIGHTS

**Summary: TPAMI/CVPR/ICCV/ECCV (8), IEEE Transactions (13), CCF A (14).**

### Refereed Journal Papers

- [J1] *Revisiting Shadow Detection: A New Benchmark Dataset for Complex World*  
**Xiaowei Hu**, Tianyu Wang, Chi-Wing Fu, Yitong Jiang, Qiong Wang, and Pheng-Ann Heng.  
IEEE Transactions on Image Processing (**TIP**, IF: 9.340, CCF A), 2021.
- [J2] *Single-Image Real-Time Rain Removal Based on Depth-Guided Non-Local Features*  
**Xiaowei Hu**, Lei Zhu, Tianyu Wang, Chi-Wing Fu, and Pheng-Ann Heng.  
IEEE Transactions on Image Processing (**TIP**, IF: 9.340, CCF A), 2021.
- [J3] *Rotation-oriented Collaborative Self-supervised Learning for Retinal Disease Diagnosis*  
Xiaomeng Li, **Xiaowei Hu**, Xiaojuan Qi, Lequan Yu, Wei Zhao, Pheng-Ann Heng, and Lei Xing.  
IEEE Transactions on Medical Imaging (**TMI**, IF: 6.685), 2021. (**TMI Popular Paper**)
- [J4] *SALMNet: A Structure-Aware Lane Marking Detection Network*  
Xuemiao Xu, Tianfei Yu, **Xiaowei Hu**, Wing W. Y. Ng, Pheng-Ann Heng.  
IEEE Transactions on Intelligent Transportation Systems (**TITS**, IF: 6.319), 2021.
- [J5] *Global Guidance Network for Breast Lesion Segmentation in Ultrasound Images*  
Cheng Xue, Lei Zhu, Yunzhu Wu, **Xiaowei Hu**, Xiaomeng Li, Hai Zhang, and Pheng-Ann Heng.  
Medical Image Analysis (**MedIA**, IF: 11.148), 2021.

- [J6] *Direction-Aware Spatial Context Features for Shadow Detection and Removal*  
**Xiaowei Hu**, Chi-Wing Fu, Lei Zhu, Jing Qin, and Pheng-Ann Heng.  
 IEEE Transactions on Pattern Analysis and Machine Intelligence (**TPAMI**, IF: 17.861, CCF A), 2020.
- [J7] *SAC-Net: Spatial Attenuation Context for Salient Object Detection*  
**Xiaowei Hu**, Chi-Wing Fu, Lei Zhu, Tianyu Wang, and Pheng-Ann Heng.  
 IEEE Transactions on Circuits and Systems for Video Technology (**TCSVT**, IF: 4.133), 2020.
- [J8] *Saliency-Aware Texture Smoothing*  
 Lei Zhu<sup>†</sup>, **Xiaowei Hu**<sup>†</sup>, Chi-Wing Fu, Jing Qin, and Pheng-Ann Heng. (<sup>†</sup>joint 1<sup>st</sup> authors)  
 IEEE Transactions on Visualization and Computer Graphics (**TVCG**, IF: 4.558, CCF A), 2020.
- [J9]  *$\Psi$ -Net: Stacking Densely Convolutional LSTMs for Sub-cortical Brain Structure Segmentation*  
 Lihao Liu<sup>†</sup>, **Xiaowei Hu**<sup>†</sup>, Lei Zhu, Chi-Wing Fu, Jing Qin, and Pheng-Ann Heng. (<sup>†</sup>joint 1<sup>st</sup> authors)  
 IEEE Transactions on Medical Imaging (**TMI**, IF: 6.685), 2020.
- [J10] *CANet: Cross-disease Attention Network for Joint Diabetic Retinopathy and Diabetic Macular Edema Grading*  
 Xiaomeng Li, **Xiaowei Hu**, Lequan Yu, Lei Zhu, Chi-Wing Fu, and Pheng-Ann Heng.  
 IEEE Transactions on Medical Imaging (**TMI**, IF: 6.685), 2020.
- [J11] *Learning Gated Non-Local Residual for Single-Image Rain Streak Removal*  
 Lei Zhu, Zijun Deng, **Xiaowei Hu**, Haoran Xie, Xuemiao Xu, Jing Qin, and Pheng-Ann Heng.  
 IEEE Transactions on Circuits and Systems for Video Technology (**TCSVT**, IF: 4.133), 2020.
- [J12] *Aggregating Attentional Dilated Features for Salient Object Detection*  
 Lei Zhu, Jiaying Chen, **Xiaowei Hu**, Chi-Wing Fu, Xuemiao Xu, Jing Qin, and Pheng-Ann Heng.  
 IEEE Transactions on Circuits and Systems for Video Technology (**TCSVT**, IF: 4.133), 2020.
- [J13] *SINet: A Scale-Insensitive Convolutional Neural Network for Fast Vehicle Detection*  
**Xiaowei Hu**, Xuemiao Xu, Yongjie Xiao, Hao Chen, Shengfeng He, Jing Qin, and Pheng-Ann Heng.  
 IEEE Transactions on Intelligent Transportation Systems (**TITS**, IF: 6.319), 2019. (**ESI Highly Cited Paper**)
- [J14] *Deep Attentive Features for Prostate Segmentation in 3D Transrectal Ultrasound*  
 Yi Wang, Haoran Dou, **Xiaowei Hu**, Lei Zhu, Xin Yang, Ming Xu, et al.  
 IEEE Transactions on Medical Imaging (**TMI**, IF: 6.685), 2019.
- [J15] *CATARACTS: Challenge on Automatic Tool Annotation for cataRACT Surgery*  
 Hassan Al Hajj, Mathieu Lamard, Pierre-Henri Conze, Soumali Roychowdhury, **Xiaowei Hu**, et al.  
 Medical Image Analysis (**MedIA**, IF: 11.148), 2019.

## Refereed Conference Papers

- [C1] *Single-Stage Instance Shadow Detection with Bidirectional Relation Learning*  
 Tianyu Wang<sup>†</sup>, **Xiaowei Hu**<sup>†</sup>, Chi-Wing Fu, and Pheng-Ann Heng. (<sup>†</sup>joint 1<sup>st</sup> authors)  
 IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**, CCF A), 2021. (**Oral**)
- [C2] *Learning Semantic Context from Normal Samples for Unsupervised Anomaly Detection*  
 Xudong Yan, Huaidong Zhang, Xuemiao Xu, **Xiaowei Hu**, and Pheng-Ann Heng.  
 AAAI Conference on Artificial Intelligence (**AAAI**, CCF A), 2021.
- [C3] *Instance Shadow Detection*  
 Tianyu Wang<sup>†</sup>, **Xiaowei Hu**<sup>†</sup>, Qiong Wang, Pheng-Ann Heng, and Chi-Wing Fu. (<sup>†</sup>joint 1<sup>st</sup> authors)  
 IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**, CCF A), 2020.
- [C4] *GrabAR: Occlusion-aware Grabbing Virtual Objects in AR*  
 Xiao Tang, **Xiaowei Hu**, Chi-Wing Fu, and Daniel Cohen-Or.  
 ACM Symposium on User Interface Software and Technology (**UIST**), 2020.
- [C5] *Mask-ShadowGAN: Learning to Remove Shadows from Unpaired Data*  
**Xiaowei Hu**, Yitong Jiang, Chi-Wing Fu, and Pheng-Ann Heng.  
 IEEE International Conference on Computer Vision (**ICCV**, CCF A), 2019.
- [C6] *Deep Multi-Model Fusion for Single-Image Dehazing*  
 Zijun Deng, Lei Zhu, **Xiaowei Hu**, Chi-Wing Fu, Xuemiao Xu, Qing Zhang, Jing Qin, and Pheng-Ann Heng.  
 IEEE International Conference on Computer Vision (**ICCV**, CCF A), 2019.
- [C7] *Depth-Attentional Features for Single-Image Rain Removal*  
**Xiaowei Hu**, Chi-Wing Fu, Lei Zhu, and Pheng-Ann Heng.  
 IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**, CCF A), 2019.

- [C8] *Probabilistic Multilayer Regularization Network for Unsupervised 3D Brain Image Registration*  
Lihao Liu, **Xiaowei Hu**, Lei Zhu, and Pheng-Ann Heng.  
International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI**), 2019.
- [C9] *Enhancing Augmented VR Interaction via Egocentric Scene Analysis*  
Yang Tian, Chi-Wing Fu, Shengdong Zhao, Ruihui Li, Xiao Tang, **Xiaowei Hu**, and Pheng-Ann Heng.  
Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (**Ubicomp**, CCF A), 2019.
- [C10] *Direction-Aware Spatial Context Features for Shadow Detection*  
**Xiaowei Hu**, Lei Zhu, Chi-Wing Fu, Jing Qin, and Pheng-Ann Heng.  
IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**, CCF A), 2018. (**Oral**)
- [C11] *Recurrently Aggregating Deep Features for Salient Object Detection*  
**Xiaowei Hu**, Lei Zhu, Jing Qin, Chi-Wing Fu, and Pheng-Ann Heng.  
AAAI Conference on Artificial Intelligence (**AAAI**, CCF A), 2018. (**Spotlight**)
- [C12] *R<sup>3</sup>Net: Recurrent Residual Refinement Network for Saliency Detection*  
Zijun Deng<sup>†</sup>, **Xiaowei Hu**<sup>†</sup>, Lei Zhu, Xuemiao Xu, Jing Qin, Guoqiang Han, and Pheng-Ann Heng. (<sup>†</sup>joint 1<sup>st</sup> authors)  
International Joint Conference on Artificial Intelligence (**IJCAI**, CCF A), 2018. (**Oral**)
- [C13] *Bidirectional Feature Pyramid Network with Recurrent Attention Residual Modules for Shadow Detection*  
Lei Zhu, Zijun Deng, **Xiaowei Hu**, Chi-Wing Fu, Xuemiao Xu, Jing Qin, and Pheng-Ann Heng.  
European Conference on Computer Vision (**ECCV**), 2018.
- [C14] *Deep Attentional Features for Prostate Segmentation in Ultrasound*  
Yi Wang, Zijun Deng, **Xiaowei Hu**, Lei Zhu, Xin Yang, Xuemiao Xu, Pheng-Ann Heng, and Dong Ni.  
International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI**), 2018.

## TEACHING AND SUPERVISION

---

### Teaching Assistant at CUHK

- ◇ Advanced Topics in Computer Graphics and Visualization (Excellent Teaching Assistant) Spring 2018
- ◇ Digital Logic and Systems Fall 2016-2018
- ◇ Linear Algebra and Vector Calculus for Engineers Spring 2017

### Supervision

- ◇ Supervise junior Ph.D. (Tianyu Wang and Xiao Tang), M.Phil. (Zijun Deng, Lihao Liu, and Tianfei Yu), and undergraduate (Yitong Jiang) students to publish research papers on top-tier conferences and journals.

## PROFESSIONAL ACTIVITIES

---

### Invited Talks

- ◇ *Shadow Detection and Removal with Deep Learning*  
at Shanghai AI Laboratory October, 2021  
at TechBeat August 2021  
at Nanjing University May 2021  
at Nanjing University of Science and Technology May 2021  
at Nanjing University of Aeronautics and Astronautics April 2021  
at Institute of Computing Technology, Chinese Academy of Sciences March 2021  
at Peng Cheng Laboratory Overseas Young Scientist Forum July 2020  
at Shantou University December 2019
- ◇ *Instance Segmentation and Instance Shadow Detection*  
at Nanjing University of Aeronautics and Astronautics October 2021
- ◇ *Mask-ShadowGAN: Learning to Remove Shadows from Unpaired Data*  
at Hong Kong Computer Vision Workshop (Best Oral Presentation Award) October 2019
- ◇ *Direction-Aware Spatial Context Features for Shadow Detection*  
at AI Massive Open Online Course July 2018

### Conference Reviews

- ◇ CVPR'22, AAAI'22, ICCV'21, CVPR'21, ACM MM'21, AAAI'21, PG'21, MICCAI'21, ECCV'20, CVPR'20, AAAI'20, PG'20, MICCAI'20, ICCV'19 (Outstanding Reviewer), CVPR'19, MICCAI'19.

### Journal Reviews

- ◇ IEEE TPAMI, IJCV, IEEE TIP, IEEE TMM, IEEE TITS, IEEE TMI, IEEE TCSVT, IEEE TVT, Neurocomputing, JBHI, JMLC, CUIV, AI Review, The Visual Computer, Computers & Graphics, IEEE CG&A, IEEE Access.