

# Zhou Ren

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## PROFESSIONAL EXPERIENCE

10/2022 – present, **Applied Science Manager**, Amazon AWS, Seattle, WA, USA

09/2021 – 09/2022, **Principal Research Manager**, Wormpex AI Research, Bellevue, WA, USA

12/2018 – 09/2021, **Senior Research Manager / Founding Member**, Wormpex AI Research, Bellevue, WA, USA

05/2018 – 12/2018, **Senior Research Scientist**, Snap Inc., Los Angeles, CA, USA

10/2017 – 05/2018, **Research Scientist (III)**, Snap Inc., Los Angeles, CA, USA

04/2017 – 10/2017, **Research Scientist (II)**, Snap Inc., Los Angeles, CA, USA

03/2016 – 04/2017, **Research Scientist (I)**, Snap Inc., Los Angeles, CA, USA

06/2010 – 06/2012, **Researcher**, Media Technology Lab, Nanyang Technological University, Singapore

## PROFESSIONAL ACTIVITIES

### Senior Member of IEEE

**Area Chair**, IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2022, 2021

**Area Chair**, IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) 2023, 2022

**Demo Chair**, IEEE Conference on Visual Communication and Image Processing (VCIP) 2022

**Senior Program Committee**, AAAI Conference on Artificial Intelligence (AAAI) 2022, 2021

**Associate Editor**, The Visual Computer Journal (TVCJ), 2018 – present

**Chair** of Industrial Governance Board, Asia-Pacific Signal and Information Processing Association (APSIPA)

## EDUCATION

### Doctor of Philosophy

09/2012 – 09/2016, *University of California, Los Angeles*

Computer Science Department (*Advisor: Prof. Alan Yuille*)

### Master of Engineering

08/2010 – 01/2012, *Nanyang Technological University*, Singapore

School of Electrical and Electronic Engineering (Part-time, *Advisor: Prof. Junsong Yuan*)

### Bachelor of Engineering

09/2006 – 06/2010, *Huazhong University of Science and Technology*, China

School of Electronic and Information Engineering (Overall GPA: 91.41/100, Rank: 1/223)

## RESEARCH INTERESTS

Human-Centric Visual Analysis, Multimodal Content Understanding, Efficient Machine Learning

## HONORS & AWARDS

- 1<sup>st</sup> Prize in ICCV 2021 Low Power Computer Vision Challenge** (among 31 competing teams)
- 2<sup>nd</sup> Place in NIPS 2017 Adversarial Defense Challenge** (among 107 competing teams)
- Best Student Paper Award Nominee, IEEE Conf. on Computer Vision and Pattern Recognition, 2017**
- Best Paper Award, IEEE Transactions on Multimedia, 2016**
- Spotlight Promotion Project Award, School of EEE, NTU** (6 out of ~200 research projects in EEE), 2011

## INDUSTRY EXPERIENCE HIGHLIGHTS

- Amazon**, Seattle, WA Oct 2022 – present  
*Work Hard, Have Fun, Make History*
- Applied Science Manager of Amazon Just Walk Out Technology
- Wormpex AI Research**, Bellevue, WA Dec 2018 – Sep 2022  
*AI branch of Bianlifeng: a Top-10 convenience store chain company in China, with over 2800 operating stores*
- As one of the 3 founding members, built the team from scratch in Beijing, Shanghai, and Bellevue, WA.
  - Manage a team focusing on human-centric visual analysis, such as detection, tracking, pose and gesture, action analysis, person ReID, crowd counting, merchandise recognition, etc.
  - Developed an edge-side model training, inference, and deployment pipeline by designing efficient neural network architecture and model compression (1<sup>st</sup> prize in ICCV'21 Low Power Computer Vision Challenge).
  - Delivered several real-world production systems to facilitate new retail logistics ranging from storefronts, warehouses to manufacture, generating millions of revenue annually.
- Snap Inc.**, Los Angeles, CA Mar 2016 – Dec 2018  
*AI for entertainment and monetization*
- Tech Lead of AI-based content monetization on Snapchat utilizing multimodal user signals such as visual, textual, and audio inputs to perform user profiling and ads targeting.
  - Tech Lead of AI-based content security on Snapchat utilizing multimodal user signals such as visual, textual, and audio inputs to detect inappropriate content such as violence, hate, drug and pornography.
  - Delivered several AR filters to support creative content creation, such as the context-aware "Moment Filter" and 3D hand lenses.
- Media Technology Lab**, Nanyang Technological University, Singapore Jun 2010 – Jun 2012  
*AI for human gesture analysis and its application in HCI*
- Invented the first generation hand gesture recognition system using Kinect sensor with Microsoft Research Redmond (IEEE Trans. on Multimedia 2016 Best Paper Award).
  - Developed Human-Computer-Interaction system using hand as the interface.

## PUBLICATIONS ([GOOGLE SCHOLAR](#))

(Note: "^" indicates the co-author is the student I mentored during whose internship or during an university collaboration)

### JOURNAL

- Sheng Liu<sup>^</sup>, **Zhou Ren**, and Junsong Yuan, "SibNet: Sibling Convolutional Encoder for Video Captioning",

*IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 2020. (cited by 83)

- Hongyu Xu<sup>^</sup>, Xutao Lv, Xiaoyu Wang, **Zhou Ren**, and Rama Chellappa, “Deep Regionlets: Blended Representation and Deep Learning for Generic Object Detection”, *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 2019. (cited by 10)
- Alexey Kurakin, *et. al*, “Adversarial Attacks and Defences Competition”, In *The NIPS'17 Competition Book: Building Intelligent Systems*, Springer. (cited by 223)
- Xiaowei Ding, Jianing Pang, **Zhou Ren**, Mariana Diaz-Zamudio, Chenfangfu Jiang, Zhaoyang Fan, Daniel Berman, Debiao Li, Demetri Terzopoulos, Piotr Slomka, and Damini Dey, “Automated Pericardial Fat Quantification from Coronary Magnetic Resonance Angiography”, *Journal of Medical Imaging (JMI)*, 2016.
- **Zhou Ren**, Junsong Yuan, and Wenyu Liu, “Minimum Near-Convex Shape Decomposition”. *IEEE Trans. on Pattern Analysis and Machine Intelligence (TPAMI)*, vol.35, pp.2546-2552, 2013. (cited by 48)
- **Zhou Ren**, Junsong Yuan, and Zhengyou Zhang, “Robust Part-based Hand Gesture Recognition using Kinect Sensor”. *IEEE Trans. on Multimedia (TMM)*, vol.15, pp.1110-1120, 2013. (**IEEE TMM 2016 Best Paper Award**) (cited by 811)

#### CONFERENCE

- Hongji Guo<sup>^</sup>, **Zhou Ren**, Yi Wu, Gang Hua, and Qiang Ji, “Uncertainty-Based Spatial-Temporal Attention for Online Action Detection”. In *IEEE European Conference on Computer Vision (ECCV)*, 2022.
- Zhenyu Wu<sup>^</sup>, **Zhou Ren**, Yi Wu, Zhangyang Wang, and Gang Hua, “TxVAD: Improved Video Action Detection by Transformers”. In *ACM Multimedia*, 2022.
- Yiding Yang<sup>^</sup>, **Zhou Ren**, Haoxiang Li, Chunluan Zhou, and Gang Hua, “Learning Dynamics via Graph Neural Networks for Human Pose Estimation and Tracking”. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2021. (cited by 17)
- Chunluan Zhou, **Zhou Ren**, Gang Hua, “Temporal Keypoint Matching and Refinement Network for Pose Estimation and Tracking”. In *IEEE European Conference on Computer Vision (ECCV)*, 2020.
- Shiyi Lan<sup>^</sup>, **Zhou Ren**, Yi Wu, Larry Davis, Gang Hua, “SaccadeNet: A Fast and Accurate Object Detector”. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2020. (cited by 21)
- Ye Yuan, Wuyang Chen, Tianlong Chen, Yang Yang, **Zhou Ren**, Zhangyang Wang, and Gang Hua, “Calibrated domain-invariant learning for highly generalizable large scale re-identification”. In *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*, 2020. (cited by 25)
- Tan Yu<sup>^</sup>, **Zhou Ren**, Yuncheng Li, Enxu Yan, Ning Xu, Junsong Yuan, “Temporal Structure Mining for Weakly Supervised Action Detection”. In *International Conference on Computer Vision (ICCV)*, 2019. (cited by 57)
- Tianlong Chen<sup>^</sup>, Shaojin Ding, Jingyi Xie, Ye Yuan, Wuyang Chen, Yang Yang, **Zhou Ren**, Zhangyang Wang, “ABD-Net: Attentive but Diverse Person Re-Identification”. In *International Conference on Computer Vision (ICCV)*, 2019. (cited by 296)
- Lihao Ge<sup>^</sup>, **Zhou Ren**, Yuncheng Li, Zehao Xue, Yingying Wang, Jianfei Cai, Junsong Yuan, “3D Hand Shape and Pose Estimation from a Single RGB Image”. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2019. (**Oral**) (cited by 284)

- Jonghwan Mun<sup>^</sup>, Linjie Yang, **Zhou Ren**, Ning Xu, and Bohyung Han, “Streamlined Dense Video Captioning”. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2019. (Oral) (cited by 76)
- Cihang Xie<sup>^</sup>, Yuyin Zhou, Song Bai, Zhishuai Zhang, Jianyu Wang, **Zhou Ren**, and Alan Yuille, “Improving Transferability of Adversarial Examples with Input Diversity”. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2019. (cited by 446)
- Yuncheng Li, Zehao Xue, Yingying Wang, Liuhao Ge, Zhou Ren, and Jonathan Rodriguez, “End-to-End 3D Hand Pose Estimation from Stereo Cameras”. In *British Machine Vision Conference*, 2019. (cited by 12)
- Liuhao Ge<sup>^</sup>, **Zhou Ren**, Junsong Yuan, “Point-to-Point Regression PointNet for 3D Hand Pose Estimation”. In *European Conference on Computer Vision (ECCV)*, 2018. (cited by 124)
- Hongyu Xu<sup>^</sup>, Xutao Lv, Xiaoyu Wang, **Zhou Ren**, and Rama Chellappa, “Deep Regionlets for Object Detection”. In *European Conference on Computer Vision (ECCV)*, 2018. (cited by 67)
- Sheng Liu<sup>^</sup>, **Zhou Ren**, Junsong Yuan, “SibNet: Sibling Convolutional Encoder for Video Captioning”. In *ACM Multimedia Conference (ACM MM)*, 2018. (Oral) (cited by 83)
- Cihang Xie<sup>^</sup>, Jianyu Wang, Zhishuai Zhang, **Zhou Ren**, Alan Yuille, “Mitigating Adversarial Effects Through Randomization”. In *International Conf. on Learning Representations (ICLR)*, 2018. (cited by 751)
- **Zhou Ren**, Hailin Jin, Zhe Lin, Chen Fang, and Alan Yuille, “Multiple Instance Visual-Semantic Embedding”. In *British Machine Vision Conference (BMVC)*, 2017. (Oral) (cited by 64)
- **Zhou Ren**, Xiaoyu Wang, Ning Zhang, and Li-Jia Li, “Deep Reinforcement Learning-based Image Captioning with Embedding Reward”. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2017. (Oral) (Best Student Paper Award Nominee) (cited by 317)
- **Zhou Ren**, Hailin Jin, Zhe Lin, Chen Fang, and Alan Yuille, “Joint Image-Text Representation by Gaussian Visual-Semantic Embedding”. In *ACM Multimedia Conference (ACM MM)*, 2016. (cited by 51)
- **Zhou Ren**, Chaohui Wang and Alan Yuille, “Scene-Domain Active Part Models for Object Representation”. In *IEEE International Conference on Computer Vision (ICCV)*, 2015.
- Xiaowei Ding, Jianing Pang, **Zhou Ren**, Mariana Zamudio, Daniel Berman, Debiao Li, Demetri Terzopoulos, Piotr Slomka, and Damini Dey, “Automated Pericardial Fat Quantification from Coronary Magnetic Resonance Angiography”. In *Medical Image Understanding and Analysis (MIUA)*, 80-85, 2015. (Oral)
- **Zhou Ren**, Junsong Yuan, Chunyuan Li and Wenyu Liu, “Minimum Near-Convex Decomposition for Robust Shape Representation”. In *IEEE International Conference on Computer Vision (ICCV)*, 2011. (cited by 98)
- **Zhou Ren**, Junsong Yuan, and Zhengyou Zhang, “Robust Hand Gesture Recognition Based on Finger-Earth Mover’s Distance with a Commodity Depth Camera”. In *ACM Multimedia Conference (ACM MM)*, Nov. 2011. (cited by 563)
- **Zhou Ren**, Jingjing Meng, Junsong Yuan, and Zhengyou Zhang, “Robust Hand Gesture Recognition with Kinect Sensor”. In *ACM Multimedia Conference (ACM MM)*, Nov. 2011. (cited by 388)
- **Zhou Ren**, Jingjing Meng, and Junsong Yuan, “Depth Camera based Hand Gesture Recognition and its Applications in Human-Computer-Interaction”. In *IEEE International Conference on Information, Communication, and Signal Processing (ICICS)*, Dec. 2011. (Oral) (cited by 256)

- Zhongyuan Lai, Junhuan Zhu, **Zhou Ren**, Wenyu Liu, and Baolan yan, “Arbitrary Directional Edge Encoding Schemes for the Operational Rate Distortion Optimal Shape Coding Framework”. In *2010 IEEE Data Compression Conference (DCC)*, pp. 20-29, Nov. 2010. (**Oral**) (cited by 13)

## MENTORED STUDENT INTERN COLLABORATORS

- Lluís Castrejon (2017 Summer), PhD student at MILA, University of Montreal
- Zhe Li (2017 Summer), PhD student at University of Iowa
- Hongyu Xu (2017 Summer), PhD student at University of Maryland, College Park
- Cihang Xie (2017 Fall – 2018 Spring), PhD student at Johns Hopkins University
- Sheng Liu (2017 Fall – 2019 Fall), PhD student at The State University of New York at Buffalo
- Liuhao Ge (2018 Spring – 2019 Spring), PhD student at Nanyang Technological University
- Tan Yu (2018 Summer), PhD student at Nanyang Technological University
- Shibi He (2018 Summer), PhD student at University of Illinois Urbana-Champaign
- Jonghwan Mun (2018 Summer), PhD student at Pohang University of Science and Technology
- Tianlong Chen (2019 Spring), PhD student at Texas A&M University
- Ye Yuan (2019 Spring), PhD student at Texas A&M University
- Wuyang Chen (2019 Spring), PhD student at Texas A&M University
- Shiyi Lan (2019 Summer), PhD student at University of Maryland, College Park
- Zhenyu Wu (2020 Summer), PhD student at Texas A&M University
- Yiding Yang (2020 Summer), PhD student at Stevens Institute of Technology
- Tongzhou Mu (2020 Summer), PhD student at University of California San Diego
- Hanwen Jiang (2021 Summer), PhD student at The University of Texas at Austin
- Kumara Kahatapitiya (2021 Summer), PhD student at Stony Brook University
- Hongji Guo (2021 Summer), PhD student at Rensselaer Polytechnic Institute
- Yuanhao Zhai (2022 Summer), PhD student at The State University of New York at Buffalo
- Wensheng Cheng (2022 Summer), PhD student at Stony Brook University

## PROFESSIONAL SKILLS

Proficient with PyTorch, Torch, Caffe. Experienced with Microsoft Kinect Sensor, Tensorflow.  
Programming languages: C/C++, Python, Lua, Matlab.

## PERSONAL QUALIFICATIONS & INTERESTS

Highly self-motivated, passionate, cooperative, bias for action, and deliver results  
Basketball, rock climbing, skiing, and fitness

## REFERENCES

Available Upon Request