

Zhikang Zhang

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RESEARCH AREAS

Multimodal learning, Signal Processing, Computer Vision,

EDUCATION

- **Doctor of Philosophy in Computer Science** Aug 2017 – Jan 2023
Arizona State University. Advisor: Prof. Fengbo Ren Tempe, AZ
- **Bachelor of Science in Statistics** Aug. 2012 – June. 2016
School of the Gifted Young, University of Science and Technology of China Hefei, China

RESEARCH EXPERIENCES

- **Amazon.com Services, Inc** Seattle, WA
Applied Scientist Jan 2023 - Present
 - **Foundation Model for Cinematic Content:** Work as data and infrastructure tech lead to build the first foundation model for cinematic content. This model is pretrained on 2 billion external data and further finetuned on 1.6 million internal data with 128 V100 GPUs to build information alignments between video, audio and text. The model achieves prominent performance on multimodal-to-multimodal retrieval and zeroshot metadata generation tasks.
 - **Foundation Model for Multimodal Understanding:** Work on building the data pipeline and modeling for general multimodal understanding tasks. The model is fine-tuned on 1m high-quality instructive data to achieve high performance on VQA, image/video caption and zeroshot image/video classification tasks.
 - **Multi-grained Video-language Pretraining:** Work as intern's mentor to lead the research on multi-grained video-language pretraining. The proposed approach is evaluated across three downstream tasks on six datasets, showcasing state-of-the-art or comparable performance, especially on long-form video understanding tasks. The research paper is under review.
 - **Metadata Generation at Scale for Cinematic Content:** Develop ML-based, end-to-end solutions for metadata generation in cinematic content. This approach has been deployed into production.
- **Parallel Systems and Computing Laboratory** Tempe, AZ
Graduate Research Associate Aug 2021 - Dec 2023
 - **Low-resolution LiDAR-camera Calibration through Multimodal Learning:** Develop a multimodal learning approach tailored for online low-resolution LiDAR-camera calibration which outperforms all reference methods by large margin. **Outcomes:** Paper 2.
 - **Data-driven Error Detection for Semiconductor Analysis:** Develop the first data-driven method to automatically detect segmentation errors for semiconductor analysis. **Outcomes:** Paper 4. Patent 5
- **Amazon.com Services, Inc** Remote
Applied Scientist Intern May 2021 - Aug 2021
 - **Multimodal Learning for Dubbed Audio-sync Detection and Correction:** Derive proof of concept for dubbed audio-sync defect detection in online video streaming applications based on compressive sensing and multimodal learning. The work has been deployed into production. **Outcomes:** Paper 5. Patent 4. More details: www.primevideotech.com
- **Parallel Systems and Computing Laboratory** Tempe, AZ
Graduate Research Associate Aug 2017 - May 2021
 - **Transfer Learning of Image Compressive Sensing for Bioelectric Signals:** Conduct a study on transfer learning from image compressive sensing to bioelectric signals. **Outcomes:** paper 7.
 - **Selective Sensing for Efficient Data Sensing:** Propose a computation-free on-sensor dimensionality reduction scheme called selective sensing. **Outcomes:** patent 2.
 - **Compression Ratio Adapter for Adaptive Compressive Sensing:** Propose a general compression ratio adapter for end-to-end compressive sensing reconstruction frameworks. **Outcomes:** paper 9. patent 3
 - **Hierarchical Network for Image Compressive Sensing Reconstruction:** Participate in a research project of proposing a flexible compressive sensing reconstruction framework. **Outcomes:** paper 10. patent 1.

OTHER EXPERIENCES

- **Parallel Systems and Computing Laboratory** Tempe, AZ
Graduate Research Associate *Dec 2019 - Dec 2020*
 - **OpenICS**: Lead the effort on building an open-source toolbox for image compressive sensing. **Outcomes**: Paper 8. Code: OpenICS
- **Parallel Systems and Computing Laboratory** Tempe, AZ
Linux Server Administrator *Aug 2019 - Dec 2023*
 - **Linux Server Administration**: Manage the computation infrastructure of the lab including 60+ servers.
- **Parallel Systems and Computing Laboratory** Tempe, AZ
Conference reviewer *Jan 2021 - Present*
 - **Conference reviewer**: As reviewers of AICAS 2021, 2023. ICASSP 2024, WACV 2023, IROS 2023.
- **School of Computing and Augmented Intelligence** Tempe, AZ
Graduate Teaching Associate *Aug 2019 - Dec 2019*
 - **Graduate Teaching Associate**: Assist with teaching "CSE 100: Principles of Programming with C++".

SKILLS

1. Proficient programming skills with Python, Matlab and R.
2. Proficient skills with modern machine learning frameworks, including Pytorch, Tensorflow, Scikit-learn.
3. Experiences on large-scale distributed model training and infrastructure management.
4. Proven record of developing innovative ML-based solutions to real-world industrial problems.

AWARDS

1. SCAI travel award(2018, 2020, 2022), Arizona State University
2. GASP travel award(2022), Arizona State University
3. ASU NSF I-Corps Award(2021), Arizona State University & NSF
4. Engineering Graduate Fellowship(2020), Arizona State University
5. National Training Program of Innovation and Entrepreneurship for Undergraduates(2015)

PUBLICATIONS

1. **Zhikang Zhang**, Vision-inspired Representation and Learning for Data-driven Signal Processing, ASU, PhD Thesis.
2. **Zhikang Zhang**, Zifan Yu, Suyu You, Raghuvveer Rao, Sanjeev Agarwal, Fengbo Ren, "Enhanced Low-resolution Lidar-Camera Calibration Via Depth Interpolation and Supervised Contrastive Learning", **ICASSP**, 2023.
3. Zifan Yu, Meida Chen, **Zhikang Zhang**, Suyu You, Fengbo Ren, "TransUPR: A Transformer-based Uncertain Point Refiner for Range Image-Based LiDAR Point Cloud Semantic Segmentation", **IROS** 2023.
4. **Zhikang Zhang**, Bruno Machado Trindade, Michael Green, Zifan Yu, Christopher Pawlowicz, and Fengbo Ren, "Automatic Error Detection in Integrated Circuits Image Segmentation: A Data-driven Approach", **ICASSP**, 2023.
5. Avijit Vajpayee, **Zhikang Zhang**, Abhinav Jain, and Vimal Bhat, "A Simple and Efficient Method for Dubbed Audio Sync Detection using Compressive Sensing", **WACVW**, 2023.

6. Zifan Yu, Bruno Machado Trindade, Michael Green, **Zhikang Zhang**, Pullela Sneha, Erfan Bank Tavakoli, Christopher Pawlowicz, and Fengbo Ren, "A Data-Driven Approach for Automated Integrated Circuit Segmentation of Scan Electron Microscopy Images", **ICIP**, 2022.
7. **Zhikang Zhang**, Jonathan Zhao, and Fengbo Ren, "An Experimental Study on Transferring Data-driven Image Compressive Sensing to Bioelectric Signals", **ICASSP**, 2022.
8. Jonathan Zhao, Márk Lakatos-Tóth, Matthew Westerham, **Zhikang Zhang**, Avi Moskoff, and Fengbo Ren. "OpenICS: Open image compressive sensing toolbox and benchmark." **Software Impacts**, 2021.
9. **Zhikang Zhang**, Kai Xu, and Fengbo Ren, "CRA: A Generic Compression Ratio Adapter For End-to-end Data-driven Image Compressive Sensing Reconstruction Frameworks", **ICASSP**, 2020, oral.
10. Kai Xu, **Zhikang Zhang**, and Fengbo Ren, "LAPRAN: A Scalable Laplacian Pyramid Reconstructive Adversarial Network for Flexible Compressive Sensing Reconstruction", **ECCV**, 2018.

PATENTS

1. Lapran: a scalable laplacian pyramid reconstructive adversarial network for flexible compressive sensing reconstruction(US11468542B2), granted.
2. Selective sensing: a data-driven nonuniform subsampling approach for computation-free on-sensor data dimensionality reduction(US20210349945A1), granted.
3. Generic compression ratio adapter for end-to-end data-driven compressive sensing reconstruction frameworks(US20210305999A1), granted
4. Audio-video synchronization for non-original audio tracks(US11610610B1), granted.
5. Method for detecting potential errors in digitally segmented images, and a system employing the same(WO2024086927A1), filed.