

# SHU ZHAO

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## RESEARCH INTERESTS

My research interests lie at the intersection of multimodal large language models and retrieval, with a particular focus on developing advanced Multimodal Retrieval-Augmented Generation (MM-RAG) systems. I am passionate about designing intelligent systems that can effectively retrieve and reason across different modalities to create robust, adaptable, and efficient AI systems.

## EDUCATION

<b>The Pennsylvania State University–University Park</b> Ph.D. in Computer Science	<i>Aug. 2022 - May. 2026 (Expected)</i> <i>Pennsylvania, USA</i>
<b>University of Chinese Academy of Sciences</b> M.E. in Computer Technology	<i>Sep. 2018 - Jun. 2021</i> <i>Beijing, China</i>
<b>Anhui University</b> B.E. in Information Security	<i>Sep. 2013 - Jun. 2017</i> <i>Anhui, China</i>

## PUBLICATIONS

- On-demand Multimodal Retrieval-Augmented Generation.**  
2024. In Preparation.  
**Shu Zhao**, Nilesh Ahuja, Omesh Tickoo, Tianyi Shen, Vijaykrishnan Narayanan.
- KALAHASH: Knowledge-Anchored Low-Resource Adaptation for Deep Hashing.**  
2024. In Submission.  
**Shu Zhao**, Tan Yu, Xiaoshuai Hao, Wenchao Ma, Vijaykrishnan Narayanan.
- Reconstruct before Query: Continual Missing Modality Learning with Decomposed Prompt Collaboration.**  
2024. In Submission.  
**Shu Zhao**, Xiaohan Zou, Tan Yu.
- SafeMap: Towards Reliable HD Map Construction from Incomplete Observations.**  
2024. In Submission.  
Xiaoshuai Hao, Mengchuan Wei, Yunfeng Diao, Lingdong Kong, **Shu Zhao**.
- MapFusion: A Novel BEV Feature Fusion Network for Multi-modal Map Construction.**  
2024. In Submission.  
Xiaoshuai Hao, Yunfeng Diao, Mengchuan Wei, Yifan Yang, Peng Hao, Rong Yin, Hui Zhang, Weiming Li, **Shu Zhao**, Yu Liu.
- Less is More: Toward Zero-Shot Local Scene Graph Generation via Foundation Models.**  
arXiv:2310.01358. 2023.  
**Shu Zhao**, Huijuan Xu.
- NEUCORE: Neural Concept Reasoning for Composed Image Retrieval.**  
UniReps Workshop @ Neural Information Processing Systems (**NeurIPS Workshop**). 2023.  
**Shu Zhao**, Huijuan Xu.
- Rescuing Deep Hashing from Dead Bits Problem.**  
International Joint Conference on Artificial Intelligence (**IJCAI**), 2021.  
**Shu Zhao**, Dayan Wu, Yucan Zhou, Bo Li, Weiping Wang.
- Asymmetric Deep Hashing for Efficient Hash Code Compression.**  
ACM International Conference on Multimedia (**ACM MM**), 2020. (**Oral**)  
**Shu Zhao**, Dayan Wu, Wanqian Zhang, Yu Zhou, Bo Li, Weiping Wang.

10. **Technical Report for EPIC-KITCHENS-100 2021 Multi-Instance Retrieval Challenge.**  
 Workshop on EPIC-Kitchens Challenges, in conjunction with CVPR (CVPR Workshop 2021). (**Ranked 1st**)  
 Xiaoshuai Hao, Wanqian Zhang, Dejie Yang, **Shu Zhao**, Dayan Wu, Bo Li, Weiping Wang.

## RESEARCH EXPERIENCE

### Research Intern. Baidu Research, Beijing

Apr. 2022 - Jul. 2022

*Advised by Dr. Tan Yu*

Topic: Large Multimodal Models for Image Retrieval

### Research Assistant. IIE, Chinese Academy of Sciences, Beijing

Mar. 2019 - Jun. 2021

*Advised by Prof. Dayan Wu and Prof. Bo Li*

Topic: Deep Image Hashing

## INTERDISCIPLINARITY

### InsectEye

2024

*Collaboration with Entomology Department, Penn State*

Description: we are developing an AI system for automated insect recognition and classification as part of the InsectEye project, a non-lethal biodiversity monitoring initiative at Penn State's Arboretum. We are working on engineering robust computer vision algorithms to overcome challenging environmental conditions, including variable lighting and background noise while achieving accurate identification of small insects with subtle morphological differences.

### Textural Threshold: Dreadlock

2023

*Collaboration with Architecture Department, Penn State*

Description: a user's hair texture is acquired through a camera, and similar and dissimilar images are retrieved through deep retrieval techniques and stitched together to form an art painting. Our work was presented at the Central Pavilion Exhibition, the 18th Architectural Venice Biennale.

## HONORS & AWARDS

1st in Multi-Instance Retrieval Track of EPIC-KITCHENS Challenges, CVPR Workshop	2021
Pacemaker to Merit Student, University of Chinese Academy of Sciences	2021
IIE Presidential Scholarship, Institute of Information Engineering	2020
Merit Student, University of Chinese Academy of Sciences	2019

## REVIEW SERVICES

Computer Vision and Pattern Recognition (CVPR)	2024-2025
Annual Conference on Neural Information Processing Systems (NeurIPS)	2023
ACM International Conference on Multimedia (ACM MM)	2022-2024

## TEACHING ASSISTANT

Deep Learning for Computer Vision, Undergraduate	2024
Vision and Language, Graduate	2023

## SKILLS

Python, PyTorch, L<sup>A</sup>T<sub>E</sub>X, Linux, MATLAB, C++