

# Yunkang CAO

 <https://caoyunkang.github.io> |  [caoyunkang0207@gmail.com](mailto:caoyunkang0207@gmail.com) |  (86) 158-2729-6607 | P.R. China

## EDUCATION

**Huazhong University of Science and Technology (Top 10 in P.R. China)** Wuhan, China  
Ph.D. in Mechanical Engineering (Supervisor: [Prof. Weiming Shen](#)) Sep. 2020 - Jun. 2025 (expected)  
**Politecnico di Milano** Milan, Italy  
Visiting Ph.D. in Computer Science (Supervisor: [Prof. Giacomo Boracchi](#)) Oct. 2023 - Oct. 2024 (expected)  
**Huazhong University of Science and Technology (Top 10 in P.R. China)** Wuhan, China  
B.E. in Mechanical Engineering **GPA: 91.55/100 (Top 3%)** Sep. 2016 - Jun. 2020

## RESEARCH

- **Research Interest:** Visual Anomaly Detection, Vision-Language Model, Computer Vision
- **Github:** 1300+ stars, with a single repository achieving 700+ stars
- **Citations:** 360+ (as of November 2024), h-index: 10

## SELECTED PUBLICATIONS

#co-first author, \*corresponding author

### First-Authored Peer-Reviewed Publications

1. **Y. Cao**, J. Zhang, L. Frittoli, Y. Cheng, W. Shen\*, G. Boracchi. AdaCLIP: Adapting CLIP with Hybrid Learnable Prompts for Zero-Shot Anomaly Detection. *European Conference on Computer Vision (ECCV)*, 2024. Arxiv: [2407.15795](#). [\[CODE\]](#)
2. **Y. Cao**, X. Xu, W. Shen\*. Complementary pseudo multimodal feature for point cloud anomaly detection. *Pattern Recognition*, 2024. Arxiv: [2303.13194](#). [\[CODE\]](#)
3. **Y. Cao**, X. Xu, C. Sun, L. Gao, W. Shen\*. BiasS: Incorporating Biased Knowledge to Boost Unsupervised Image Anomaly Localization. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 2024. DOI: [10.1109/TSMC.2023.3344383](#).
4. **Y. Cao**, X. Xu, Z. Liu, W. Shen\*. Collaborative discrepancy optimization for reliable image anomaly localization. *IEEE Transactions on Industrial Informatics*, 2023. DOI: [10.1109/TII.2023.3241579](#). [\[CODE\]](#)
5. **Y. Cao**, Y. Zhang, W. Shen\*. High-Resolution Image Anomaly Detection via Spatiotemporal Consistency Incorporated Knowledge Distillation. *International Conference on Automation Science and Engineering (CASE)*, 2023. DOI: [10.1109/CASE56687.2023.10260338](#).
6. **Y. Cao**, Q. Wan, W. Shen\*, L. Gao. Informative knowledge distillation for image anomaly segmentation. *Knowledge-Based Systems*, 2022. DOI: [10.1016/J.KNOSYS.2022.108846](#). [\[CODE\]](#)

### First-Authored Manuscripts under Review

1. **Y. Cao**, X. Xu, C. Sun, Y. Cheng, Z. Du, L. Gao, W. Shen\*. Segment any anomaly without training via hybrid prompt regularization. *IEEE Transactions on Cybernetics*, reject and resubmit. Arxiv: [2305.10724](#). [\[CODE\]](#)
2. **Y. Cao**, H. Yao, W. Luo, W. Shen\*. VarAD: Lightweight High-Resolution Image Anomaly Detection via Visual Autoregressive Modeling. *IEEE Transactions on Industrial Informatics*, major revision.
3. **Y. Cao**, X. Xu, J. Zhang, Y. Cheng, X. Huang, G. Pang, W. Shen\*. A Survey on Visual Anomaly Detection: Challenge, Approach, and Prospect. *pending to submit*. Arxiv: [2401.16402](#).
4. **Y. Cao**, X. Xu, C. Sun, X. Huang, W. Shen\*. Towards generic anomaly detection and understanding: Large-scale visual-linguistic model (gpt-4v) takes the lead. *pending to submit*. Arxiv: [2311.02782](#). [\[Press Coverage\]](#)
5. Y. Cheng#, **Y. Cao**#, G. Xie, Z. Lu, W. Shen\*. Towards Zero-shot Point Cloud Anomaly Detection: A Multi-View Projection Framework. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, reject and resubmit. Arxiv: [2409.13162](#).
6. **Y. Cao**#, H. Yao #, Y. Cai, H. Chen, W. Shen\*. A Generalized Medical Anomaly Detection Suite: Detecting Anomalies in Multi-Source and Multi-Modality Images. *IEEE Transactions on Neural Networks and Learning Systems*, under review.

## Other Peer-Reviewed Publications

1. H. Yao, **Y. Cao**, W. Luo, W. Zhang, W. Yu\*, W. Shen. Prior Normality Prompt Transformer for Multi-class Industrial Image Anomaly Detection. *IEEE Transactions on Industrial Informatics*, 2024. DOI: [10.1109/TII.2024.3413322](https://doi.org/10.1109/TII.2024.3413322).
2. Y. Jiang, **Y. Cao**, W. Shen\*. Prototypical Learning Guided Context-Aware Segmentation Network for Few-Shot Anomaly Detection. *IEEE Transactions on Neural Networks and Learning Systems*, 2024.
3. Y. Zhang, **Y. Cao**, X. Xu, W. Shen\*. LogiCode: an LLM-Driven Framework for Logical Anomaly Detection. *IEEE Transactions on Automation Science and Engineering*. Arxiv: [2406.04687](https://arxiv.org/abs/2406.04687).
4. Y. Jiang, **Y. Cao**, W. Shen\*. A masked reverse knowledge distillation method incorporating global and local information for image anomaly detection. *Knowledge-Based Systems*, 2023. DOI: [10.1016/J.KNOSYS.2023.110982](https://doi.org/10.1016/J.KNOSYS.2023.110982).

## RESEARCH PROJECT

---

### Mobile E-Ink Screen Surface Defect Detection Equipment

Jun. 2023 - Present

- constructed a *high-resolution* defect inspection prototype for mobile e-ink screens.
- collected a comprehensive dataset of high-resolution images for mobile e-ink screen inspection.
- translated image anomaly detection into token prediction, and introduced state space models to predict the future tokens based on previous tokens
- achieved high detection efficiency with great global information capture capacity for high-resolution images.

### Complex Surface Part Inspection Equipment

Jun. 2020 - Jun. 2024

- constructed a *multi-view and multi-illumination* defect inspection prototype equipment for curved surface parts.
- collected an automotive part inspection dataset featuring multi-illumination images.
- proposed a multi-illumination visual anomaly detection task and extended reverse knowledge distillation for this task.

## SELECTED AWARDS & HONORS

---

- Provincial Second Prize, China International College Students' Innovation Competition. Aug. 2024
- **2nd place** in [Visual Anomaly and Novelty Detection 2023 Challenge](#) by CVPR. [\[Paper\]](#) [\[CODE\]](#) Jun. 2023
- Mathematical Modeling Stars Nomination (**Top2**) of China Mathematical Modeling Contest. May 2022
- **National Scholarship (the highest scholarship for B.E.)** Sep. 2017 & Sep. 2019

## ACADEMIC SERVICE

---

- **Peer-reviewer of journals:**  $\diamond$  *IEEE TSMC*,  $\diamond$  *IEEE TNNLS*,  $\diamond$  *IEEE TKDE*,  $\diamond$  *IEEE TII*, etc.
- **Peer-reviewer of conferences:**  $\diamond$  *CVPR*,  $\diamond$  *NeurIPS*,  $\diamond$  *AAAI*,  $\diamond$  *IJCAI*,  $\diamond$  *ICRA*, etc.
- **Committee Member:** *Industrial Foundation Models and Applications in Smart Manufacturing* at IEEE CASE; *Anomaly Detection with Foundation Models* at IJCAI.

## INVITED PRESENTATIONS

---

- EPFL, *Application-Oriented Industrial Visual Anomaly Detection*. [\[Slides\]](#) July 2024
- National University of Defense Technology, *Overview of Visual Anomaly Detection—Review, Applications, and Future Prospects*. [\[Slides\]](#) Nov. 2023

## REFERENCES

---

- [Prof. Weiming Shen](#), Ph.D., FCAE, FIEEE, FEIC, FAAIA.
  - Professor of Huazhong University of Science and Technology, Wuhan, China
  - Email: [wshen@ieee.org](mailto:wshen@ieee.org) — Tel: (86) 027-8754-3129
  - Relationship: Supervisor (since Sep. 2020 to present)