









# Shiyu Hu (胡世宇)



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## Work Experience

- 2024.08 - Now  **Research Fellow, School of Physical and Mathematical Sciences (SPMS), Nanyang Technological University (NTU)**
- **Direction:** AI4Science, Computer Vision
  - **PI:** Assoc Prof. Kanghao Cheong (IEEE Senior Member)
- 2018.03 - 2018.11  **Research Assistant, University of Hong Kong (HKU)**
- **Direction:** High Performance Computing, Heterogeneous Computing
  - **PI:** Prof. Choli Wang
- 2016.08 - 2016.09  **Research Intern, Institute of Electronics, Chinese Academy of Sciences (CASIE)**

## Teaching Experience

- 2024.08 - 2024.12  **Teach Assistant in Nanyang Technological University (NTU)**
- **Course:** SC1123 (Math 1: Linear Algebra and Calculus for Computing)
  - **Course Author:** Assoc Prof. Kanghao Cheong
- 2018.01 - 2018.04  **Teach Assistant for Experimental Course in University of Hong Kong (HKU)**
- **Course:** COMP7305 (Cluster and Cloud Computing)
  - **Course Author:** Prof. Choli Wang

## Education Background

- 2019.09 - 2024.01  **Ph.D, Institute of Automation, Chinese Academy of Sciences (CASIA)**
- **Major:** Computer Applied Technology
  - **Supervisor:** Prof. Kaiqi Huang (IAPR Fellow, IEEE Senior Member)
  - **Co-supervisor:** Prof. Xin Zhao (IEEE Senior Member)
  - **Thesis title:** *Research of Intelligence Evaluation Techniques for Single Object Tracking*
  - **Thesis committee:** Prof. Jianbin Jiao, Prof. Yuxin Peng, Prof. Yao Zhao (IEEE Fellow, IET Fellow), Prof. Yunhong Wang (IEEE Fellow, IAPR Fellow, CCF Fellow), Prof. Ming Tang
  - **Thesis defense grade:** Excellent
- 2017.09 - 2019.07  **M.Sc., Department of Computer Science, University of Hong Kong (HKU)**
- **Major:** Computer Science
  - **Supervisor:** Prof. Choli Wang
  - **Thesis title:** *NightRunner: Deep Learning for Autonomous Driving Cars after Dark*
  - **Thesis defense grade:** A+
- 2013.09 - 2017.07  **B.E., Elite Class in School of Information and Electronics, Beijing Institute of Technology (BIT)**
- **Major:** Information Engineering
  - **Diploma project supervisor:** Prof. Senlin Luo
  - **Thesis title:** *Text Sentiment Analysis Based on Deep Neural Network*
  - **Thesis defense grade:** Excellent
- 2015.07 - 2015.08  **Summer Semester, University of California, Berkeley (UCB)**
- **Major:** New Media
  - **Course grade:** A

## Research Foundation & Interests

- Data-centric AI
  - Research on construction strategy of single-modal and multi-modal datasets incorporating human knowledge structure.
  - Research on evaluation mechanisms for robustness, generalization, and safety.
- Visual Object Tracking
  - Research on object tracking algorithms in general scenes and specific scenarios (e.g., unmanned aerial vehicles).
- Visual Language Tracking
  - Research on multi-modal tracking, video understanding, and visual reasoning tasks based on long video sequences.
- Video Understanding
  - Exploring using Large Language Models (LLMs) and Large Vision Models (LVMs) for long video understanding.
- Visual Turing Test
  - Design of a human-machine universal visual ability evaluation framework .
  - Benchmarking the performance of algorithms based on human abilities in perceptual, cognitive, inferential, etc. Analyzing the bottlenecks of algorithms and human subjects in depth, providing guidance for research on human-like modeling, human-machine collaboration, and human-machine integration.
- Human-machine Interaction
  - Exploring human-computer interaction patterns in video sequences with various proxy tasks.
- AI4Science
  - Education:** Research on human-computer interaction (HCI) technology for education scenarios, including designing an intelligent education framework from a multidisciplinary perspective, investigating HCI technology, and conducting qualitative and quantitative analysis.
  - Cognitive Science:** Visual task design, environment construction, and human-machine capability analysis based on human-like modeling principle.
  - Medical Science:** Research on medical image processing techniques based on artificial intelligence technologies (e.g., cell segmentation and tracking).
  - Psychology:** Development of gamified assessment systems targeting psychological dimensions such as anxiety, depression, and obsession, along with research on intelligent psychological evaluation technologies. Exploring using LLMs and LVMs for visual comprehension with psychological elements.

## Research Publications

### Book


- 1 X. Zhao, **S. Hu**, and X. Yin, *Visual Object Tracking - An Evaluation Perspective*. Springer, 2025, ISBN: 978-981-96-4558-9.

### Acceptance

- 1 **S. Hu**, X. Zhao, L. Huang, and K. Huang, "Global instance tracking: Locating target more like humans," *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, vol. 45, no. 1, pp. 576–592, 2023.  
DOI: 10.1109/TPAMI.2022.3153312.
- 2 **S. Hu**, X. Zhao, and K. Huang, "Sotverse: A user-defined task space of single object tracking," *International Journal of Computer Vision (IJCV)*, vol. 132, pp. 872–930, 2024. DOI: 10.1007/s11263-023-01908-5.
- 3 **S. Hu**, D. Zhang, M. Wu, X. Feng, X. Li, X. Zhao, and K. Huang, "A multi-modal global instance tracking benchmark (mgit): Better locating target in complex spatio-temporal and causal relationship," in *The 37th Conference on Neural Information Processing Systems (NeurIPS, Poster)*, vol. 36, 2023, pp. 25 007–25 030.
- 4 **S. Hu**, X. Zhao, and K. Huang, "Visual intelligence evaluation techniques for single object tracking: A survey," *Journal of Images and Graphics* (《中国图象图形学报》), 2023.

- 5 X. Zhao , **S. Hu** , Y. Wang, J. Zhang, Y. Hu, R. Liu, H. Ling, Y. Li, R. Li, K. Liu, and J. Li, "Biodrone: A bionic drone-based single object tracking benchmark for robust vision," *International Journal of Computer Vision (IJCV)*, vol. 132, pp. 1659–1684, 2024.  DOI: 10.1007/s11263-023-01937-0.
- 6 D. Zhang, **S. Hu**, X. Feng, X. Li, M. Wu, J. Zhang, and K. Huang, "Beyond accuracy: Tracking more like human via visual search," *The 38th Conference on Neural Information Processing Systems (NeurIPS, Poster)*, 2024.
- 7 X. Feng, X. Li, **S. Hu**, D. Zhang, M. Wu, J. Zhang, X. Chen, and K. Huang, "Memvlt: Visual-language tracking with adaptive memory-based prompts," *The 38th Conference on Neural Information Processing Systems (NeurIPS, Poster)*, 2024.
- 8 X. Feng, D. Zhang, **S. Hu**, X. Li, M. Wu, J. Zhang, X. Chen, and K. Huang, "Enhancing vision-language tracking by effectively converting textual cues into visual cues," *The 50th IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP, Poster)*, 2025.
- 9 M. Wu, K. Huang, Y. Cai, **S. Hu**, Y. Zhao, and W. Wang, "Finger in camera speaks everything: Unconstrained air-writing for real-world," *IEEE Transactions on Circuits and Systems for Video Technology (TCSVT)*, 2024.
- 10 X. Li, X. Feng, **S. Hu**, M. Wu, D. Zhang, J. Zhang, and K. Huang, "Dtllm-vlt: Diverse text generation for visual language tracking based on llm," *The 3rd Workshop on Vision Datasets Understanding and DataCV Challenge in The IEEE/CVF Conference on Computer Vision and Pattern Recognition 2024 (CVPRW, Oral, Best Paper Honorable Mention)*, 2024.
- 11 J. Zhang, T. Zhao, **S. Hu**, and X. Zhao, "Robust single-particle cryo-em image denoising and restoration," in *The 49th IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP, Poster)*, 2024.
- 12 X. Feng, **S. Hu**, X. Chen, and K. Huang, "A hierarchical theme recognition model for sandplay therapy," in *The 6th Chinese Conference on Pattern Recognition and Computer Vision (PRCV, Poster)*, 2023, pp. 241–252.  DOI: 10.1007/978-981-99-8462-6\_20.
- 13 M. Wu, Y. Kang, X. Li, **S. Hu**, X. Chen, Y. Kang, W. Wang, and K. Huang, "Vs-llm: Visual-semantic depression assessment based on llm for drawing projection test," *The 7th Chinese Conference on Pattern Recognition and Computer Vision (PRCV, Poster)*, 2024.
- 14 Y. Wang, **S. Hu**, and X. Zhao, "Rethinking similar object interference in single object tracking," in *The 7th International Conference on Computer Science and Artificial Intelligence (CSAI, Oral)*, 2023, pp. 251–258.
- 15 K. Huang, X. Zhao, Q. Li, and **S. Hu**, "Visual turing: The next development of computer vision in the view of human-computer gaming," *Journal of Graphics (《图学学报》)*, vol. 42, no. 3, p. 339, 2021.  DOI: 10.11996/JG.j.2095-302X.2021030339.
- 16 K. Huang, Y. Kang, C. Yan, **S. Hu**, L. Wang, T. Tao, and W. Gao, "A review of intelligent psychological assessment based on interactive environment," *Chinese Mental Health Journal (《中国心理卫生杂志》)*, 2024.
- 17 Y. Zhang, C. Liu, W. Chen, X. Xu, F. Wang, H. Li, **S. Hu**, and X. Zhao, "Revisiting instance search: A new benchmark using cycle self-training," *Neurocomputing (Neu)*, vol. 501, pp. 270–284, 2022.  DOI: 10.1016/j.neucom.2022.06.027.





## Preprint

- 1 **S. Hu**, X. Zhao, Y. Wang, Y. Shan, and K. Huang, *Nearing or surpassing: Overall evaluation of human-machine dynamic vision ability*, 2023.  URL: [https://openreview.net/forum?id=LGbZYw\\_pnsc](https://openreview.net/forum?id=LGbZYw_pnsc).
- 2 **S. Hu\***, X. Li\*, X. Li, J. Zhang, Y. Wang, X. Zhao, and K. H. Cheong, "Can lvlms describe videos like humans? a five-in-one video annotations benchmark for better human-machine comparison," *arXiv preprint arXiv:2410.15270*, 2024.













- 3 Y. Ma\*, **S. Hu\***, X. Li, Y. Wang, S. Liu, and K. H. Cheong, "Students rather than experts: A new ai for education pipeline to model more human-like and personalised early adolescences," *arXiv preprint arXiv:2410.15701*, 2024.
- 4 X. Li\*, **S. Hu\***, X. Feng, D. Zhang, M. Wu, J. Zhang, and K. Huang, "How texts help? a fine-grained evaluation to reveal the role of language in vision-language tracking," *arXiv preprint arXiv:2411.15600*, 2024.
- 5 X. Li, **S. Hu**, X. Feng, D. Zhang, M. Wu, J. Zhang, and K. Huang, "Dtvlt: A multi-modal diverse text benchmark for visual language tracking based on llm," *arXiv preprint arXiv:2410.02492*, 2024.
- 6 X. Li, **S. Hu**, X. Feng, D. Zhang, M. Wu, J. Zhang, and K. Huang, "Visual language tracking with multi-modal interaction: A robust benchmark," *arXiv preprint arXiv:2409.08887*, 2024.

## Projects





### Framework

- 2018.03 - 2018.11  **Darknet-Cross: Light-weight Deep Learning Framework for Heterogeneous Computing**
-  <https://github.com/huuuuusy/Darknet-Cross>
  -  Darknet-Cross supports algorithm acceleration processing on various platforms (e.g., Android and Ubuntu) and various GPUs (e.g., Nvidia GTX1070 and Adreno 630).
  -  The work is a part of my master's thesis at HKU (thesis defense grade: A+).

### Platform (Development & Maintenance)

- 2019.11 - Now  **VideoCube / MGIT Platform**
-  <http://videocube.aitestunion.com>
  -  VideoCube / MGIT is the supporting platform for research accepted by IEEE TPAMI 2023 and NeurIPS 2023.
  -  As of Sept. 2024, the platform has received 440k+ page views, 1.2k+ downloads, 420+ trackers from 220+ countries and regions worldwide.
- 2021.07 - Now  **SOTVerse / VLTVerse Platform**
-  <http://metaverse.aitestunion.com>
  -  SOTVerse is the supporting platform for research accepted by IJCV 2024.
  -  As of Sept. 2024, the platform has received 126k+ page views from 150+ countries and regions worldwide.
- 2022.05 - Now  **BioDrone Platform**
-  <http://biodrone.aitestunion.com/>
  -  BioDrone is the supporting platform for research accepted by IJCV 2024.
  -  As of Sept. 2024, the platform has received 170k+ page views from 200+ countries and regions worldwide.


### Platform (Maintenance)


- 2020.07 - Now  **GOT-10k Platform**
-  <http://got-10k.aitestunion.com/>
  -  GOT-10k is the supporting platform for research accepted by IEEE TPAMI 2021.
  -  As of Sept. 2024, the platform has received 3.92M+ page views, 7.5k+ downloads, 21.5k+ trackers from 290+ countries and regions worldwide.

## Projects (continued)

### Challenge (Organizer)

2023.05 - 2023.11  **Hislopvision Challenge**

 <http://hislopvision.aitestunion.com/>

 Hislopvision Challenge supports the 3rd High-speed and Low-power Visual Understanding Challenge in the 5th Chinese Conference on Pattern Recognition and Computer Vision.

✓ The participating teams include researchers from Tsinghua University, Beijing Institute of Technology, Jilin University, etc.

### Challenge (Participant)

2021.01 - 2021.04  **Cell Tracking Challenge**

 <https://celltrackingchallenge.net/>

✓ This project was submitted to the Cell Tracking Challenge in Mar. 2021, and maintains the second place in the Fluo-C2FL-MSD+ dataset and the third place in the Fluo-C2FL-Huh7 dataset (statistics by Oct. 2023).

### Grant (Participant)

2023.12 - Now  **Research on the Dilemma and Countermeasures of Human-Computer Interaction in Intelligent Education**

✓ The project is funded by the 2023 Intelligent Education PhD Research Fund, supported by the Institute of AI Education Shanghai and East China Normal University, and is currently in progress.

## Academic Activities and Services

Tutorial  **31st IEEE International Conference on Image Processing (ICIP)**


• **Title:** An Evaluation Perspective in Visual Object Tracking: from Task Design to Benchmark Construction and Algorithm Analysis

• **Date & Location:** 9:00-12:30, 27th October, 2024, Abu Dhabi, United Arab Emirates

 **27th International Conference on Pattern Recognition (ICPR)**


• **Title:** Visual Turing Test in Visual Object Tracking: A New Vision Intelligence Evaluation Technique based on Human-Machine Comparison

• **Date & Location:** 14:30-18:00, 1st December, 2024, Kolkata, India

 **17th Asian Conference on Computer Vision (ACCV)**


• **Title:** From Machine-Machine Comparison to Human-Machine Comparison: Adapting Visual Turing Test in Visual Object Tracking


• **Date & Location:** 9:00-12:00, 9th December, 2024, Hanoi, Vietnam

Guest Editor  **Journal:** Electronics (Special Issue: Techniques and Applications of Multimodal Data Fusion)

Associate Editor  **Journal:** Innovation and Emerging Technologies

Reviewer  **Conference:** NeurIPS, ICML, ICLR, CVPR, ECCV, ICCV, AAAI, IJCAI, ACMMM, AISTATS, etc.

 **Journal:** IEEE Transactions on Image Processing, SCIENCE CHINA Information Sciences, Scientific Reports, IEEE Access, Journal of Computational Science, Journal of Electronic Imaging, Digital Signal Processing, etc.

Member  **Society:** Institute of Electrical and Electronics Engineers (IEEE, No.97803543), China Society of Image and Graphics (CSIG, No.E651129499M), Chinese Association for Artificial Intelligence (CAAI, No.E660120827A)

## Skills

- Languages 📌 Mandarin Chinese (native speaker) and English.
- Coding 📌 Python, Java, Matlab, C,  $\LaTeX$ .
- Development 📌 Android, Flask, SQLite.
- Linux 📌 Shell, OS virtualization.
- Misc. 📌 Academic research, leadership, presentation.

## Awards and Honors

- 2024 📌 **Best Paper Honorable Mention**, the 3rd Workshop on Vision Datasets Understanding and DataCV Challenge in CVPR 2024.
- 📌 **Beijing Outstanding Graduates**, Beijing Municipal Education Commission (Top 5%).
- 2023 📌 **China National Scholarship**, Ministry of Education of the People's Republic of China (Top 1%).
- 📌 **First Prize of Climbing Scholarship**, Institute of Automation, Chinese Academy of Sciences.
- 2022 📌 **Merit Student**, University of Chinese Academy of Sciences.
- 2017 📌 **Excellent Innovative Student**, Beijing Institute of Technology.
- 2016 📌 **College Scholarship**, Chinese Academy of Sciences.
- 📌 **Excellent League Member on Youth Day Competition**, Beijing Institute of Technology.
- 2015 📌 **National First Prize**, Contemporary Undergraduate Mathematical Contest in Modeling (Top 1%).
- 📌 **First Prize of Mathematics Modeling Competition**, Beijing Institute of Technology.
- 📌 **Outstanding Individual on Summer Social Practice**, Beijing Institute of Technology.
- 📌 **Second Prize on Summer Social Practice**, Beijing Institute of Technology (Team Leader).
- 📌 **Outstanding Student Cadre**, Beijing Institute of Technology.
- 📌 **Outstanding League Cadre on Youth Day Competition**, Beijing Institute of Technology.
- 📌 **Outstanding Youth League Branch**, Beijing Institute of Technology (Team Leader).
- 📌 **Top 10 Activities on Youth Day Competition**, Beijing Institute of Technology (Team Leader).
- 2014 📌 **Outstanding Student**, Beijing Institute of Technology.
- 2013-2017 📌 **Academic Scholarship**, Beijing Institute of Technology.

## Assisted Student Supervision

- Ph.D. Student 📌 **Meiqi Wu**, 2022.08-Now, University of Chinese Academy of Sciences
- 📌 **Xiaokun Feng**, 2023.04-Now, Institute of Automation, Chinese Academy of Sciences
- 📌 **Yiping Ma**, 2023.08-Now, East China Normal University
- 📌 **Dailing Zhang**, 2023.08-Now, Institute of Automation, Chinese Academy of Sciences
- 📌 **Yipei Wang**, 2024.08-Now, Southeast University
- 📌 **Xuchen Li**, 2024.08-Now, Institute of Automation, Chinese Academy of Sciences
- 📌 **Hong-jui Shen**, 2024.10-Now, Nanyang Technological University (NTU), Singapore
- 📌 **Kainan Li**, 2024.10-Now, Nanyang Technological University (NTU), Singapore
- 📌 **Buyuan Zhu**, 2025.01-Now, Nanyang Technological University (NTU), Singapore
- M.S. Student 📌 **Yiping Ma**, 2022.05-2023.07, Nanjing Normal University
- 📌 **Yipei Wang**, 2022.08-2024.07, Southeast University
- 📌 **Xuzhao Li**, 2024.07-Now, Beijing Institute of Technology
- 📌 **Yuqi Cui**, 2024.07-Now, University of Science and Technology Beijing
- 📌 **Panxi Xu**, 2024.09-Now, University of Science and Technology Beijing



## Assisted Student Supervision (continued)

- **Nguyen Khanh Truong**, 2025.02-Now, Nanyang Technological University (NTU), Singapore
- B.E. Student ■ **Junyou Zhu**, 2022.09-2023.08, University of Chinese Academy of Sciences
- **Lihang Hu**, 2022.09-2023.08, University of Chinese Academy of Sciences
- **Dailing Zhang**, 2022.09-2023.08, Southeast University
- **Xuchen Li**, 2023.04-2024.07, Beijing University of Posts and Telecommunications
- **Zi Ye**, 2024.09-Now, University of Science and Technology Beijing
- **Leying Tan**, 2024.09-Now, Nanyang Technological University (NTU), Singapore
- **Jinlin Ma**, 2024.10-Now, Nanyang Technological University (NTU), Singapore
- **Yuxiao Li**, 2024.10-Now, Nanyang Technological University (NTU), Singapore
- **Yihan Meng**, 2024.12-Now, University of Science and Technology Beijing
- **Yihui Jiang**, 2025.01-Now, University of Science and Technology Beijing

## References

Professors Kaiqi Huang and Xin Zhao served as my Ph.D. supervisor and co-supervisor, respectively, with whom I collaborated on research in computer vision. Additionally, Prof. Choli Wang oversaw my M.Sc. studies at HKU, and I had the privilege of working with him on high-performance computing projects. Currently, I am lucky to work with Prof. Kanghao Cheong at NTU.

### Prof. Kaiqi Huang

Professor, IAPR Fellow, IEEE Senior Member, 10,000 Talents Program - Leading Talents  
Director of Center for Research on Intelligent Systems and Engineering (CRISE)  
National Laboratory of Pattern Recognition (NLPR)  
Institute of Automation, Chinese Academy of Sciences (CASIA)  
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### Prof. Choli Wang

Honorary Professor  
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### Prof. Xin Zhao

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### Prof. Kanghao Cheong

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