







# Shiyu Hu, Ph.D. Candidate

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 visual object tracking, visual Turing test, evaluation techniques

## Education



- 2019.9 - Now    **Ph.D, Institute of Automation, Chinese Academy of Sciences (CASIA)**  
**Major:** Computer Application Technology  
**Supervisor:** Prof. Kaiqi Huang (IAPR Fellow)  
**Thesis title:** *Research of Intelligence Evaluation Techniques for Single Object Tracking* (thesis defense grade: excellent).
- 2017.9 - 2019.6    **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+).
- 2013.9 - 2017.6    **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: A+).





## Experiences

- 2022.9 - Now    **Initiator and organizer** of interdisciplinary symposia around computer vision (22 participants from 10+ universities, once a week).
- 2022.9 - 2023.7    **Assisted supervisor** for two undergraduate students about their bachelor's degree projects in University of Chinese Academy of Sciences (UCAS) (one for visual object tracking, one for visual Turing test).
- 2022.5 - 2022.10    **Organizer** of the 3rd High-Speed Low-Power Visual Understanding Challenge in the 5th Chinese Conference on Pattern Recognition and Computer Vision.
- 2018.3 - 2018.11    **Research assistant** at Big-Little Heterogeneous Computing with Polymorphic GPU Kernels project, University of Hong Kong.
- 2016.8 - 2016.9    **Internship** on satellite faster algorithm of hard X-ray modulation telescope for space pilot satellite project at Aerospace Information Research Institute, Chinese Academy of Sciences (internship grade: A+).
- 2015.7 - 2015.8    **Summer school student** for New Media at University of California, Berkeley (course grade: A+) .  
 **Team leader** in Summer Social Practice in University of California, Berkeley.
- 2013.9 - 2017.6    **League Branch Secretary** of Elites Class in School of Information and Electronics, Beijing Institute of Technology.

## Research Publications

### Journal Articles

-  **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, CCF-A Journal, IF=23.6)*, 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, CCF-A Journal, IF=19.5)*, pp. 1–59, 2023.  DOI: 10.1007/s11263-023-01908-5.
- 3 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, CCF-A Journal, IF=19.5)*, 2023.  DOI: 10.1007/s11263-023-01937-0.
- 4 **S. Hu**, X. Zhao, and K. Huang, "Visual intelligence evaluation techniques for single object tracking: A survey (单目标跟踪中的视觉智能评估技术综述)," *Journal of Images and Graphics (《中国图象图形学报》, CCF-B Chinese Journal)*, 2023.
- 5 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, CCF-C Journal, IF=6)*, vol. 501, pp. 270–284, 2022.  DOI: 10.1016/j.neucom.2022.06.027.
- 6 K. Huang, X. Zhao, Q. Li, and **S. Hu**, "Visual turing: The next development of computer vision in the view of human-computer gaming (视觉图灵：从人机对抗看计算机视觉下一步发展)," *Journal of Graphics (《图学学报》, CCF-C Chinese Journal)*, vol. 42, no. 3, p. 339, 2021.  DOI: 10.11996/JG.j.2095-302X.2021030339.

## Conference Proceedings





- 1 **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, CCF-A Conference, Poster)*, 2023.
- 2 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, CCF-B Conference, Poster)*, 2024.
- 3 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, CCF-C Conference, Poster)*, 2023.
- 4 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, EI Conference, Oral)*, 2023.

## R&D Projects



### Independent Developer of Platform Design & Development & Maintenance

- 2019.11 - Now  **VideoCube: A large-scale multi-dimensional global instance tracking intelligent evaluation platform.**  
**Link:**  <http://videocube.aitestunion.com>.  
**Description:** VideoCube presents a video content decoupling framework and implements a large-scale, multi-dimensional global instance tracking intelligent evaluation platform comprising 7.46 million frames. Moreover, a multi-granularity semantic annotation strategy has been proposed to enhance VideoCube's capability in providing high-quality semantic information, thus enabling support for multi-modal research.  
**Note:** VideoCube is the supporting platform for two researches accepted by TPAMI and NeurIPS. It receives 236k+ page views, 1k+ downloads, 360+ trackers from 130+ countries (statistics by 2023.10).



## R&D Projects (continued)

- 2022.03 - Now  **SOTVerse: A user-defined single object tracking task space.**  
**Link:**  <http://metaverse.aitestunion.com>.  
**Description:** *SOTVerse* introduces a 3E paradigm as a task analysis framework, integrating representative datasets to transform the original static closed datasets into a dynamic open data space comprising 12.56 million frames. Additionally, a subspace construction method is proposed to facilitate user-defined task studies.  
**Note:** *SOTVerse* is the supporting platform for a research accepted by IJCV. It receives 88k page views from 100+ countries (statistics by 2023.10).
- 2023.02 - Now  **BioDrone: A bionic drone-based single object tracking benchmark for robust vision.**  
**Link:**  <http://biodrone.aitestunion.com/>.  
**Description:** *BioDrone* is the first bionic drone-based single object tracking benchmark, it features videos captured from a flapping-wing UAV system with a major camera shake due to its aerodynamics. *BioDrone* highlights the tracking of tiny targets with drastic changes between consecutive frames, providing a new robust vision benchmark for SOT.  
**Note:** *BioDrone* is the supporting platform for a research accepted by IJCV.



### Independent Developer of Platform Maintenance & Upgrade

- 2020.07 - Now  **GOT-10k: A large high-diversity benchmark and evaluation platform for single object tracking in the wild.**  
**Link:**  <http://got-10k.aitestunion.com/>.  
**Description:** *GOT-10k* is constructed to evaluate the generalization ability of trackers on unseen object classes and motion patterns. The platform provides a high-quality video trajectory dataset containing 10,000 video segments, 563 object classes, 87 motion patterns, and 1.5 million tight annotations, where its coverage of object classes is magnitudes wider than other existing tracking benchmarks.  
**Note:** *GOT-10k* is the supporting platform for a research accepted by TPAMI. It receives 2.44M page views, 6k+ downloads, 14k+ trackers from 150+ countries, and gets 16× page views increase after maintenance (statistics by 2023.8).

### Independent Developer of Project Research

- 2018.06 - 2018.11  **Darknet-Cross: A lightweight deep learning framework for heterogeneous computing.**  
**Link:**  <https://github.com/huuuuusy/Darknet-Cross>.  
**Description:** *Darknet-Cross* is a lightweight deep learning framework based on Darknet and yolov2\_light. It provides computation acceleration for multi-platform (e.g., Ubuntu or Android) and multiple types of GPUs (e.g., Nvidia GTX1070 or Adreno 630).  
**Note:** *Darknet-Cross* is a part of my M.Sc. thesis in HKU (thesis grade: A+).

### Co-developer of Project Research

- 2020.11 - 2021.3  **A project for cell tracking based on deep learning method.**  
**Link:**  <http://celltrackingchallenge.net/latest-ctb-results/>.  
**Description:** This method follows the tracking by detection paradigm and combines per-frame CNN prediction for cell segmentation with a Siamese network for cell tracking.  
**Note:** This project is submitted to the cell tracking challenge in 2021.3, and maintains the second place in the Fluo-C2FL-MSC+ dataset and the third place in the Fluo-C2FL-Huh7 dataset (statistics by 2023.10).

## 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

- 2023    📌 **China National Scholarship**, Ministry of Education of the People's Republic of China (Top 0.2%).
- 📌 **First Prize of Climbing Scholarship**, Institute of Automation, Chinese Academy of Sciences.
- 2022    📌 **Merit Student**, University of Chinese Academy of Sciences.
- 2017    📌 **Academic Scholarship**, Beijing Institute of Technology.
- 📌 **IE Admission Scholarship**, Chinese University of Hong Kong.
- 📌 **Excellent Innovative Student**, Beijing Institute of Technology.
- 2016    📌 **Academic Scholarship**, Beijing Institute of Technology.
- 📌 **College Scholarship**, Chinese Academy of Sciences.
- 📌 **Excellent League Member on Youth Day Competition**, Beijing Institute of Technology.
- 2015    📌 **Academic Scholarship**, Beijing Institute of Technology.
- 📌 **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    📌 **Academic Scholarship**, Beijing Institute of Technology.
- 📌 **Outstanding Student**, Beijing Institute of Technology.
- 2013    📌 **Academic Scholarship**, Beijing Institute of Technology.
- 2012    📌 **Second Prize of the 27th China Adolescents Science and Technology Innovation Contest**, China Association for Science and Technology.
- 2010    📌 **Merit Student**, Zhengzhou, Henan Province.

## References

### Prof. Kaiqi Huang

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### Prof. Choli Wang

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