

## Dong LIANG

Ph.D  
Professor



✉ liangdong@nuaa.edu.cn

🌐 <http://faculty.nuaa.edu.cn/liangdong/en/index.htm>

🌐 <https://scholar.google.com/citations?user=oKE2Wx8AAAAJ&hl=zh-CN>

🌐 <https://dongl-group.github.io/>

### \*Education

- **Ph.D.** in Information Science and Technology, *Hokkaido University, Japan*, 2015
- **M.S.** in Circuits and Systems, *Lanzhou University, China*, 2011
- **B.S.** in Telecommunication Engineering, *Lanzhou University, China*, 2008

### \*Academic Positions

- **Professor** (2025–Present), College of Computer Science and Technology, Nanjing University of Aeronautics and Astronautics (NUAA)
- **Associate Professor** (2021–2025), College of Computer Science and Technology, NUAA
- **Lecturer** (2015–2021), College of Computer Science and Technology, NUAA
- **Key Member**, MIIT Key Laboratory of Pattern Analysis and Machine Intelligence
- **Core Researcher**, Collaborative Innovation Center of Novel Software Technology and Industrialization

### \*Research Profile

Professor Liang's research spans machine learning, computer vision, and intelligent systems, with particular expertise in multi-modal large models, computational imaging, and human-computer interaction. His work bridges fundamental algorithms and practical applications in aerospace remote sensing, unmanned systems, and optical imaging. He leads a dynamic research group that has made significant contributions to both academic literature and industrial applications.

### \*Research Leadership

**Principal Investigator** of multiple competitive research projects:

- 2 National Natural Science Foundation of China (NSFC) projects (2017-2020 2022-2026)
- 2 National Defense Special Projects (2018-2021 2023-2025)
- MIIT Forward-looking Layout Project (2024-2025)
- Jiangsu Provincial Major Project on Frontier-leading Technologies (2023-2025)
- Jiangsu Basic Research Program Project (2017-2020)
- China Postdoctoral Science Foundation (2015-2017)
- Shenzhen Basic Research Program Project (2022-2026)

**Key Contributor** to major national initiatives including National Key R&D Program, NSFC Joint Funds, and Jiangsu Major Innovation Project for Scientific Research Achievements Transformation.

\*Industrial Engagement Established strong collaborations with leading industrial partners: China Aerospace Science and Technology Corporation, CAS research institutes, China Academy of Engineering Physics, Alibaba, Huawei, DJI, NARI Group, and Hitachi, driving technology transfer and practical innovation.

\*Academic Achievements

- **80+ Research Papers** in prestigious venues including *IEEE TPAMI, IJCV, IEEE TIP/TMM/TNNLS/TGRS/TCSVT, Science China Information Sciences, ICCV, ECCV, AACL, IJCAI*. According to Google Scholar, his publications have received over 2,000 citations.
- **20+ Granted Patents** across China, USA, and Japan with 3 successful patent transfers

\*Professional Services

- **Associate Editor:** *The Visual Computer* (Springer), 2023–Present
- **Youth Editorial Board:** *Journal of Intelligent Construction*, 2023–Present
- **Guest Editor:** *MDPI Sensors*, 2022–2023
- **Workshop Chair:** ACM CVSUI'23
- **Co-chair:** China Symposium on Machine Learning and Applications (MLA'21)
- **PC Member:** China Conference on Biometrics (CCBR'15–22)
- **Outstanding Member:** China Computer Federation (CCF)
- **Committee Member:** Jiangsu Association for Artificial Intelligence

\*Honors & Awards

- Jiangsu Provincial Science and Technology Award (2024)
- Jiangsu Information Technology Application Association Science and Technology Award (2023)
- Gold Medal, Geneva International Invention Exhibition (2022)
- Outstanding Contribution Award, China Conference on Biometrics (2021)
- Intelligent Base Outstanding Educator, Ministry of Education & Huawei (2021)
- Outstanding Advisor, China "Software Cup" Competition (2019)
- Best Student Paper Award, International Symposium on Optomechatronic Technology (2013)
- Excellence Research Award, Hokkaido University (2013)

\*International Collaboration

Extensive international experience through research visits to AIST Japan (2015), University of Leicester UK (2017), University of Western Australia (2019), and The Chinese University of Hong Kong (2024). Regular participant in top international conferences including AACL, ECCV, ICCV, and IJCAI.

\*Mentoring & Talent Development

Cultivated a thriving research environment where graduates have secured positions at leading companies including Huawei, Aerospace Corporations, Sensetime, Alibaba, and Hikvision. Successfully recommended students for advanced studies at Tsinghua University, Nanjing University, Zhejiang University, CAS, HKUST, and CUHK. The research group emphasizes comprehensive development of scientific literacy, problem-solving capabilities, and professional skills.

## Research Publications

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## Journal Articles

- 1 Kang, B., **Liang, D.**, Chen, D., Ding, T., & Wei, M. (2025). Robust fine-grained visual categorization via cyclical attention. *IEEE Transactions on Neural Networks and Learning Systems (TNNLS)*, 36(4), 1–14.
- 2 Kang, B., Wang, Z., **Liang, D.**, Ding, T., & Du, S. (2025). Robust unsupervised visual tracking via image-to-video identity knowledge transferring. *Pattern Recognition (PR)*, 156, 112109.
- 3 Li, S., Zheng, J., Zhang, M., **Liang, D.**, Li, S., & Wang, K. (2025). Robust contrastive knowledge distillation for long-tailed noisy class labels. *Knowledge-Based Systems (KBS)*, 299, 114408.
- 4 Li, Z., Chen, S., & **Liang, D.** (2025). Sgd-font: Style and glyph decoupling for one-shot font generation. *Knowledge-Based Systems (KBS)*, 300, 114600.
- 5 **Liang, D.**, Gao, Y., Li, L., Xu, Z., Huang, S., & Chen, S. (2025). Aesthetics-guided low-light enhancement. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 47(9), 1–16.
- 6 Sun, Y., **Liang, D.**, Li, S., Chen, S., & Huang, S. (2025). Handling noisy annotation for remote sensing semantic segmentation via boundary-aware knowledge distillation. *IEEE Transactions on Geoscience and Remote Sensing (TGRS)*, 63, 1–13.
- 7 Wang, Q., Ye, H., **Liang, D.**, & Huang, S. (2025). Diffusion-noise-based augmentation for long-tailed remote sensing image classification. *IEEE Transactions on Geoscience and Remote Sensing (TGRS)*, 63, 1–15.
- 8 Wu, S., Ye, H., Li, A., Tu, H., Xu, S., & **Liang, D.** (2025). A new method for reconstructing building model using machine learning. *Journal of Intelligent Construction (JIC)*, 3(1), 1–11.
- 9 Yan, S., Ju, Y., Quan, R., Tu, H., & **Liang, D.** (2025). Ezgo: Free your hands for smartphone interaction. *International Journal of Human–Computer Interaction (IJHCI)*, 41(1), 1–15.
- 10 Zhou, Y., **Liang, D.**, Chen, S., & Huang, S. (2025). Image lens flare removal using adversarial curve learning. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 47(8), 1–14.
- 11 Zhu, X., Qian, X., & **Liang, D.** (2025). Ssdq: Target speaker extraction via semantic and spatial dual querying. *IEEE Signal Processing Letters (SPL)*, 32, 2–6.
- 12 Fan, Y., Wang, Y., & **Liang, D.** (2024). Low-facenet: Face recognition-driven low-light image enhancement. *IEEE Transactions on Instrumentation and Measurement (TIM)*, 73, 1–14.
- 13 Kang, B., Du, S., & **Liang, D.** (2024). Fine-grained recognition via submodular optimization regulated progressive training. *Pattern Recognition (PR)*, 156, 110849.
- 14 **Liang, D.**, Sun, Y., Du, Y., Chen, S., & Huang, S. (2024). Relative difficulty distillation for semantic segmentation. *Science China Information Sciences (SCIS)*, 67(3), 1–15.
- 15 **Liang, D.**, Xu, Z., Li, L., Wei, M., & Chen, S. (2024). Pie: Physics-inspired low-light enhancement. *International Journal of Computer Vision (IJCV)*, 132(9), 3911–3932.
- 16 She, Y., Li, P., Wei, M., **Liang, D.**, Chen, Y., Xie, H., & Wang, F. (2024). Evitbins: Edge-enhanced vision-transformer bins for monocular depth estimation on edge devices. *IEEE Transactions on Intelligent Transportation Systems (TITS)*, 25(6), 1–14.
- 17 Wen, M., **Liang, D.**, Ye, H., & Tu, H. (2024). Architectural facade design with style and structural features using stable diffusion model. *Journal of Intelligent Construction (JIC)*, 2(4), 1–12.
- 18 Wu, P., Huang, H., Sun, H., & **Liang, D.** (2024). Cprnc: Channels pruning via reverse neuron crowding for model compression. *Computer Vision and Image Understanding (CVIU)*, 240, 103942.
- 19 Zhang, X., Lian, J., Yu, Z., Tang, H., **Liang, D.**, Liu, J., & Liu, J. (2024). Revealing the mechanisms of semantic satiation with deep learning models. *Communications Biology (CommBio)*, 7(1), 487.

- 20 Zhao, X., Li, Q., Chao, Y., Wang, Q., He, Z., & **Liang, D.** (2024). Rt-less: A multi-scene rgb dataset for 6d pose estimation of reflective texture-less objects. *The Visual Computer (TVC)*, 40(8), 5187–5200.
- 21 Zhou, W., Wang, N., & **Liang, D.** (2024). Precision in visual object tracking: A dual-branch approach. *Journal of Electronic Imaging (JEI)*, 33(2), 023023.
- 22 Guo, Y., Gao, Y., Hu, B., Qian, X., & **Liang, D.** (2023). Cmid: Crossmodal image denoising via pixel-wise deep reinforcement learning. *Sensors*, 24(1), 42.
- 23 Kang, B., **Liang, D.**, Mei, J., & Tan, X. (2023). Robust rgb-t tracking via graph attention-based bilinear pooling. *IEEE Transactions on Neural Networks and Learning Systems (TNNLS)*, 34(8), 1–14.
- 24 **Liang, D.**, Zhang, D., Wang, Q., Wei, Z., & Zhang, L. (2023). Crossnet: Cross-scene background subtraction network via 3d optical flow. *IEEE Transactions on Multimedia (TMM)*, 25, 1–13.
- 25 **Liang, D.**, Zhang, J., Tang, Y., & Huang, S. (2023). Mus-cdb: Mixed uncertainty sampling with class distribution balancing for active annotation in aerial object detection. *IEEE Transactions on Geoscience and Remote Sensing (TGRS)*, 61, 1–13.
- 26 Quan, R., Xu, B., & **Liang, D.** (2023). Discriminatively unsupervised learning person re-identification via considering complicated images. *Sensors*, 23(6), 3259.
- 27 Wei, Z., **Liang, D.**, & Zhang, D. (2023). Learning calibrated-guidance for object detection in aerial images. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (JSTARS)*, 16, 1–15.
- 28 Yi, Z., Lian, J., Liu, Q., Zhu, H., **Liang, D.**, & Liu, J. (2023). Learning rules in spiking neural networks: A survey. *Neurocomputing*, 531, 163–179.
- 29 Zhu, Q., Xin, G., Fei, L., **Liang, D.**, Zhang, Z., Zhang, D., & Zhang, D. (2023). Contactless palmprint image recognition across smartphones with self-paced cyclegan. *IEEE Transactions on Information Forensics and Security (TIFS)*, 18, 4944–4954.
- 30 **Liang, D.**, Geng, Q., Sun, H., Zhou, H., & Kaneko, S. (2022). Inferred box harmonization and aggregation for degraded face detection in crowds. *Multimedia Tools and Applications (MTA)*, 81(24), 35411–35430.
- 31 **Liang, D.**, Geng, Q., Wei, Z., Vorontsov, D., & Kim, E. (2022). Anchor retouching via model interaction for robust object detection in aerial images. *IEEE Transactions on Geoscience and Remote Sensing (TGRS)*, 60, 1–15.
- 32 Zheng, C., Shi, D., Yan, X., & **Liang, D.** (2022). Glassnet: Label decoupling-based three-stream neural network for robust image glass detection. *Computer Graphics Forum (CGF)*, 41(1), 377–388.
- 33 **Liang, D.**, Kang, B., Liu, X., Gao, P., Tan, X., & Kaneko, S. (2021). Cross-scene foreground segmentation with supervised and unsupervised model communication. *Pattern Recognition (PR)*, 117, 107995.
- 34 **Liang, D.**, Xue, F., & Li, L. (2021). Active terahertz imaging dataset for concealed object detection. *arXiv preprint arXiv:2105.03677*.
- 35 Sun, H., Cen, J., Liu, N., **Liang, D.**, & Zhou, H. (2021). Mpi: Multi-receptive and parallel integration for salient object detection. *IET Image Processing (IET-IP)*, 15(13), 3281–3291.
- 36 Sun, H., Fan, Y., Shen, J., Liu, N., & **Liang, D.** (2020). A novel semantics-preserving hashing for fine-grained image retrieval. *IEEE Access*, 8, 26199–26209.
- 37 Sun, H., Yang, J., Shen, J., & **Liang, D.** (2020). Tib-net: Drone detection network with tiny iterative backbone. *IEEE Access*, 8, 130697–130707.
- 38 Xiang, S., **Liang, D.**, Kaneko, S., & Asano, H. (2020). Robust defect detection in 2d images printed on 3d micro-textured surfaces. *IET Image Processing (IET-IP)*, 14(14), 3373–3384.

- 39 Kang, B., **Liang, D.**, Ding, W., Zhou, H., & Zhu, W. (2019). Grayscale-thermal tracking via inverse sparse representation-based collaborative encoding. *IEEE Transactions on Image Processing (TIP)*, 29, 3401–3415.
- 40 Kang, B., **Liang, D.**, & Yang, Z. (2019). Robust visual tracking via global context regularized locality-constrained linear coding. *Optik*, 183, 232–240.
- 41 Kang, B., Zhu, W., & **Liang, D.** (2019). Robust visual tracking via nonlocal regularized multi-view sparse representation. *Pattern Recognition (PR)*, 88, 75–89.
- 42 **Liang, D.**, & Pan, J. (2019). Spatio-temporal attention model for foreground detection in cross-scene surveillance videos. *Sensors*, 19(23), 5142.
- 43 **Liang, D.**, Pan, J., & Yu, Y. (2019). Concealed object segmentation in terahertz imaging via adversarial learning. *Optik*, 185, 1104–1114.
- 44 Zhou, W., Kaneko, S., Hashimoto, M., Satoh, Y., & **Liang, D.** (2019). Foreground detection based on co-occurrence background model with degradation modification. *Signal Processing*, 160, 66–79.
- 45 Gao, P., Xiang, W., & **Liang, D.** (2018). Texture-distortion-constrained joint source-channel coding of multi-view video plus depth-based 3d video. *IEEE Transactions on Circuits and Systems for Video Technology (TCSVT)*, 29(11), 3326–3340.
- 46 Kang, B., Zhu, W., & **Liang, D.** (2017). Robust multi-feature visual tracking via multi-task kernel-based sparse learning. *IET Image Processing (IET-IP)*, 11(12), 1172–1178.
- 47 **Liang, D.**, Hashimoto, M., Iwata, K., & Zhao, X. (2015). Co-occurrence probability-based pixel pairs background model for robust object detection in dynamic scenes. *Pattern Recognition (PR)*, 48(4), 1374–1390.
- 48 **Liang, D.**, Kaneko, S., & Satoh, Y. (2015). A robust appearance model and similarity measure for image matching. *Journal of Robotics and Mechatronics (JRM)*, 27(2), 126–135.
- 49 Zhao, X., He, Z., Zhang, S., & **Liang, D.** (2015a). A sparse-representation-based robust inspection system for hidden defects classification in casting components. *Neurocomputing*, 153, 1–10.
- 50 Zhao, X., He, Z., Zhang, S., & **Liang, D.** (2015b). Robust pedestrian detection in thermal infrared imagery using a shape distribution histogram feature and modified sparse representation. *Pattern Recognition (PR)*, 48(6), 1947–1960.

## Conference Proceedings

- 1 Geng, C., Li, Q., Wang, X., **Liang, D.**, Chen, S., & Yuen, P. (2025). Lod: Loss-difference ood detection by intentionally label-noisifying unlabeled wild data. In *International Joint Conference on Artificial Intelligence (IJCAI)* (pp. 1–10).
- 2 Lai, Y., Quan, R., **Liang, D.**, & Qin, J. (2025). Clipgaze: Zero-shot goal-directed scanpath prediction using clip. In *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)* (pp. 1–5).
- 3 Li, Q., Zhang, E., **Liang, D.**, & Geng, C. (2025). Equiangular aligned dual prompt learning for open-set recognition. In *International Conference on Intelligent Computing (ICIC)* (Vol. 1501, pp. 138–150). Springer.
- 4 Li, Y., **Liang, D.**, Ding, T., & Huang, S. (2025). Structsr: Refuse spurious details in real-world image super-resolution. In *AAAI Conference on Artificial Intelligence (AAAI)* (Vol. 39, pp. 1–9).
- 5 Liu, R., Xu, H., Hu, K., & **Liang, D.** (2025). Towards realistic lens flare removal: A data-centric approach with enhanced synthetic diversity. In *International Conference on Intelligent Computing (ICIC)* (Vol. 1501, pp. 433–444). Springer.
- 6 Quan, R., Lai, Y., Qiu, M., & **Liang, D.** (2025). Pathformer3d: A 3d scanpath transformer for 360° images. In *European Conference on Computer Vision (ECCV)* (Vol. 1502, pp. 1–16). Springer.

- 7 Wen, M., Wu, S., Wang, K., & **Liang, D.** (2025). Intergsedit: Interactive 3d gaussian splatting editing with 3d geometry-consistent attention prior. In *IEEE International Conference on Computer Vision (ICCV)* (pp. 1–10).
- 8 Zhang, S., Wang, X., Ye, X., Sun, J., & **Liang, D.** (2025). 3d human pose estimation in camouflaged scenarios. In *International Conference on Intelligent Computing (ICIC)* (Vol. 1501, pp. 337–348). Springer.
- 9 Li, Y., Fu, Y., Dong, F., & **Liang, D.** (2024). Diffgic: Diffusion prior based null-space correction for high resolution grayscale image colorization. In *International Conference on Intelligent Computing (ICIC)* (Vol. 1499, pp. 234–245). Springer.
- 10 Sun, Y., Huang, L., Zhu, Q., & **Liang, D.** (2024). Cs-kd: Confused sample knowledge distillation for semantic segmentation of aerial imagery. In *International Conference on Intelligent Computing (ICIC)* (Vol. 1499, pp. 266–278). Springer.
- 11 Li, D., Yan, Y., **Liang, D.**, & Du, S. (2023). Msformer: Multi-scale transformer with neighborhood consensus for feature matching. In *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)* (pp. 1–5).
- 12 Li, L., **Liang, D.**, Gao, Y., Huang, S., & Chen, S. (2023). All-e: Aesthetics-guided low-light image enhancement. In *International Joint Conference on Artificial Intelligence (IJCAI)* (pp. 1–8).
- 13 Qiu, M., Rong, Q., **Liang, D.**, & Tu, H. (2023). Visual scanpath transformer: Guiding computers to see the world. In *IEEE International Symposium on Mixed and Augmented Reality (ISMAR)* (pp. 1–10).
- 14 Zhou, W., Wang, N., & **Liang, D.** (2023). Visual tracking based on efficient dual-branch siamese network. In *IEEE International Conference on Systems, Man, and Cybernetics (SMC)* (pp. 1–6).
- 15 Zhou, Y., **Liang, D.**, Chen, S., Huang, S., & Yang, S. (2023). Improving lens flare removal with general-purpose pipeline and multiple light sources recovery. In *IEEE/CVF International Conference on Computer Vision (ICCV)* (pp. 12969–12979).
- 16 Du, Y., **Liang, D.**, Quan, R., Du, S., & Yan, Y. (2022). More than accuracy: An empirical study of consistency between performance and interpretability. In *Pacific Rim International Conference on Artificial Intelligence (PRICAI)* (Vol. 1353, pp. 579–590). Springer.
- 17 **Liang, D.**, Li, L., Wei, M., & Yang, S. (2022). Semantically contrastive learning for low-light image enhancement. In *AAAI Conference on Artificial Intelligence (AAAI)* (Vol. 36, pp. 1–9).
- 18 Shen, Y., Feng, Y., Wang, W., & **Liang, D.** (2022). Mba-raingan: A multi-branch attention generative adversarial network for mixture of rain removal. In *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)* (pp. 3418–3422).
- 19 Zhu, H., Li, P., Xie, H., Yan, X., **Liang, D.**, Chen, D., ... Qin, J. (2022). I can find you! boundary-guided separated attention network for camouflaged object detection. In *AAAI Conference on Artificial Intelligence (AAAI)* (Vol. 36, pp. 1–9).
- 20 Deng, Y., Zhou, W., Peng, B., **Liang, D.**, & Kaneko, S. (2021). Robust spatial-temporal correlation model for background initialization in severe scene. In *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)* (pp. 2415–2419).
- 21 **Liang, D.**, Du, Y., Sun, H., Zhang, L., Liu, N., & Wei, M. (2021). Nlkd: Using coarse annotations for semantic segmentation based on knowledge distillation. In *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)* (pp. 2335–2339).
- 22 **Liang, D.**, & Liu, X. (2021). Coarse-to-fine foreground segmentation. In *International Conference on Pattern Recognition (ICPR)* (pp. 3807–3813).
- 23 **Liang, D.**, Wei, Z., Sun, H., & Zhou, H. (2021). Robust cross-scene foreground segmentation in surveillance video. In *IEEE International Conference on Multimedia and Expo (ICME)* (pp. 1–6).

- 24 Wu, T., & **Liang, D.** (2019). Score-specific non-maximum suppression and coexistence prior for multi-scale face detection. In *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)* (pp. 1957–1961).
- 25 Wu, T., **Liang, D.**, Pan, J., & Kaneko, S. (2019). Context-anchors for hybrid resolution face detection. In *IEEE International Conference on Image Processing (ICIP)* (pp. 3297–3301).
- 26 Zhou, W., Kaneko, S., Hashimoto, M., Satoh, Y., & **Liang, D.** (2018). Hypothesis on degradation modification for object detection in strong background changes. In *International Conference on Pattern Recognition (ICPR)* (pp. 1743–1748).
- 27 Kang, B., **Liang, D.**, & Zhang, S. (2017). Robust visual tracking via multi-view discriminant based sparse representation. In *IEEE International Conference on Image Processing (ICIP)* (pp. 2587–2591).
- 28 **Liang, D.**, & Kaneko, S. (2017). Adaptive local spatial modeling for online change detection under abrupt dynamic background. In *IEEE International Conference on Image Processing (ICIP)* (pp. 2020–2024).
- 29 Pan, J., & **Liang, D.** (2017). Holistic crowd interaction modelling for anomaly detection. In *Chinese Conference on Biometric Recognition (CCBR)* (Vol. 10568, pp. 1–10). Springer.
- 30 **Liang, D.**, Kaneko, S., Hashimoto, M., Iwatao, K., Zhao, X., & Satoh, Y. (2013). Co-occurrence-based adaptive background model for robust object detection. In *IEEE International Conference on Advanced Video and Signal Based Surveillance (AVSS)* (pp. 1–6).

## Patens

- 1 **Liang, Dong**, Li, L., Huang, S., & Chen, S. (2025, February 11). *Methods for enhancement of low-light images based on reinforcement learning and aesthetic evaluation*. US18976298.
- 2 Huang, S., Zong, C., Xie, M., Ning, K., Zou, B., & **Liang, Dong**. (2024, December 20). *Noisy label identification method based on meta denoising and negative learning*. ZL202410011290.3.
- 3 Zhang, M., **Liang, Dong**, Zhang, J., Chen, S., & Huang, S. (2024, December 6). *Active learning optimization method for remote sensing object detection scenarios*. ZL202410078840.3.
- 4 **Liang, Dong**, Du, Y., Sun, Y., Huang, S., & Chen, S. (2024, November 14). *Data weighting learning method based on model collaboration*. ZL202410004710.5.
- 5 **Liang, Dong**, Li, L., Huang, S., & Chen, S. (2024a, October 23). *Reinforcement learning and aesthetic evaluation based low-light image enhancement method*. JP2024-572237.
- 6 **Liang, Dong**, Gao, Y., Huang, S., & Chen, S. (2024, October 18). *Multi-modal image denoising method based on reinforcement learning*. ZL202311409429.1.
- 7 **Liang, Dong**, Xu, Z., & Chen, S. (2024, September 20). *Physics-driven contrastive learning method for low-light image enhancement*. ZL202311349484.6.
- 8 **Liang, Dong**, Zhou, Y., Chen, S., & Huang, S. (2024, August 30). *Neural network deflaring method based on synthetic data*. ZL202310744654.4.
- 9 Qiu, M., Quan, R., **Liang, Dong**, & Qin, J. (2024, August 2). *Saccade path prediction method based on multi-visual memory units*. ZL202310773662.1.
- 10 **Liang, Dong**, Hu, G., Huang, S., & Chen, S. (2024, July 12). *Autonomous driving event camera object detection method based on cross-modal noise perception*. ZL202311181388.5.
- 11 Quan, R., **Liang, Dong**, Ju, Y., & Yan, S. (2024, June 28). *Eye movement control method for smartphones*. ZL202211514332.2.
- 12 Wei, M., Fan, Y., **Liang, Dong**, & Yan, X. (2024, May 24). *Self-supervised representation method and system for low-light image visual features*. ZL202211723586.5.

- 13 **Liang, Dong**, Li, L., Huang, S., & Chen, S. (2024b, April 5). *Low-light image enhancement method based on reinforcement learning and aesthetic evaluation*. ZL202210650946.7.
- 14 **Liang, Dong**, Xu, B., Quan, R., Gao, P., Li, L., & Du, Y. (2024, March 15). *Appearance feature update method and system for multi-target tracking in dense crowd scenarios*. ZL202210037157.6.
- 15 **Liang, Dong**, Sun, Y., Du, Y., Chen, S., & Huang, S. (2024, February 9). *Semantic segmentation method based on difficulty distillation*. ZL202310219333.2.
- 16 **Liang, Dong**, Wei, Z., Geng, Q., Sun, H., Zhang, L., & Liu, N. (2023, November 10). *Foreground segmentation method and system*. ZL202011539304.7.
- 17 **Liang, Dong**, Liu, X., Tan, X., Gao, S., & Sun, H. (2023, October 13). *Foreground segmentation method and system*. ZL201911010315.3.
- 18 **Liang, Dong**, Gao, S., Sun, H., Liu, X., & Su, B. (2023, September 22). *Uav target detection method and system*. ZL201911010556.8.
- 19 **Liang, Dong**, Geng, Q., Wei, Z., Sun, H., Zhang, L., & Liu, N. (2023, August 25). *Face detection method and system*. ZL202011450368.X.
- 20 **Liang, Dong**, Su, B., Sun, H., Xue, F., & Liu, N. (2023, July 14). *Non-cooperative face image recognition method and system*. ZL201911059722.3.
- 21 **Liang, Dong**, Pan, J., Wu, T., & Sun, H. (2023, April 21). *Target object detection and segmentation method in terahertz images and computer storage medium*. ZL201910048648.9.
- 22 **Liang, Dong**, Wu, T., Pan, J., & Sun, H. (2023, March 17). *Face detection method under low resolution*. ZL201910068263.9.