

Changsheng Lu

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Google Scholar

Education

- Oct 2020– **Australian National University (ANU)**, *College of Engineering,*
Jan 2025 *Computing and Cybernetics.*
- **Ph.D.** in Computer Vision and Machine Learning.
Supervisor: Dr. Piotr Koniusz, Prof. Stephen Gould, Dr. Liang Zheng
- Sep 2017– **Shanghai Jiao Tong University (SJTU)**, *Department of Automation.*
Mar 2020 ○ **M.S.** in Pattern Recognition & Intelligent System. *Sup:* Prof. Xinpeng Guan
- Sep 2013– **Southeast University (SEU)**, *Department of Automation.*
Jun 2017 ○ **B.S.** in Automation. *Supervisor:* Dr. Siyu Xia

Selected Awards and Honors

- Awards**
- 2023 **Outstanding award** for studying abroad, awarded by CSC
 - 2021 **Outstanding thesis award** for master graduates, awarded by Shanghai Association of Automation (CAA)
 - 2020 **PhD Fellowship**, awarded by ANU & Australian Government
 - 2019 **National Scholarship**, awarded by MoE of China
 - 2017 **National Scholarship**, awarded by MoE of China
 - 2017 **First-class thesis award** for undergraduates
 - 2017 **Envision Future Scholarship**, awarded by Envision Energy
 - 2014 **Principal's Scholarship**, awarded by SEU
- Honors**
- 2022 **Outstanding Reviewer** for ECCV'22
 - 2020 **Outstanding Master graduate** of SJTU in Shanghai
 - 2017 **Outstanding Undergraduate** of SEU
- Competition**
- 2016 **First Prize of National Electronic Design Competition**
- Awards**
- 2016 Third prize in National Information Security Competition
 - 2015 **First Prize of National Electronic Design Competition**
 - 2015 Second Prize in “Freescall Cup” Smart Car Competition
 - 2014 Third Prize in China Collegiate Programming Contest
 - 2014 **First Prize in Advanced Mathematics Competition**

Research of Interests

I have wide research interests in computer vision, machine learning, and robotics. My long-term pursuit is **artificial general intelligence**, namely, making the machine see, think and conduct more like a human.

Now I study **multimodal generic vision**, **zero- and few-shot learning**, **foundation model**, **transfer learning**, and **AI4Science**.

Selected Publications

Journal Papers

- **Changsheng Lu**, Hao Zhu, and Piotr Koniusz. Exploiting Class-agnostic Visual Prior for Few-shot Keypoint Detection. *International Journal of Computer Vision (IJCV)*, 2023. (**Impact Factor: 19.5**, minor revision)
- **Changsheng Lu**, Siyu Xia, Ming Shao, and Yun Fu. Arc-support Line Segments Revisited: An Efficient and High-quality Ellipse Detection. *IEEE Transactions on Image Processing (TIP)*, vol. 29, pp. 768-781, 2020, doi: 10.1109/TIP.2019.2934352. (**Impact Factor: 10.8**, [code](#))
- **Changsheng Lu**, Chaochen Gu, Kaijie Wu, Siyu Xia, Haotian Wang, Xinping Guan. Deep transfer neural network using hybrid representations of domain discrepancy. *Neurocomputing*, 2020. (**Impact Factor: 6.0**)
- Tongkun Guan, Chaochen Gu, **Changsheng Lu**, Jingzheng Tu, Qi Feng, Kaijie Wu, Xinping Guan. Industrial Scene Text Detection with Refined Feature-attentive Network. *IEEE Transactions on Circuits and Systems for Video Technology (TCSVT)*, 2022. (**Impact Factor: 8.4**, [code](#))

Conference Papers

- **Changsheng Lu**, Zheyuan Liu, Piotr Koniusz. “OpenKD: Opening Prompt Diversity for Zero- and Few-Shot Keypoint Detection.” In *18th European Conference on Computer Vision (ECCV)*, 2024. ([code](#))
- **Changsheng Lu**, Piotr Koniusz. “Detect Any Keypoints: An Efficient Light-weight Few-shot Keypoint Detector.” In *Proceedings of 38th Annual AAAI Conference on Artificial Intelligence (AAAI)*, 2024.
- **Changsheng Lu**, Piotr Koniusz. “Few-shot Keypoint Detection with Uncertainty Learning for Unseen Species.” In *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022. ([code](#))
- **Changsheng Lu***, Wenlong Shi*, Ming Shao, Yinjie Zhang, Siyu Xia, and Piotr Koniusz. “Few-shot Shape Recognition by Learning Deep Shape-aware Features.” In *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*, 2024. (* indicates equal contribution)

- **Changsheng Lu**, Haotian Wang, Chaochen Gu, Kaijie Wu, and Xinping Guan. “Viewpoint Estimation for Workpieces with Deep Transfer Learning from Cold to Hot.” In *International Conference on Neural Information Processing*, pp. 21-32. Springer, Cham, 2018. (**Oral**, [code](#))
- **Changsheng Lu**, Siyu Xia, Wanming Huang, Ming Shao, and Yun Fu. “Circle Detection by Arc-support Line Segments.” In *IEEE International Conference on Image Processing (ICIP)*, 2017. (**Oral**, [code](#))
- Rong Wang, Wei Mao, **Changsheng Lu**, and Hongdong Li. “Towards High-Quality 3D Motion Transfer for Stylized Characters with Realistic Apparel Animation.” In *18th European Conference on Computer Vision (ECCV)*, 2024. ([code](#))
- Xiaofeng Zhang, Yudi Zhao, Chaochen Gu, **Changsheng Lu**, Shanying Zhu. “SpA-Former: An effective and lightweight transformer for image shadow removal.” In *IJCNN 2023*. (**Oral**, [code](#))
- Tianhao Wang, **Changsheng Lu**, Ming Shao, Xiaohui Yuan, Siyu Xia. “Eldet: An anchor-free general ellipse object detector.” In *ACCV 2022*.
- Mingjian Chen, Hao Zheng, **Changsheng Lu**, Enmei Tu, Jie Yang, and Nikola Kasabov. “A Spatio-Temporal Fully Convolutional Network for Breast Lesion Segmentation in DCE-MRI.” In *International Conference on Neural Information Processing*, 2018. (**Oral**)

Representative Achievements

- **Few-shot keypoint detection:** To break the limitation of keypoint types to be detected, we are the first to expand few-shot learning to the field of keypoint detection and substantially push forward this new field.
- **Zero-shot keypoint detection:** To overcome the insufficient diversity in modality, semantics (seen *vs.* unseen), and language, we propose a general keypoint detector which can perform both zero-shot and few-shot detection by exploiting the foundation models such as **CLIP** and **LLM** (*e.g.* GPT3.5, Vicuna).
- **High-quality ellipse/circle detector:** We propose two industry-level ellipse/circle detection algorithms which can detect ellipses/circles from digital images precisely, robustly, and fast, overcoming the long-standing issue of unsatisfactory detection in this field. (Rank #1 in [GitHub](#))

Academic Services

- Journal Services**
1. IEEE Trans. on Pattern Analysis and Machine Intelligence (TPAMI)
 2. International Journal of Computer Vision (IJCV)
 3. IEEE Transactions on Image Processing (IEEE T-IP)
 4. IEEE Computational Intelligence Magazine (IEEE CIM)
 5. Pattern Recognition (PR)
 6. Journal of Visual Communication and Image Representation (JVCIR)
 7. Neural Processing Letters (NPL)
 8. IEEE/CAA Journal of Automatica Sinica
 9. IEEE Robotics and Automation Letters (RA-L)

- Conference Services**
- Served to review the manuscripts including
1. CVPR, ICCV, ECCV
 2. AAAI, NeurIPS, ICML, ICLR
 3. WACV, BMVC, ICIP, IJCNN, ACCV, ICONIP, ICMLA, ICASSP

Talks

- 2024.10.03 “OpenKD: Opening Prompt Diversity for Zero- and Few-shot Keypoint Detection”, **ECCV 2024**, Milan, Italy
- 2024.08.08 “General Keypoint Detection: Few-shot, Zero-shot and Beyond”, **AI, ML and Friends Seminars**, ANU, Australia
- 2024.04.17 “Few-Shot Keypoint Detection”, **statML reading group**, DATA61 / CSIRO, Australia
- 2024.01.12 “Detect Any Keypoints: An Efficient Light-weight Few-shot Keypoint Detector”, **AAAI 2024**
- 2022.06.24 “Few-shot Keypoint Detection with Uncertainty Learning for Unseen Species”, **CVPR 2022**
- 2022.04.07 “Ellipse Detection: A Perspective from Low-level Vision to Deep Learning”, **Dalian University of Technology (DLUT)**
- 2020.07.08 “High-precision steel ball surface defect detection”, **Shanghai Steel Ball Plant Co. Ltd.**
- 2020.04.26 “How to do research?”, **SEU**
- 2020.01.13 “Research on Technologies of Transfer Learning towards Virtual-real Viewpoint Estimation”, **SJTU**
- 2019.10.24 “Brief Introduction of AI Hotspots and My works”, **SJTU**
- 2019.07.14 “PointDoN: A shape pattern aggregation module for deep learning on point cloud”, **IJCNN 2019**, Budapest, Hungary

- 2018.12.13 “Viewpoint estimation for workpieces with deep transfer learning from cold to hot”, **ICONIP 2018**, Siem Reap, Cambodia
- 2018.06.27 “SNC Neuron Detection Method Based on Deep Learning for Efficacy Evaluation of Anti-PD Drugs”, **2018 American Control Conference**, Milwaukee, USA
- 2017.09.18 “Circle Detection based on Arc-support Line Segments”, **ICIP 2017**, Beijing, China

Professional Experience

- Oct 2024– **Queensland University of Technology**
Present
 - Visiting Scholar
 - Participating the research on multi-modal pre-training for 3D vision understanding.
- Oct 2020– **Australian National University**
Sep 2024
 - PhD Candidate
 - Studying and developing novel algorithms for few-shot, one-shot, and zero-shot keypoint detection; Participating the research of shape recognition, motion transfer, *etc.*
- July 2020– **Shanghai Jiao Tong University**
Oct 2022
 - Research Scientist
 - Advising students to do research; Developing algorithms for COVID-19 test bands detection and nanometer thin membrane defect detection.
- Mar 2020– **Jiuding Automation Co. Ltd.**
Jun 2020
 - Research Lead
 - Studying and developing high-precision steel ball surface defect detection system.
- Sep 2017– **Shanghai Jiao Tong University**
Mar 2020
 - M.S. candidate
 - Studying and developing deep transfer learning methods for virtual-real workpiece viewpoint estimation; Participating the research of breast lesion segmentation, 3D point cloud processing, and generic vision recognition such as classification, detection and segmentation.

Oct 2016– **Joint Stars Technology Co. Ltd, Nanjing**

May 2017 ○ Research Intern

- Developing industry-level defect inspection algorithms. During this period, I learned lots of skills and knowledge regarding industrial standards and engineering.

2016 Summer **Huawei Nanjing Research Institute**

○ Engineer Intern

- Participating the embedded communication software programming (C/C++); I was listed as a member in the first term of Huawei F(X) future scientist program and achieved the special offer.

Sep 2013– **Southeast University**

Jun 2017 ○ B.S. candidate

- Studying advanced mathematics, control theory, digital signal processing, etc; Establishing lots of interesting projects, including software projects: Tetrix, TSP (Traveling Salesman Problem), android travel software, etc., and automatic systems: smart car system, inverted/wind pendulum control system, and laser target shooting system; Cultivating broad interests ranging from the hardware to high-level algorithms.

Teaching Experience

Shanghai Jiao Tong University

- Teaching Assistant. Advanced Academic Writing. Sep 2018–Jan 2019
- Teaching Assistant. C++ Programming. Jan 2018–Jun 2018

Skills

Computer Skills Python, C/C++, MATLAB

Libraries Pytorch, OpenCV, MEX

Languages Chinese, English