Changsheng Lu

B168 Brian Anderson Building
Canberra ACT 2601, Australia
+61 423029782
Changsheng.Lu@anu.edu.au
https://alanlusun.github.io
Google Scholar

Education

Oct 2020–*Current* **Australian National University (ANU)**, *College of Engineering, Computing and Cybernetics.*
- **Ph.D.** in Computer Vision and Machine Learning

Sep 2017–Mar 2020 **Shanghai Jiao Tong University (SJTU)**, *Department of Automation.*
- **M.S.** degree in Pattern Recognition and Intelligent System

Sep 2013–Jun 2017 **Southeast University (SEU)**, *Department of Automation.*
- **B.S.** degree in Automation

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 Awards
- 2016 First Prize of "TI Cup" National Electronic Design Competition
- 2016 Third prize in National Information Security Competition
- 2015 First Prize of National Electronic Design Competition
- 2015 Second Prize in "Freescale 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**, and **transfer learning**.

Selected Publications

Journal Papers

- **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: 10.6**, 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**)
- **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**, major revision)
- 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.
- **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.
- 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

2024.01.12 "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 "Reasearch on Technologies of Trasnfer 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 2020– Present
Australian National University
- 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– Oct 2022
Shanghai Jiao Tong University
- Research Scientist
- Advising students to do research; Developing algorithms for COVID-19 test bands detection and nanometer thin membrane defect detection.

Mar 2020– Jun 2020
Jiuding Automation Co. Ltd.
- Research Scientist
- Studying and developing high-precision steel ball surface defect detection system.

Sep 2017– Mar 2020
Shanghai Jiao Tong University
- M.S. candidate
- Studying and developing novel methods for deep transfer learning based workpiece viewpoint estimation; Participating the research of breast lesion segmentation, 3D point cloud processing, and generic vision recognition.

Oct 2016– May 2017
Joint Stars Technology Co. Ltd, Nanjing
- 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–
Jun 2017

Southeast University

- B.S. candidate
- Establishing lots of interesting projects, e.g. Tetrix, TSP (Traveling Salesman Problem), android travel software, and inverted pendulum/wind pendulum control 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