

# Dr. Chao YIN

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## 💡 RESEARCH INTERESTS

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3D point cloud processing; semantic / instance segmentation and 3D scene understanding; weakly-supervised, long-tailed, and unsupervised learning; **multi-modal AI** (foundation models – SAM, DINO, CLIP – and 2D/3D LLMs); large-scale dataset and benchmark construction; **remote sensing and GIS** applications; scan-to-BIM.

## 📖 PUBLICATIONS

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**Preprints** (\* denotes corresponding author). For the complete and up-to-date list, see [Google Scholar](#).

- **C. Yin**, H. Yue, Q. Han, D. Hu, Z. Liang, F. Lin, B. Sun, B. Wang, M. Li, W. Yao, and J. C. P. Cheng, “Industrial3D: A Terrestrial LiDAR Point Cloud Dataset and Cross-Paradigm Benchmark for Industrial Infrastructure,” *arXiv:2603.28660*, 2026.
- **C. Yin**, Q. Han, Z. Hou, Y. Liu, A. Dai, H. Hu, J. Yang, and W. Yao, “Resolving Primitive-Sharing Ambiguity in Long-Tailed Industrial Point Cloud Segmentation via Spatial Context Constraints,” *arXiv:2601.19128*, 2026.

## Journal Papers

- S. Jing and **C. Yin\***, “From Geometric Labels to Semantic Understanding of Indoor Building Components Using Multimodal Large Language Models,” *Automation in Construction*, 2026. (**Accepted**; JCR Q1, IF: 10.5)
- Q. Han, Z. Wang, **C. Yin\***, Z. Hou, and T. Yao, “Semi-Supervised AI for Architectural Heritage Classification and Style Lineage Discovery in Chinese Traditional Settlements,” *ISPRS International Journal of Geo-Information*, vol. 15, no. 5, p. 221, 2026.
- B. Wang, Z. Chen, M. Li, Q. Wang, **C. Yin**, and J. C. P. Cheng, “Omni-Scan2BIM: A ready-to-use Scan2BIM approach based on vision foundation models for MEP scenes,” *Automation in Construction*, vol. 162, p. 105384, 2024. (JCR Q1, IF: 10.5)
- **C. Yin**, B. Yang, J. C. P. Cheng\*, V. J. L. Gan\*, B. Wang, and J. Yang, “Label-efficient semantic segmentation of large-scale industrial point clouds using weakly supervised learning,” *Automation in Construction*, vol. 148, p. 104757, 2023. (JCR Q1, IF: 10.5)
- D. Hu, V. J. L. Gan, and **C. Yin**, “Robot-assisted mobile scanning for automated 3D reconstruction and point cloud semantic segmentation of building interiors,” *Automation in Construction*, vol. 152, p. 104949, 2023. (JCR Q1, IF: 10.5)
- **C. Yin**, J. C. P. Cheng\*, B. Wang, and V. J. L. Gan\*, “Automated Classification of Piping Components from 3D LiDAR Point Clouds using SE-PseudoGrid,” *Automation in Construction*, vol. 139, p. 104300, 2022. (JCR Q1, IF: 10.5)
- Q. Han, **C. Yin\***, Y. Deng, and P. Liu, “Towards Classification of Architectural Styles of Chinese Traditional Settlements Using Deep Learning: A Dataset, a New Framework, and Its Interpretability,” *Remote Sensing*, vol. 14, no. 20, 2022. (JCR Q2, IF: 5.3)
- B. Wang, Q. Wang, J. C. P. Cheng, C. Song, and **C. Yin**, “Vision-assisted BIM reconstruction from 3D LiDAR point clouds for MEP scenes,” *Automation in Construction*, vol. 133, p. 103997, 2022. (JCR Q1, IF: 10.5)
- B. Wang, Q. Wang\*, J. C. P. Cheng\*, and **C. Yin**, “Object verification based on deep learning point feature comparison for scan-to-BIM,” *Automation in Construction*, vol. 142, p. 104515, 2022. (JCR Q1, IF: 10.5)
- **C. Yin**, B. Wang, V. J. L. Gan, M. Wang, and J. C. P. Cheng\*, “Automated semantic segmentation of industrial point clouds using ResPointNet++,” *Automation in Construction*, vol. 130, p. 103874, 2021. (JCR Q1, IF: 10.5)
- B. Wang, **C. Yin**, H. Luo, J. C. P. Cheng, and Q. Wang, “Fully automated generation of parametric BIM for MEP scenes based on terrestrial laser scanning data,” *Automation in Construction*, vol. 125, p. 103615, 2021. (JCR Q1, IF: 10.5)

## Conference Papers

- **C. Yin**, B. Wang, and J. C. P. Cheng, “Deep learning-based scan-to-BIM framework for complex MEP scene using laser scanning data,” ICCBEI 2019. **Best Paper Award**.

- **C. Yin**, J. C. P. Cheng\*, B. Wang, and V. J. L. Gan, “Automated Classification of Piping Components from 3D LiDAR Point Clouds using Deep Learning and Squeeze-Excite Mechanism,” IPC 2022.

## Book Chapter

- **C. Yin**, B. Wang, K. Chen, H. Liu, C. Huang, J. C. P. Cheng\*, and L. Chen, “Digital modelling layer: two digital modelling methods,” in *Digital Twins in the Built Environment: Fundamentals, principles and applications*, ICE Publishing, 2022, pp. 101–159.

## EDUCATION

<b>Hong Kong University of Science and Technology (HKUST)</b>	Hong Kong
<i>Ph.D., Point Cloud Processing, Deep Learning, and BIM Modeling (Advisor: Prof. Jack Cheng)</i>	Aug 2018 – Aug 2022
<b>Wuhan University</b>	Hubei, China
<i>M.Phil., Cartography and GIS (Advisor: Prof. Zhongliang Fu)</i>	Sep 2011 – Jun 2013
<b>Anhui University of Science and Technology</b>	Anhui, China
<i>B.S., Geographic Information System (GIS)</i>	Sep 2007 – Jun 2011

## RESEARCH & PROFESSIONAL EXPERIENCE

<b>Geography Institute of Guangzhou, Guangdong Academy of Sciences</b>	Guangzhou, China
<i>Research Scientist (Associate Researcher)</i>	Sep 2022 – 2026

- Lead research on weakly-supervised 3D point cloud segmentation, long-tailed learning, multi-modal perception, and remote sensing applications.
- Built **Industrial3D**, the largest terrestrial LiDAR dataset and cross-paradigm benchmark for industrial MEP scene understanding.

<b>Hong Kong University of Science and Technology</b>	Hong Kong
<i>Research Assistant, BIM Lab</i>	Aug 2018 – Aug 2022

- Developed deep learning methods for 3D point cloud processing, semantic segmentation, and BIM reconstruction from LiDAR data.
- Key participant in the HK ITF project “Automated BIM Generation using UAV and Indoor 3D Laser Scanning Technologies” (PI: Prof. Jack C.P. Cheng); work led to the ICCBEI 2019 **Best Paper Award**.

<b>Hong Kong Polytechnic University</b>	Hong Kong
<i>Visiting Fellow, Lab of Smart City</i>	Aug 2017 – Jun 2018

- Key participant in the HK ITF project “3D Geodatabase Framework for Hong Kong – A Lightweight 3D Seamless Spatial Data Acquisition System (SSDAS)” (PI: Prof. Wenzhong Shi).

<b>Hengyang Normal University</b>	Hengyang, China
<i>Lecturer, GIS</i>	Jul 2013 – Jul 2018

- Taught GIS development courses: C#/.NET programming, ArcGIS Engine, Web GIS, and GIS Software Design and Development.

## RESEARCH FUNDING & PROJECTS

<b>Guangdong Province Overseas Postdoctoral Talent Support Program (PI)</b>	Jun 2023 – 2025
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- Weakly-supervised semantic segmentation for complex indoor 3D perception using point clouds.

<b>China Postdoctoral Science Foundation (PI)</b>	Sep 2023 – Dec 2024
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- Weakly-supervised semantic segmentation for 3D point clouds based on deep long-tail learning.

<b>National Natural Science Foundation of China (Co-PI)</b>	Jan 2021 – Dec 2023
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- Automated identification and extraction of landscape genes for Chinese traditional settlements based on 3D semantic models.

<b>Hong Kong ITF (Key Participant; PI: Prof. Jack C.P. Cheng, HKUST)</b>	Oct 2018 – Dec 2021
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- **HK\$3.4M**. Automated BIM generation using UAV and indoor 3D laser scanning technologies.

<b>Hong Kong ITF (Key Participant; PI: Prof. Wenzhong Shi, PolyU)</b>	Aug 2017 – Jun 2018
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- **HK\$6.06M**. 3D Geodatabase Framework for Hong Kong – A Lightweight 3D Seamless Spatial Data Acquisition System (SSDAS).

## TECHNICAL SKILLS

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**3D Vision & Point Clouds:** PointNet++, KPConv, PTv3, ResPointNet++; semantic/instance segmentation; weakly-supervised, unsupervised, and long-tailed learning

**Foundation Models & LLMs:** SAM, DINO, CLIP; LLaVA, LISA; LLaMA with LoRA/QLoRA; RAG; 3D multi-modal LLMs

**Programming & MLOps:** Python (expert, 6+ open-source projects), PyTorch, TensorFlow, Hugging Face, PointCept, Docker, Git

**Geospatial & RS:** ArcGIS, QGIS, GDAL, CloudCompare, PCL, FME, Revit; Linux, CUDA, HPC clusters; LaTeX

## ACADEMIC SERVICE

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**Peer Reviewer:** Automation in Construction, ISPRS Journal of Photogrammetry and Remote Sensing, Science of Remote Sensing, Geo-spatial Information Science, Results in Engineering, Remote Sensing

**Open-Source Contributions:** Active maintainer of 6+ research code repositories with **140+ GitHub stars** ([github.com/PointCloudYC](https://github.com/PointCloudYC)); all published papers ship publicly available code for reproducibility.

## AWARDS & HONORS

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**Best Paper Award**, International Conference on Construction, Building Engineering and Innovation (ICCBEI), 2019.

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