

Dr. Yixiong Jing

Research Associate, Department of Engineering, University of Cambridge · Head of AI, InfraMind Labs

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RESEARCH PROFILE

I work at the intersection of **physical AI and infrastructure engineering**. My research develops 3D perception for civil infrastructure (large-scale point cloud segmentation, unsupervised anomaly detection), physics-grounded reconstruction and world models (differentiable simulation, neural dynamics, 3D reconstruction, and system identification), and LLM-driven embodied intelligence for construction robotics. I lead a cross-institution group of research students and engineers, with recent work in *Automation in Construction*, *Computer-Aided Civil and Infrastructure Engineering*, and at *ICRA*, *ICML*, and *ECCV*, in collaboration with groups at **Oxford**, **TUM**, **MIT**, and **PolyU** (Hong Kong).

EDUCATION

DPhil in Engineering Science, University of Oxford, UK Jan 2021 – Feb 2025

- Thesis: Development of synthetic point cloud data and deep learning algorithms for automatic segmentation and defect detection in masonry bridges.
- Supervisors: **Prof. Sinan Acikgoz**, co-supervised by **Prof. Brian Sheil**

MEng, Kyoto University, Japan Sep 2017 – Apr 2020

BEng, Harbin Institute of Technology, China Sep 2013 – Sep 2017

APPOINTMENTS

Research Associate, Department of Engineering, University of Cambridge Feb 2025 – present

- Research directions: physics-based world models and differentiable simulation; LLM-driven embodied intelligence for robot manipulation; 3D perception for infrastructure.
- Group of Cambridge Centre for Smart Infrastructure and Construction (CSIC) and **Laing O'Rourke Centre** led by **Prof. Brian Sheil**; researcher on EPSRC grant EP/Z533427/1 “**Digital Underground Construction**” (PI: B. Sheil).
- Co-supervise 7 research students and visiting interns; student-led work under my direction has produced publications [C1], [P1], [J1], and [U2].
- International collaborations: University of Oxford (**Active Vision Laboratory**), Technical University of Munich, MIT (**Perceptual Science Group**), PolyU (**JC STEM Lab of Machine Learning and Computer Vision**).

Head of AI, InfraMind Labs (concurrent, part-time) Feb 2026 – present

- Lead the company's AI function: a team of 9 researchers and engineers working on automated tunnel/bridge and infrastructure inspection.
- Designed and implemented the end-to-end industrial pipeline for infrastructure point cloud inspection and monitoring.
- Inspection products deployed commercially with clients including Jacobs, National Highways, Transport for London, and Network Rail.

Research Assistant, Kyoto University, Japan Apr 2019 – Jul 2019

- Shaking table tests for the skew bridge pounding.

Junior AI developer, Zoomscape, Japan Jul 2019 – Jan 2020

- Computer vision algorithm for bolt defect detection.

PUBLICATIONS

My publications concentrate on the top destinations of **three fields**: the leading journals of civil engineering (*Automation in Construction* and *Computer-Aided Civil and Infrastructure Engineering*) and the premier international conferences of robotics (*ICRA*), machine learning (*ICML*), and computer vision (*ECCV*), reflecting a deliberate emphasis on quality over quantity. **Bold** denotes Y. Jing; † denotes corresponding author.

Journal articles

- [J1] Yang, W., Lin, W., **Jing, Y.**[†], Hill, T., Wysocki, O., & Sheil, B. (2026). Tunnel Scanner: Geometry-informed synthetic point cloud generation and transfer learning for tunnel segmentation. *Automation in Construction*, 187, 106924.
- [J2] **Jing, Y.**, Zhang, C., Wu, H., Wang, G., Wysocki, O., & Sheil, B. (2026). Zero-shot depth map restoration from sparse infrastructure point clouds using diffusion models and prompted segmentation. *Automation in Construction*, 184, 106839.
- [J3] **Jing, Y.**, Lin, W., Sheil, B., & Acikgoz, S. (2025). 3D multimodal feature for infrastructure anomaly detection. *Automation in Construction*, 178, 106388.
- [J4] **Jing, Y.**, Zhong, J. X., Sheil, B., & Acikgoz, S. (2024). Anomaly detection of cracks in synthetic masonry arch bridge point clouds using fast point feature histograms and PatchCore. *Automation in Construction*, 168, 105766.
- [J5] **Jing, Y.**, Sheil, B., & Acikgoz, S. (2024). A lightweight Transformer-based neural network for large-scale masonry arch bridge point cloud segmentation. *Computer-Aided Civil and Infrastructure Engineering*, 39, 2427–2438.
- [J6] **Jing, Y.**, Sheil, B., & Acikgoz, S. (2022). Segmentation of large-scale masonry arch bridge point clouds with a synthetic simulator and the BridgeNet neural network. *Automation in Construction*, 142, 104459.

Conference proceedings

- [C1] Wang, G., Ying, Q., **Jing, Y.**[†], Wysocki, O., & Sheil, B. (2026). ActionReasoning: Robot action reasoning in 3D space with LLM for robotic brick stacking. *IEEE International Conference on Robotics and Automation (ICRA)*.
- [C2] Lin, S., Xu, H., Chen, J., Li, Z., Wang, G., **Jing, Y.**, Xu, S., Zhao, R., Sheil, B., Chau, L.-P., & Liu, G. (2026). RoboFlow4D: A lightweight flow world model toward real-time flow-guided robotic manipulation. *Proceedings of the 43rd International Conference on Machine Learning (ICML)*, PMLR.
- [C3] Wang, Y., Wang, F., Gyawali, P., Xu, Z., Klimkowska, A., **Jing, Y.**, Yang, W., Biljecki, F., Holst, C., Busam, B., Sheil, B., & Wysocki, O. (2026). UnderOneFacade: Worldwide facade semantic segmentation benchmark dataset. *European Conference on Computer Vision (ECCV)*, Springer.
- [C4] **Jing, Y.**, Sheil, B., & Acikgoz, S. (2023). A method to generate realistic synthetic point clouds of damaged single-span masonry arch bridges. *International Conference on Structural Analysis of Historical Constructions (SAHC)*, 436–448, Springer.
- [C5] **Jing, Y.**, Sheil, B., & Acikgoz, S. (2023). Extraction of key geometric parameters from segmented masonry arch bridge point clouds. *5th Joint International Symposium on Deformation Monitoring (JISDM 2022)*, 185–190.

Preprints

- [P1] Ying, Q., Wang, G., Pan, Y., Prisacariu, V. A., Sheil, B., & **Jing, Y.**[†] (2026). NEXUS: Neural energy fields for physically consistent contact-rich 3D object dynamics. arXiv:2606.15015.
- [P2] **Jing, Y.**, Chen, X., Wang, G., Wysocki, O., Wu, H., & Sheil, B. (2026). PhySPRING: Structure-preserving reduction of physics-informed twins via GNN. arXiv:2605.07687.
- [P3] Ye, P., Ma, Y., Chen, H., Wang, G., **Jing, Y.**, Sheil, B., Du, Y., & Adelson, E. (2026). You Only Touch Once: 6-DoF object pose estimation from single tactile contact. arXiv:2606.28899.

Under review

- [U1] **Jing, Y.**, Chen, L., Jiang, J., Wang, G., Ma, W., Wu, H., Wysocki, O., & Sheil, B. (2026). PhysTwin++: Bending-enhanced differentiable physical reconstruction and simulation from videos. Under review.
- [U2] Wu, H., **Jing, Y.**[†], Deng, S., Wang, G., Wysocki, O., & Sheil, B. (2026). Neural Maxwell Projector: Physics-informed domain adaptation for cross-waveform electromagnetic projection. Under review.
- [U3] Lehmberg, D., Duhr, F., Deryło, A., Wang, F., Zhang, Q., Li, W., **Jing, Y.**, Yang, W., Yang, J., Jutzi, B., Sheil, B., Busam, B., Xia, Y., & Wysocki, O. (2026). JAB: Injecting geometric features into point cloud neural networks. Under review.
- [U4] Wu, H., **Jing, Y.**, Wang, G., Wysocki, O., & Sheil, B. (2026). GauGal: Gaussian-Galerkin electromagnetic inverse scattering imaging. Under review.

[U5] Wang, G., Liu, Z., Wu, H., Ma, W., **Jing, Y.**, Wysocki, O., & Sheil, B. (2026). Physics-aware 4D Gaussian splatting SLAM. Under review.

INVITED TALKS & PRESENTATIONS

- Invited lecture, Dongtumuwu Salon, Southeast University, Nanjing, China: “**From 3D Perception to Physics-Aware Embodied AI for Construction**”, 14 July 2026.
- Invited lecture, JC STEM Lab of Machine Learning and Computer Vision, PolyU, HK, China: “**Physics-Driven 3D Reconstruction and Generation for Embodied AI**”, 31 July 2026.

PROFESSIONAL SERVICE

- Journal reviewer: *Automation in Construction*; *Underground Space*; *ISPRS Journal of Photogrammetry and Remote Sensing*; *Journal of Computing in Civil Engineering*; *Engineering Structures*.
- Conference reviewer: European Conference on Computer Vision (ECCV) Workshop.

TECHNICAL SKILLS & LANGUAGES

- Methods: 3D vision and point cloud learning; differentiable physics and simulation; generative models; LLM/VLM-driven robot planning; zero-/few-shot learning.
- Tools: PyTorch, PyTorch3D, Open3D, ROS, CUDA, physical and robot simulators (e.g., MuJoCo, Pybullet, COSMOS).
- Languages: Chinese (native); English (fluent); Japanese (basic).