

VINCENT GAN (Dr)



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EDUCATION:

- PhD in Civil Engineering (2016), Hong Kong University of Science and Technology
- MSc in Civil Engineering (2012), Hong Kong University of Science and Technology

APPOINTMENTS AND PROFESSIONAL AFFILIATIONS:

- Assistant Professor, National University of Singapore, Singapore (09.2020 - present)
- Member, Institute of Electrical and Electronics Engineers (IEEE), US (10.2024 – Present)
- Member, American Society of Civil Engineers (ASCE), US (01.2019 – Present)
- Visiting Lecturer, Imperial College London, UK (2019)
- Visiting Scholar, Purdue University, US (2019)
- Research Assistant Professor, Hong Kong University of Science and Technology (2017-2019)

SELECTED RESEARCH PROJECTS:

- Principal Investigator, AI-assisted scan-to-BIM technology for 3D reconstruction of infrastructure information models. National Research Foundation through AI Singapore Programme and Land Transport Authority through Land Transport Innovation Fund, 9.2023 – 2.2025.
- Principal Investigator, Robotic scan planning technology for automated 3D digital reconstruction. DeGAP Grant under RIE2025, 12.2024 – 11.2025 and MOE AcRF Tier-1, 3.2025 – 9.2026.
- Principal Investigator, Pilot study for measurement of carbon emissions from construction activities and EC from residential development. Swire Properties, 1.2022 – 9.2022.
- Principal Investigator, Automated reconstruction of as-built building information models using LiDAR and deep learning. Singapore Ministry of Education AcRF Tier-1 Grant, 3.2023 – 3.2026.
- Principal Investigator, Artificial intelligence assisted Scan-to-BIM for existing buildings in A&A projects. Singapore Ministry of Education AcRF Tier-1 Grant, 3.2020 – 2.2023.

SELECTED PUBLICATIONS:

- Qiao, Z., Gan, V.J.L.,* Li, M.K., Goh, K.C.K., Lim, P.L., Yeo A.C.L., (2026) Semantic instance segmentation and automated 3D BIM reconstruction for viaduct using LiDAR point clouds and weakly-supervised learning. **Automation in Construction**. 106612.

- Li, M.K., **Gan, V.J.L.,*** Wang, B.Y., (2025) Integrating hierarchical segmentation and vision-language reasoning for spatially complex and occluded MEP point clouds. **Automation in Construction**. 106455.
- **Gan, V.J.L.,** Hu, D.,* Wang, Y., Zhai, R., (2025) Automated indoor 3D scene reconstruction with decoupled mapping using quadruped robot and LiDAR sensor. **Computer-Aided Civil and Infrastructure Engineering**. 13450.
- Hu, D., **Gan, V.J.L.,*** (2025) Semantic navigation for automated robotic inspection and indoor environment quality monitoring. **Automation in Construction**. 105949.
- **Gan, V.J.L.,** Li, K.X.,* Li, M.K., Halfian a L.B.E., (2025) 3D reconstruction of building information models with weakly-supervised learning for carbon emission modelling in the built environment. **Applied Energy**. 124695.
- Zhai, R., Zou, J., **Gan, V.J.L.,*** Han, X., Wang, Y., Zhao, Y. (2024) Semantic enrichment of BIM with IndoorGML for quadruped robot navigation and automated 3D scanning. **Automation in Construction**. 105605.
- Wang, T., **Gan, V.J.L.,*** (2024) Enhancing 3D reconstruction of textureless indoor scenes with IndoReal multi-view stereo (MVS). **Automation in Construction**. 105600.
- Hu, D., **Gan, V.J.L.,*** Zhai, R., (2024) Automated BIM-to-scan point cloud semantic segmentation using a domain adaptation network with hybrid attention and whitening (DawNet). **Automation in Construction**. 105473.
- Liu, H., **Gan, V.J.L.,*** Cheng, J.C.P., Zhou, A.S., (2024) Automatic fine-grained BIM element classification using multi-modal deep learning. **Advanced Engineering Informatics**. 102458.
- Wang, T., **Gan, V.J.L.,*** (2024) Multi-view stereo for weakly-textured indoor 3D reconstruction. **Computer-Aided Civil and Infrastructure Engineering**. 13149.
- Hu, D., **Gan, V.J.L.,*** Yin, C., (2023) Robot-assisted mobile scanning for automated 3D reconstruction and point cloud semantic segmentation of building interiors. **Automation in Construction**. 104949.
- Zhuang, D., **Gan, V.J.L.,*** Tekler, Z., Chong, A., Tian, S., Shi, Xing., (2023) Data-driven predictive control for smart HVAC system in IoT-integrated buildings with time-series forecasting and reinforcement learning. **Applied Energy**. 120936.
- Wang, T., **Gan, V.J.L.,*** (2023) Automated joint 3D reconstruction and visual inspection for buildings using computer vision and transfer learning. **Automation in Construction**. 104810.
- Yin, C., Yang, B., Cheng, J.C.P., **Gan, V.J.L.,*** Wang, B., Yang, J., (2023) Label-efficient semantic segmentation of large-scale industrial point clouds using weakly supervised learning. **Automation in Construction**. 104757.
- Wang, T., **Gan, V.J.L.,*** Hu, D., Liu, H., (2022) Digital twin-enabled built environment sensing and monitoring through semantic enrichment of BIM with SensorML. **Automation in Construction**. 104625.
- **Gan, V.J.L.,*** (2022) BIM-based graph data model for automatic generative design of modular buildings. **Automation in Construction**. 104062.

AWARDS:

- Second Runner-Up (2024) Scan2BIM - Robotic scanning for automated 3D digital reconstruction. Awarded by NUS College of Design and Engineering, Impact Accelerator Challenge.
- openBIM/openGIS Grand Award (2022) openBIM-based design optimisation and prefabrication automation of steel reinforcement. Awarded by buildingSMART HK.

- Structural Excellence Award (2020) Parametric modelling and evolutionary optimisation for cost-optimal and low-carbon design of high-rise reinforced concrete buildings (First Author). Awarded by Hong Kong Institution of Engineers.
- Best Paper Award (2020) Concrete reinforcement modelling with IFC for automated rebar fabrication (Corresponding Author). Awarded jointly by the International Conference on Innovative Production and Construction and the International Conference on Construction Engineering and Project Management.

INVITED PRESENTATIONS:

- Singapore-Hong Kong Joint Research Seminar: Digital and Sustainable Construction Toward Construction 5.0. Scan2BIM robot: autonomous 3D scanning for BIM reconstruction in the built environment. Invited by Department of Building and Real Estate, Hong Kong Polytechnic University. Sep 2025, Hong Kong, China.
- IAARC Research Seminar. From reality to digital twin: Robotic scanning and scan-to-BIM for automated 3D reconstruction of the built environment. Invited by University of British Columbia and International Association of Automation and Robotics in Construction (IAARC, Canada). July 2025, Kelowna, Canada.
- UCL Guest Lecture. Digital twins, robotics, and automation for smart facilities management. Invited by Bartlett School of Sustainable Construction, University College London. Feb 2025, London, UK.
- Panel Speaker for Building and Simulation Conference. AI and robotics technologies for building information modelling, simulation and optimisation. Invited by Tsinghua University. Nov 2024, Beijing, China.
- Panel Speaker for International Forum on Engineering Education. Artificial intelligence and robotics for building information modelling and optimisation. Invited by Tsinghua University and United Nations Educational, Scientific and Cultural Organization (UNESCO). Nov 2024, Beijing, China.
- Keynote Speaker for International Forum on Generative Design. openBIM-based generative design optimisation and precast construction. Invited by Faculty of Architecture, Hong Kong University. May 2023, Hong Kong, China.
- UCL Guest Lecture. Digital twins, robotics, and automation for smart facilities management. Invited by Bartlett School of Sustainable Construction, University College London. Feb 2023, London, UK.

EDUCATION:

Course Taught

- PF1103 Digital Construction / IPM1103 Digitalisation in Built Environment
- PF2108 / IPM2104 Project Cost Management
- PF3205 Advanced Measurement
- PF3211 AI for Built Environment
- PF4101 / IPM4101 Dissertation

Research Students

- Melanie Tan, (01.2023 – present). PhD (GTS). Research Topic: Integration of LiDAR and image data for robotic operations in unmanned built environment management.
- Xiuqi Li, (08.2022 – present). PhD (Scholarship). Research Topic: Automated high-precision 3D BIM reconstruction for MEP systems using LiDAR point clouds.
- Kexin Li, (01.2022 – present). PhD. Research Topic: AI-assisted automatic 3D reconstruction of large-scale building information models.

- Tao Wang, (08.2021 – 10.2024). PhD (Scholarship). Research Topic: Enhancing digital twins through semantic enrichment and geometric reconstruction.
- Qiao Zheng, (08.2021 – 05.2025). PhD. Research Topic: Geometric quality assessment and BIM reconstruction for building structural components using LiDAR and AI.
- Difeng Hu, (08.2021 – 12.2024). PhD. Research Topic: AI-assisted 3D reconstruction and scene understanding for robotic navigation in indoor inspections.
- Runfeng Ma, (08.2023 – 03.2024). MSc. Research Topic: LiDAR-based as-built BIM reconstruction for infrastructure.
- Yushuo Wang, (01.2023 – 09.2024). MSc (Research). Research Topic: As-built 3D reconstruction of building interiors using quadruped robots and LiDAR sensors.
- Hui Lin Oh, (01.2022 – 01.2025). MSc (Research). Research Topic: BIM-based digital twin for indoor built environment monitoring and robot-assisted facility management.
- Xiayi Chen, (08.2021 – 01.2024). MSc (Research). Research Topic: Data-driven, semantic-rich digital twin for monitoring and analysing ACMV performance in tropics.
- Xin Li, (09.2023 – 09.2024). Visiting PhD. Research Topic: Semantically-enriched BIM for human tracking and robotic operations in the built environment.
- Ruoming Zhai, (10.2022 – 10.2023). Visiting PhD. Research Topic: Semantic enrichment of BIM with IndoorGML for quadruped robot navigation and automated 3D scanning.
- Yongjie Pan, (01.2023 – 12.2023). Visiting PhD. Research Topic: 3D reconstruction of digital twins for ACMV monitoring and anomaly detection via Scan-to-BIM.
- Chao Xiang, (08.2022 – 08.2023). Visiting PhD. Research Topic: Unified weakly and semi-supervised crack segmentation framework using limited coarse labels.
- Dian Zhuang, (08.2021 – 08.2022). Visiting PhD. Research Topic: Data-driven predictive control for smart HVAC with time-series forecasting and reinforcement learning.

Postdoctoral Researchers and Research Assistants (Staff)

- Mingkai Li, (04.2024 – present). Research Associate / Research Fellow. Research Topic: Cross-domain point cloud representation learning for Scan-to-BIM automation.
- Shaobo Li, (09.2024 – 08.2025). Research Associate (Visiting). Research Topic: Autonomous robot navigation for mobile 3D scanning and LiDAR mapping.
- Asiri Weerasuriya, (08.2018 – 03.2019). Research Associate (HKUST). Research Topic: BIM and computational simulation for high-rise building optimisation.
- Jey Chandar, (01.2025 – present). Research Assistant. Research Topic: Reinforcement learning for robot semantic navigation and automated LiDAR mapping.
- Yuanyuan Deng, (07.2024 – 08.2025). Research Assistant. Research Topic: Gaussian splatting SLAM for 3D scene reconstruction of indoor built environments.

PROFESSIONAL SERVICE:

Editorial Service

- Guest Editor, Advanced Engineering Informatics (JCR Q1, Elsevier). Special Issue on “Application of Large Language Models in Energy Engineering and Informatics”. Ke Yan, Vincent Gan, Amy Trappey, Linda Xiao (eds). August 2025.

- Guest Editor, Sensors (JCR Q2). Special Issue on “Digital Twins and Robot Sensing for Smart Construction and Facilities Management”. Vincent Gan, Ali Ghahramani, Weiwei Chen, Mingzhu Wang (eds). February 2023.

Conference Committees

- Area Chair, 42nd International Symposium on Automation and Robotics in Construction (ISARC). Organised by International Association for Automation and Robotics in Construction (IAARC). Montreal, Canada, July 2025.
- Scientific Committee Member and Session Chair, International Conference on Civil and Building Engineering Informatics (ICCBEI). Organised by HKUST. Hong Kong, January 2025.
- Area Chair, 41st International Symposium on Automation and Robotics in Construction (ISARC). Organised by International Association for Automation and Robotics in Construction (IAARC). Lille, France, June 2024.
- Technical Committee Member, International Conference on Computing in Civil Engineering (i3CE), Organised by American Society of Civil Engineers and Carnegie Mellon University. Pittsburgh, USA, July 2024.
- Organising Committee Member, 8th International Conference on Innovative Production and Construction (IPC 2020) and 8th International Conference on Construction Engineering and Project Management (ICCEPM 2020). Organised by HKUST and HKPolyU. Hong Kong, December 2020.

Reviewer for International Journals

- Automation in Construction
- Computer-Aided Civil and Infrastructure Engineering
- Advanced Engineering Informatics
- Applied Energy
- ISPRS Journal of Photogrammetry and Remote Sensing
- Building and Environment
- Journal of Cleaner Production

Reviewer for International Conferences

- International Symposium on Automation and Robotics in Construction (ISARC), July 2025
- International Conference on Computing in Civil Engineering (i3CE), July 2024
- International Symposium on Automation and Robotics in Construction (ISARC), June 2024