

RUI MA

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Research Interests

An urban researcher with a PhD from the City University of Hong Kong, focusing on sustainable urban systems, smart cities, GeoAI, and urban building energy management. Skilled in applying advanced modeling techniques to enhance the efficiency and sustainability of urban environments.

Education

City University of Hong Kong

Ph.D. in Urban Analytics

Hong Kong

09/2020 - 10/2024

- Supervisors: Prof. Xin Li and Prof. Jiayu Chen (Tsinghua University)
- Ph.D. Dissertation: Urban Building Energy Modeling: A City-scale Distributed Simulation Approach

National University of Singapore

Visiting Scholar in Urban Analytics Lab

Singapore

01/2024 - 07/2024

- Supervisor: Prof. Filip Biljecki

Tongji University

M.Eng. in Communication and Transportation Engineering

Shanghai

09/2017 - 06/2020

- Supervisor: Prof. Chuanzhi Geng

Inner Mongolia University

B.Eng. in Civil Engineering (Transportation)

Hohhot

09/2013 - 06/2017

- Outstanding Graduate, GPA: 3.7/4.0

Teaching & Work Experience

Zhengzhou University

Zhengzhou

Lecturer (Assistant Professor)

01/2025 - Present

Teaching Principles and Applications of Big Data Technology

Fall 2025

City University of Hong Kong

Hong Kong

Postdoctoral Fellow

10/2024 - 12/2024

City University of Hong Kong

Hong Kong

Teaching Assistant Environmental Economics, Planning and Policy

Fall 2023

Teaching Assistant Beauty of Ancient Chinese Architecture

Spring 2023

Teaching Assistant Integrated Building Project Development

Fall 2022

Teaching Assistant Integrated Building Project Development

Fall 2021

Teaching Assistant Building Science

Spring 2021

Teaching Assistant Structural Systems

Spring 2021

Volvo Car (Asia Pacific) Investment Holdings Co., Ltd.

Shanghai

Data Statistics Intern

2018

Publications (0000-0003-4153-9101)

Peer-reviewed Journal Papers:

1. Linghao Wang, Gaoyuan Wang, Ziyu Liu, Rui Ma*. (2025). Exploring Urban Activity Intensity with Gravity-Based Betweenness Centrality and Social Media Evaluation: A Case Study of Beijing. (Accepted, *Sustainable Cities and Society*)
2. Rui Ma, Qi Li, Botao Zhang, Hao Huang, Chendi Yang. (2024). An Ontology-driven Method for Urban Building Energy Modeling. *Sustainable Cities and Society*, 106, 105394.
3. Rui Ma, Dongping Fang, Jiayu Chen, Xin Li. (2023). A Tiled Multi-city Urban Objects Dataset for City-scale Building Energy Simulation. *Scientific Data (Nature)*, 10(1), 352.
4. Rui Ma, Jiayu Chen, Chendi Yang, Xin Li. (2023). OSMsc: A Novel Framework for Semantic City Modeling Using OpenStreetMap. *International Journal of Geographical Information Science*, 38(1), 1–26.
5. Rui Ma, Tao Wang, Yan Wang, Jiayu Chen. (2022). Tuning Urban Microclimate: A Morpho-patch Approach for Multi-scale Building Group Energy Simulation. *Sustainable Cities and Society*, 76, 103516.
6. Rui Ma, Xin Li, Jiayu Chen. (2021). An Elastic Urban Morpho-blocks (EUM) Modeling Method for Urban Building Morphological Analysis and Feature Clustering. *Building and Environment*. 192.
7. Rui Ma, Bin Ren, Dong Zhao, Jiayu Chen, and Yujie Lu. (2020). Modeling Urban Energy Dynamics under Clustered Urban Heat Island Effect with Local-weather Extended Distributed Adjacency Blocks. *Sustainable Cities and Society*, 56, 102099.
8. Rui Ma, Chuanzhi Geng, Zhun Yu, Jiayu Chen, Xiaowei Luo. (2019). Modeling City-scale Building Energy Dynamics through Inter-connected Distributed Adjacency Blocks. *Energy and Buildings*, 202, 109391.
9. Qi Li, Rui Ma, Mo Yang, Wei Wang, Jiayu Chen. (2025). Net Zero Energy Buildings for low-carbon cities: Progress, challenges, and future directions. *Journal of Building Design and Environment*, 3, 202559.
10. Koichi Ito, Yihan Zhu, Mahmoud Abdelrahman, Xiucheng Liang, Zicheng Fan, Yujun Hou, Tianhong Zhao, Rui Ma, Kunihiro Fujiwara, Jiani Ouyang, Matias Quintana, Filip Biljecki. (2025). ZenSVI: An open-source software for the integrated acquisition, processing and analysis of street view imagery towards scalable urban science. *Computers, Environment and Urban Systems*, 119, 102283.
11. Chendi Yang, Rui Ma, Hongqiang Fang, Siu Ming Lo, Jacqueline TY Lo. (2024). Street Characteristics and Human Activities in Commercial Districts: A Clustering-based Approach Application for Shenzhen. *Environment and Planning B: Urban Analytics and City Science*, 51(8), 1794-1813.

12. Chendi Yang, Siu Ming Lo, Rui Ma, Hongqiang Fang. (2024). The Effect of the Perceptible Built Environment on Pedestrians' Walking Behaviors in Commercial Districts: Evidence from Hong Kong. *Environment and Planning B: Urban Analytics and City Science*, 51(2), 329–346.
13. Yongjun Sun, Rui Ma, Jiayu Chen, Tao Xu. (2020). Heuristic Optimization for Grid-interactive Net-zero Energy Building Design Through the Glowworm Swarm Algorithm. *Energy and Buildings*, 208, 109644.

Journal Papers Under Review:

1. Rui Ma, Chendi Yang, Jiayu Chen, Filip Biljecki, Xin Li. Reconstructing 3D Building Facade Openings: A Street View Imagery-based Enhancement Approach. (Under Review, *Automation in Construction*)
2. Hanmo Wang, Cai Wu, Tao Wang, Difeng Hu, Mingkai Li, Zhuyin Lu, Alexander Lin, Rui Ma*. Deploying Spatiotemporal Graph Neural Networks for Forecasting Building Operation Emissions at City-Scale: A Case Study in Seattle, USA. (Under Review, *Energy and Buildings*)
3. Chendi Yang, Hao Huang, Sian Meng, Yunjie Zhang, Jacqueline T. Y. Lo, Rui Ma*. A Typology-Driven Spatial Framework for Assessing Commercial Vitality at the Block Level: The Case of Shenzhen. (Under Review, *Land Use Policy*)
4. Qi Li, Rui Ma, Zhihao Ren, Jiayu Chen, Xiaowei Luo. Shadow-based optimization of facade retrofit strategies for energy efficiency in urban high-rise buildings. (Under Review, *Journal of Cleaner Production*)
5. Qi Li, Wei Wang, Rui Ma, Jiayu Chen, Xiaowei Luo. Integrating graphic building group height distribution grids to assess a city's microclimate with wind-direction-dependent deep transfer learning neural networks. (Under Review, *Building and Environment*)
6. Botao Zhang, Ziyi Dai, Rui Ma, Tieqiao Tang, Siuming Lo. What Determines a Step: Observations from Pedestrian Movement Evaluation at Intersections with Machine Learning Methods. (Under Review, *IEEE Transactions on Intelligent Transportation Systems*)
7. Hao Huang, Jin Yeu Tsou, Hao Zheng, Rui Ma, Haochen Shi, Botao Zhang. More than just slope: An interpretable machine learning approach for modeling nonlinear environmental effects on hiking performance. (Under Review, *Journal of Transport Geography*)
8. Yiqian Xu, Zhou Ren, Rui Ma, Sian Meng. The non-linear effects of weather conditions on public transit riders in major Chinese cities. (Under Review, *Transportation Research Part A: Policy and Practice*)

Journal Papers in Prep:

1. Rui Ma, Zicheng Fan, Filip Biljecki. Multi-view SVI Fusion for Automated 3D Building Façade Reconstruction.
2. Rui Ma, Hanmo Wang. Environment-Aware Spatio-Temporal Graph Neural Networks for City-Scale Building Emission Forecastin.

3. Rui Ma. From Street Facades to Carbon Footprints: Deep Learning and Ontology-based Urban Building Emission Modelling.
4. Hanmo Wang, Rui Ma*. Ontology-Driven Intelligence: LLM-Powered Agentic RAG for Analysis, Forecasting and Management of City-Scale Building Carbon.

Conference Papers:

1. Rui Ma, Chendi Yang, Xin Li. (2023). Enriching the Semantics of CityJSON Road Objects with OpenStreetMap. *GSCS & ICUI 2023*. Hong Kong SAR, China.
2. Chendi Yang, Rui Ma, Siu Ming Lo. (2023). Identifying the built environment factors for revitalizing the vitality of commercial districts. *GSCS & ICUI 2023*. Hong Kong SAR, China.
3. Rui Ma, Jiayu Chen, Chendi Yang, Xin Li. (2023). A Method for Semantic City Modeling. *CEAC 2023*. Kyoto, Japan. **(Honorable Mention)**
4. Chendi Yang, Siu Ming Lo, Rui Ma. (2023). Identifying the Influencing Factors for the Walkability of Business Streets Based on Urban Multi-source Data. *CEAC 2023*. Kyoto, Japan.
5. Rui Ma, Jiayu Chen, Xiaowei Luo. (2021). Simulating Urban Building Energy Dynamic with Inter-Building-Effects (Ibes) Linked Building Networks. *ACMR 2020*. Chongqing, China. **(Best Paper Award)**
6. Rui Ma, Jiayu Chen, Xiaowei Luo. (2020). Distributed Adjacent Block Modeling (DAB): A Rapid Urban Building Energy Dynamics Simulation with Urban Building Digital Model. *ASCE CRC 2020*. Tempe, USA.
7. Rui Ma, Chuanzhi Geng. (2019). Analysis of the Vibration Reduction Effect of the Floating Slab Track with Different Base Forms in a Small Radius Curve of Subway Lines. *CADP 2018*. Hefei, China.

Presentations

1. Semantic 3D City Modeling and City-scale Building Energy Modeling. *Jinan University*. Online. September 26, 2024.
2. Urban Building Energy Modeling. *Pecha Kucha presentation, MIT Senseable City Lab*. Online. July 31, 2024.
3. Reconstructing 3D Building Facade Openings with Street View Imagery. *ReLoD3 workshop jointly organized by the National University of Singapore and the Technical University of Munich*. Online. March 19, 2024.
4. Urban Building Energy Modeling. *NUS Urban Analytics Lab seminar*, Singapore. February 05, 2024.
5. OSMsc: a framework for semantic 3D city modeling using OpenStreetMap. *City University of Hong Kong - Chongqing University Exchange Conference on New Urban Infrastructure Construction and Practice*. Chongqing, China. December 15, 2023.

6. A Method for Semantic City Modeling. *The Global Smart Cities Summit cum The 3rd International Conference on Urban Informatics*. Hong Kong SAR, China. August 21, 2023.
7. Enriching the Semantics of CityJSON Road Objects with OpenStreetMap. *The 3rd International Civil Engineering and Architecture Conference*. Kyoto, Japan. March 18, 2023.

Services

Academic Journal Peer Review

- | | |
|--|-------------------------|
| • Sustainable Cities and Society | <i>Reviewed 4 times</i> |
| • Applied Energy | <i>Reviewed 2 times</i> |
| • Building and Environment | <i>Reviewed 5 times</i> |
| • Journal of Building Engineering | <i>Reviewed 6 times</i> |
| • Habitat International | <i>Reviewed 1 time</i> |
| • Scientific Data | <i>Reviewed 2 times</i> |
| • Scientific Reports | <i>Reviewed 2 times</i> |
| • International Journal of Digital Earth | <i>Reviewed 2 times</i> |
| • Environment and Planning B: Urban Analytics and City Science | <i>Reviewed 1 time</i> |
| • Journal of Cleaner Production | <i>Reviewed 1 time</i> |

Zhengzhou University Service

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| • Class Adviser | <i>2025</i> |
| • Innovation Competition Expert (CICSIC 2025) | <i>2025</i> |

City University of Hong Kong Service

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| • Course Invigilator | <i>2020 - 2023</i> |
| • Teaching Assistant | <i>2020 - 2023</i> |
| • Supervising Ms. Fan Yujun, M.S. in Urban Design and Regional Planning | <i>2021 - 2023</i> |

Tongji University Service

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| • Tongji University Graduate Student Union | <i>2017 - 2018</i> |
| • Volunteer for First World Innovation & Entrepreneurship EXPO | <i>2018</i> |
| • Volunteer for World Artificial Intelligence Autonomous Driving Championship | <i>2018</i> |
| • Volunteer for the 2017 World Autonomous Vehicle Ecosystem Conference | <i>2017</i> |

Inner Mongolia University Service

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| • Student Union of Department of Bridge Engineering | <i>2014 - 2015</i> |
| • Inner Mongolia University Student Union | <i>2013 - 2014</i> |

Professional Society Membership

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| • Hong Kong Institution of Science | <i>Since 2024</i> |
| • W3C Linked Building Data Community Group | <i>Since 2019</i> |

Scholarships & Awards

1. City University of Hong Kong Research Tuition Scholarship (HKD \$35,080). *2023*
2. City University of Hong Kong Research Tuition Scholarship (HKD \$42,096). *2021*
3. Postgraduate Studentship Fully Funded by Hong Kong Government (HKD \$823,968). *2020*
4. IBM Data Science Professional Certificate. *2020*
5. Best Paper Award in the 24th International Symposium on Advancement of Construction Management and Real Estate. *2019*
6. Tongji University Guanghua Scholarship (CNY ¥6,000). *2019*
7. Second Prize of the 15th China Graduate Mathematical Modelling Competition. *2018*
8. Outstanding Graduate of Inner Mongolia Autonomous Region. *2017*
9. Outstanding Graduate of Inner Mongolia University. *2017*
10. First Class Scholarship of Inner Mongolia University. *2017*
11. Outstanding Student of Inner Mongolia Autonomous Region. *2016*
12. Outstanding Student of Inner Mongolia University. *2015*

Travel Grants

1. CityU Research Activities Fund for visit to National University of Singapore, Singapore, SG (HKD \$45,000). *2024*
2. CityU Conference Grant for Global Smart Cities Summit (GSCS 2023) cum 3rd International Conference on Urban Informatics (ICUI 2023), Hong Kong SAR, CN (HKD \$10,000). *2023*
3. CityU Conference Grant for 3rd International Civil Engineering and Architecture Conference, Kyoto, JP (HKD \$10,000). *2020*

Technical Skills

Languages: Chinese (native), English (fluent).

Computer Skills: Python (PyTorch, TensorFlow, LangChain), JavaScript, Ruby, Hadoop, OpenStudio, EnergyPlus, Grasshopper, GeoSPARQL, QGIS, Mapbox, Protégé, Rhino, ANSYS, ABAQUS.

References

Xin Li

Associate Professor

Department of Architecture and
Civil Engineering, CityU

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Jiayu Chen

Associate Professor

School of Civil Engineering,
Tsinghua University

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Filip Biljecki

Assistant Professor

College of Design and Engineering,
National University of Singapore

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