Xinwei Zhuang

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RESEARCH EMPHASIS

Energy and Environment: Locale-specific performance-driven design; Building stock analysis; Urban building energy modeling; Energy conservation and projection; Ventilation and day lighting optimization

Computation: Machine learning; Data science; Network science; Computer vision; Computer graphics; Robotic fabrication

EDUCATION

Massachusetts Institute of Technology   Cambridge, United States
Exchange Scholar, Senseable City Lab, Department of Urban Studies + Planning   Sept 2024 − Present

University of California, Berkeley   Berkeley, United States
Ph.D. in Architecture **GPA: 3.95/4.00**   Aug 2020 − Present
  Dissertation prospectus: Performance-driven morphogenesis for urban neighborhood energy resilience

Bartlett School of Architecture, University College London   London, United Kingdom
M.S. in Architectural Computation **GPA: 70.5/100 (Distinction)**   Sept 2016 − Nov 2017
  Dissertation: Space frame optimization with spectral clustering algorithm

Edinburgh Napier University   Edinburgh, United Kingdom
B.S. in Civil Engineering **GPA: 79.7/100 (First Honor)**   Sept 2012 − May 2016
  Dissertation: Influence of Particle Loss on Soil Behaviour

EXPERIENCE

Lawrence Berkeley National Lab   Berkeley, United States
Research assistant   May 2022 − Present
  - Decarbonizing Energy through Collaborative Analysis Routes and Benefits
  - Multi-scale Energy Conservation Measurement (ECM) evaluation and projection for U.S. residential and commercial building sectors, provide policy insight for ECMs and regulations

Robotic Plus   Shanghai, China
Software developer   March 2020 − July 2020

Architecture Studio   Shanghai, China
Architectural designer   Aug 2018 − Mar 2020

China Shanghai Architectural Design & Research Institute Co. Ltd   Shanghai, China
Research assistant   Nov 2017 − Aug 2018
  - Energy consumption control and optimization for commercial buildings with neural network, a part of 13th national 5-year project

INVITED TALK

July 2023   Regional evolution on urban modeling and narrative with reinforcement learning
                 The 3rd computational art & tech workshop organized by DigitalFutures
June 2023   Performance-driven architectural design with deep learning
                 Invited talk at 33rd Young Scholar Forum, Nanjing University, China
May 2023   ZNE house case study and machine learning for building morphology analysis
                 Invited talk at Center for the Built Environment (CBE), USA
Oct. 2022   Data-driven design: Machine learning and its application in architecture
                 Guest lecture at New York Institute of Technology (NYIT), USA

Awards

2024   Advance Humanity through Science: $10k graduate student research grant
         Lau Just Climate Futures: $35k research grant
2023   Eric T. Andresen Memorial Scholarship (ASHRAE): Research in energy conservation
2021   Golden Gate Chapter Scholarship (ASHRAE): Research contributing to the energy sector
2017   Alistair Turner Prize (Bartlett School of Architecture): Best master's dissertation
2016   Shanghai Distinct Graduate Award (Shanghai Municipal Education Commission)
2015   Edinburgh Napier Scholarship (Edinburgh Napier University)

Pbulication

* equal contribution

1. **Zhuang X.***, Huang Z.*, Zeng W., and Caldas L. (2023) MARL: Multi-scale Archetype Representation Learning for Urban Building Energy Modeling, workshop on Computer Vision Aided Architectural Design (CVAAD), at *International Conference on Computer Vision (ICCV)*, Paris, France. DOI: 10.1109/ICCVW60793.2023.00171

2. **Zhuang X.***, Huang Z.*, Zeng W., and Caldas L. (2023) Encoding Urban Ecologies: Automated Building Archetype Generation through Self-Supervised Learning for Energy Modeling, in *2023 Conference on Association for Computer Aided Design in Architecture (ACADIA)*, Denver, United States of America. [paper]

3. **Zhuang X.**, Luo, N., Hong T. and Koenig, M. (2023) What can we learn from Honda Smart Home with high-resolution monitored performance data: A zero-net energy home in California, in *18th International IBPSA Conference and Exhibition* In Shanghai, China. DOI: 10.26868/25222708.2023.1315

4. Li F.* and **Zhuang X.*** (2023) Evaluating an Auto Decoder-based Generative Model for the Infomorphism Urban Planning Framework, in *18th International IBPSA Conference and Exhibition* In Shanghai, China. DOI: 10.26868/25222708.2023.1393

5. **Zhuang X.**, Ju Y., Yang A. and Caldas L. (2023) Synthesis and Generation for 3D Architecture Volume with Generative Modeling, in *International Journal of Architectural Computing*, Vol. 21, Issue 2: AI, Architecture, Accessibility, & Data Justice. DOI: 10.1177/14780771231168233

6. **Zhuang X.** (2022) Rendering sketches: Interactive rendering generation from sketches using conditional generative adversarial neural network, in *40th Education and research in Computer Aided Architectural Design in Europe (eCAADe).* In Brussels, Belgium
papers.cumincad.org/cgi-bin/works/paper/ecaade2022_273

7. **Zhuang X.** and Caldas L. (2022) Prediction of Ventilation Performance in Urban Area with CFD Simulation and Conditional Generative Adversarial Networks, in *5th International Conference on Building Energy and Environment (COBEE).* In Montreal, Canada DOI: 10.1007/978-981-19-9822-5_15

8. **Zhuang X.** and Hanna S. (2020) Space Frame Optimisation with Spectral Clustering, *International Journal of Machine Learning and Computing* vol. 10, no. 4, pp. 507-512. DOI: 10.18178/ijmlc.2020.10.4.965