

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

University of California, Berkeley Berkeley, United States
Ph.D. in Architecture **GPA: 3.95/4.00** Aug 2020 – May 2025 (exp.)

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

Shanghai Normal University Shanghai, China
B.S. in Civil Engineering **GPA: 3.69/4.0** Sept 2012 – May 2016

EXPERIENCE

Lawrence Berkeley National Lab Berkeley, United States
Research assistant May 2022 – Present

- Spatial and temporal anthropocentric heat emission analysis for Los Angeles county
- Multi-scale Energy Conservation Measurement (ECM) evaluation and projection for U.S. residential and commercial building sectors, provide policy insight for ECMs and regulations
- Case study on Home Energy Management System (HEMS) for evaluating net zero energy capacity, grid independence, and climate resilience

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

- 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)

PUBLICATION

* 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](https://doi.org/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.
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.
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](https://doi.org/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 [[paper](#)]
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](https://doi.org/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](https://doi.org/10.18178/ijmlc.2020.10.4.965)