# Xia CHEN
Research Associate

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Linkedin|Website

Proficient in predictive modeling, data-based value proposition, AI for science, advanced machine assistance in human-computer interaction, uncertainty analysis, and causal inference for sustainable decision-making support.

## Research & Work Experience

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| 2024/01 - 2024/06 | **Visiting Scholar, Center for the Built Environment, University of California, Berkeley** |

- Investigating how AI/ML embedded with causal inference benefits engineering domains.
- Advanced causal inference tool development for factor analysis.
- Machine assistance framework collaboration with industrial partners.

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| 2020/07 - Current *(Anticipated graduation: 09.2024)* | **Ph.D. Candidate, Technical University Berlin/Leibniz Hannover University, Germany** |

- Dissertation: *'Beyond Predictions - Alignment between Prior Knowledge and Machine Learning for Human-Centric Augmented Intelligence'*; Supervised by Prof. Dr.-Ing. Philipp Geyer.
- Led in Research Projects: German Research Foundation (DFG), FOR 2363 (2020-2023); German Federal Ministry of Education, AI for Science, HyThroughGen (2023).

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| 10/2017 - 12/2019 | **Research Assistant, FCN institute of E.ON Energy Research Center, Aachen, Germany** |

- Renewable energy time-series analysis within different EU sectors & predictive algorithm development.
- Economic analysis of German Energy Transition Innovation projects.
- Full-stack development for projects: *'Virtual Energy System Laboratory'* and *'Junior Professorship for Energy Resource and Innovation Economics'* (JERI).

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| 11/2016 - Current | **Co-founder, Joinergy Co. Ltd. (Jiaonengwang)**, **Shanghai, PR China** |

- Specialized in AI solutions and data-driven consulting within the energy digitalization and power market, and sustainability domains.
- Received funding from: Technology Entrepreneurship Foundation for Graduates (EFG), Shanghai, 2019; Tongji Eagles Foundation, Business Incubator of Tongji University Science Park, Tongji University, Shanghai, 2019; Talent Start-up Leadership Program, Suzhou, 2019.

## Education

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| 10/2015 - 12/2018 | **RWTH Aachen University, Aachen, Germany** |

- Master of Science in Sustainable Energy Supply Technology

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| 09/2014 - 09/2015 | **Beuth Hochschule für Technik Berlin, Berlin, Germany** |

- Bachelor of Engineering in Building Engineering Technology, (Dual Bachelor Program)

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| 09/2011 - 09/2015 | **Tongji University, Shanghai, PR China** |

- Bachelor of Engineering in Building Facility Intelligence Technology, Faculty of Chinese-German University of Applied Sciences (CDHAW)

## Technical Competency

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| 02/2021 | • Top 5% in *M5 (Makridakis Competitions) time-series forecasting competition*, Kaggle. |
| 07/2021 | • *AutoML Open Challenge: Artificial Intelligence Dependability Assessment (AI-DA)*, Siemens, Berlin, Germany. |
| | • Finalist of *Siemens 'Hello Future' innovation challenge 2021*, Digitally-enabled Applications for Smart Districts, Berlin, Germany. |

## Technical Skills

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| Programming & Deployment | • Expertise in Python and R with knowledge of mainstream frameworks in Data Science, Machine Learning, and Deep Learning (Pytorch); Knowledge of different systems (Windows, Linux), servers (Google Colaboratory, Amazon AWS), and environments. |
| Development/ Software | • Full-stack development: HTML with JavaScript and CSS, Vue, PHP, Python (Django); Autodesk suite, knowledge in Revit, AutoCAD; Sketchup, EnergyPlus; Citavi, LaTeX; Adobe suite |

## Publications

### Working on

- Chen. X, Sun, R, Schiavon, S. & Geyer, P., Beyond traditional statistic: uncovering deeper insights of survey data with causal inference.

### Peer-reviewed Articles in International Journals or Open-source Platforms

- Chen, X., Rex, A., Woelke, J., Eckert, C., Bensmann, B., Hanke-Rauschenbach, R., & Geyer, P. (2024). Machine learning in proton exchange membrane water electrolysis — A knowledge-integrated framework. *Applied Energy*, 371, 123550.

- Chen, X., Singh, M.M. & Geyer, P., (2024). Utilizing domain knowledge: robust machine learning for building energy performance prediction with small, inconsistent datasets. *Knowledge-Based Systems*, p.111774.

- Chen, X., Teng, X., Chen, H., Pan, Y., & Geyer, P. (2024). Toward reliable signals decoding for electroencephalogram: A benchmark study to EEGNeX. *Biomedical Signal Processing and Control*, 87, 105475.

- Chen, X., Sun, R., Saluz, U., Schiavon, S., & Geyer, P. (2023). Using causal inference to avoid fallouts in data-driven parametric analysis: A case study in the architecture, engineering, and construction industry. *Developments in the Built Environment*, 100296.

- Chen, X., Abualdenien, J., Singh, M. M., Borrmann, A., & Geyer, P. (2022). Introducing causal inference in the energy-efficient building design process. *Energy and Buildings*, *277*, 112583.

- Chen, X., & Geyer, P. (2022). Machine assistance in energy-efficient building design: A predictive framework toward dynamic interaction with human decision-making under uncertainty. *Applied Energy*, *307*, 118240.

- Chen, X., Guo, T., Kriegel, M., & Geyer, P. (2022). A hybrid-model forecasting framework for reducing the building energy performance gap. *Advanced Engineering Informatics*, *52*, 101627.

- Chen X., Zhang Y., & Cai X. (2022). Frontiers of carbon neutrality in EU-German building sector, *Heating Ventilating & Air Conditioning*, TU-023; X322.

- Zong, C., Chen, X., Fatma, D., Johannes, S., Geyer, P., & Werner, L. (2023). A holistic two-stage decision-making methodology of passive and active building design strategies under uncertainty. *Building and Environment*, 111211.

- Geyer, P., Singh, M. M., & Chen, X. (2021). Explainable AI for engineering design: A unified approach of systems engineering and component-based deep learning. *arXiv preprint arXiv:2108.13836*.

### Peer-reviewed Articles in Conference Proceedings

- Chen, X., & Geyer, P. (2023). Sustainability recommendation system for building design alternatives under multi-objective scenarios. In 30th International Workshop on Intelligent Computing in Engineering, EG-ICE 2023, London, UK.

- Chen, X., & Geyer, P. (2023). Pathway toward prior knowledge-integrated machine learning in engineering. In 18th International IBPSA conference and Exhibition, Building Simulation 2023, Shanghai, China.

- Guo, T., Chen, X., Geyer, P., & Kregel, M. (2023). Performance investigation of different topology organizations in district heating systems with component-based machine learning. In 18th International IBPSA conference and Exhibition, Building Simulation 2023, Shanghai, China.

- Wang, S., Chen, X., & Geyer, P. (2023). Feasibility Analysis of POD and Deep-autoencoder for Indoor Environment CFD Prediction. In 18th International IBPSA conference and Exhibition, Building Simulation 2023, Shanghai, China.

- Chen X., Cai X., Kümpel A., Müller D., & Geyer P., (2022). Dynamic Feedforward Strategy Development for Building Heating System based on AI Forecasting and Simulation. In Passive and Low Energy Architecture, PLEA 2022, Santiago de Chile, Chile.

- Chen X., Saluz U., Staudt J., Margesin M., Lang W., & Geyer P. (2022). Integrated data-driven and knowledge-based performance evaluation for machine assistance in building design decision support, In 29th International Workshop on Intelligent Computing in Engineering, EG-ICE 2022. Aarhus, Denmark.

- Chen, X., Guo, T., & Geyer, P. (2021). A hybrid-model forecasting framework for reducing the building energy performance gap. In 28th International Workshop on Intelligent Computing in Engineering, EG-ICE 2021. Berlin, Germany, 2021, special issue on Advanced Engineering Informatics.

- Chen, X., Singh, M.M. & Geyer, P. (2021). Component-based machine learning for predicting representative time-series of energy performance in building design. In 28th International Workshop on Intelligent Computing in Engineering, EG-ICE 2021. Berlin, Germany.

**Patent**

- Device and method for predicting power consumer demand based on weight, CN 202011575395.X · Issued Dec 28, 2020.
- Automatic selection system and method for time series data prediction, CN 201911374036.5 · Issued Dec 27, 2019.

## Teaching Experience

- 2023 Summer (LUH): Co-teaching 'Data Sciences for Design and Engineering', M.S. Lecture, Guest Lecturer 'Data Science and Simulation', B.A. Lecture.
- 2022 Winter (LUH): Co-teach 'Data Sciences for Design and Engineering', M.S. Lecture.
- 2022 Sommer (LUH): Teaching assistant for 'Data Sciences for Design and Engineering', M.S. Lecture.
- 2021 Winter (TUB): Teach 'Data Sciences for Energy-Efficient Design'. M.S./B.A. Lecture.
- 2021 Sommer (TUB): Teaching assistant for 'Data Sciences for Energy-Efficient Design', M.S./B.A. Lecture.

## Invited Talks and Interviews

- "Pathway toward Prior Knowledge-Integrated Machine Learning in Engineering", *Intelligent reconstruction of multiphysical fields, DigitalFUTURES workshop, Tongji University, Shanghai, China,* 2024.
- "Enhancing Plausibility in Parametric Analysis: Causal Inference for Augmented Decision-Making - Insights from Architecture, Engineering, and Construct", *Indoor Air, Honolulu, USA,* 2024.
- "Knowledge-integrated Machine Learning in Building Engineering", *WELL Seminar, Center for the Built Environment, University of California, Berkeley, USA,* 2024.
- "Knowledge Base and Machine-Learning Assistance for Performance-oriented Building", *Toward Habitable Future Lecture, Faculty of Architecture and Landscape, Leibniz University Hannover, Germany,* 2022.
- "Introducing Causal Inference in the Energy-Efficient Building Design Process", *WELL Seminar, Center for the Built Environment, University of California, Berkeley, USA,* 2022.
- "Causal Inference as a Method to Aid the Process of Sustainable Building Design", *Community workshop on causal tools, Microsoft,* 2021.

## Academic Services

- **Journal Reviewer:** Advanced Engineering Informatics (ADVEI), Energy and Buildings (ENB), Structures (STRUCTURES).
- **Conference Reviewer:** IBPSA, BS 2023(International IBPSA conference and Exhibition, Building Simulation), EG-ICE 2021/22/23 (International Workshop on Intelligent Computing in Engineering), PLEA 2022 (Passive and Low Energy Architecture).
- **Scientific Committee Member:** International Workshop on Intelligent Computing in Engineering (EG-ICE).

Berlin, June. 21. 2024