

Xia CHEN

Research Associate

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

Research & Work Experience

- 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.
- 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 German Research Foundation (DFG) project FOR 2363 (2020-2023); German Federal Ministry of Education project AI for Science, HyThroughGen (2023).
 - Lecturer for the courses: '*Data Sciences for Energy-Efficient Design*' (TUB) and '*Data Sciences for Design and Engineering*' (LUH).
- 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).
- 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

- 10/2015 - 12/2018 **RWTH Aachen University, Aachen, Germany**
- Master of Science in Sustainable Energy Supply Technology
- 09/2014 - 09/2015 **Beuth Hochschule für Technik Berlin, Berlin, Germany**
- Bachelor of Engineering in Building Engineering Technology, (Dual Bachelor Program)
- 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

- 02/2021 • Top 5% in *M5 (Makridakis Competitions) time-series forecasting competition*, Kaggle.
- 07/2021 • Finalist of *Siemens 'Hello Future' innovation challenge 2021*, Digitally-enabled Applications for Smart Districts, Berlin, Germany.

Technical Skills

- 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.

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*
- “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.*

Berlin, June. 21. 2024