

# YINSHUANG XIAO

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## EDUCATION

- **Ph.D. in Mechanical Engineering** Expected May 2024  
*The University of Texas at Austin* Austin, TX, USA
- **Master of Science in Mechanical Engineering** Jun. 2018  
*University of Electronic Science and Technology of China* Chengdu, China
- **Bachelor of Science in Mechanical Engineering** Jun. 2014  
*University of Electronic Science and Technology of China* Chengdu, China

## PROFESSIONAL DEVELOPMENT

- **Data Scientist Intern** Jun. 2023 - Present  
*Ford Motor Company* Remote
- **Graduate Research Assistant** Aug. 2021 - Present  
*The University of Texas at Austin* Austin, TX, USA
- **Graduate Research Assistant** Aug. 2019 - Jul. 2021  
*The University of Arkansas* Fayetteville, AR, USA
- **New Energy Vehicles R&D Engineer** Aug. 2018 - Aug. 2019  
*Shanghai Volkswagen Automotive* Shanghai, China

## PUBLICATIONS

### Journal Articles

- [1] **Y. Xiao**, Y. Cui, W. Chen, J. Koskinen, N. Contractor, Z. Sha, "Network-Based Complex System Engineering Optimization Design With Considering Local Dependencies," *Journal of Mechanical Design*. In preparation.
- [2] Y. Cui, Z. Sun, **Y. Xiao**, Z. Sha, J. Koskinen, N. Contractor, W. Chen, "Network-Based Analysis of Heterogeneous Customer Preferences in Consideration-then-Choice Decision-Making with Market Segmentation," *Journal of Marketing*. In Review.
- [3] **Y. Xiao**, Y. Cui, N. Raut, J. Januar, J. Koskinen, N. Contractor, W. Chen, Z. Sha, "Survey Data on Customer Two-Stage Decision-Making Process in Household Vacuum Cleaner Market," *Data in Brief*. In review.
- [4] **Y. Xiao**, F. Ahmed, Z. Sha, "Graph Neural network-based design decision support for shared mobility systems," *Journal of Mechanical Design*, volume 145, issue 9, pp: 091703 (13), 2023.
- [5] Z. Sha, Y. Cui, **Y. Xiao**, A. B. Stathopoulos, N. Contractor, Y. Fu, W. Chen, "A Network-Based Discrete Choice Model for Decision-Based Design," *Design Science*, 9, E7, 2023.
- [6] **Y. Xiao**, Z. Sha, "Robust Design of Complex Socio-Technical Systems against Seasonal Effects: A Network Motif-Based Approach," *Design Science*, 8, E2, 2022.
- [7] **Y. Xiao**, D. Ren, P. Xiao, P. Du, "An Equivalent Modeling Method for the Radiated Electromagnetic Interference of PCB Based on Near-field Scanning," *Applied Computational Electromagnetics Society Journal*, 34(5), 2019.

### Refereed Conference Papers

- [8] B. Thongmak, **Y. Xiao**, A. Layton, Z. Sha, "From Plant-Pollinator to Product-Customer: Bio-Inspired Network Modularity Analysis in Design for Market Systems," *The 21st Annual Conference on Systems Engineering Research (CSER 2024)*, Tucson, Arizona, Mar 25-27, 2024. In review.
- [9] B. Thongmak, **Y. Xiao**, P. Gavino, M. Zhang, Z. Sha, "Geospatial Network Analysis of US Megaregions in 40 Years," *The 57th Hawaii International Conference on System Science (HICSS)*, Maui, HI, Jan. 3-6, 2024. Accepted.
- [10] P. Gavino, **Y. Xiao**, Y. Cui, W. Chen, Z. Sha, "Evolutionary Co-Mention Network Analysis via Social Media Mining," *ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, Boston, MA, Aug. 20-23, 2023.
- [11] **Y. Xiao**, Y. Cui, M. Cardone, W. Chen, Z. Sha, "Product Competition Analysis for Engineering Design: A Network Mining Approach," *The 20th Annual Conference on Systems Engineering Research (CSER 2023)*, Hoboken, New Jersey, Mar 16-17, 2023.
- [12] Y. Cui, **Y. Xiao**, Z. Sha, W. Chen, "Network-Based Analysis of Heterogeneous Consideration-then Choice Customer Preferences with Market Segmentations," *The 20th Annual Conference on Systems Engineering Research (CSER 2023)*, Hoboken, New Jersey, Mar 16-17, 2023.
- [13] **Y. Xiao**, F. Ahmed, Z. Sha, "Travel Links Prediction In Shared Mobility Networks Using Graph Neural Network Models," *ASME 2022 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, St. Louis, Missouri, Aug. 14-17, 2022.

- [14] **Y. Xiao**, Y. Cui, N. Raut, J. H. Januar, J. Koskinen, N. Contractor, W. Chen, Z. Sha, "Information Retrieval and Survey Design For Two-Stage Customer Preference Modeling," *The 17th International Design Conference*, Cavtat, Croatia, May 23-26, 2022.
- [15] **Y. Xiao**, Z. Sha, "Towards Engineering Complex Sociotechnical Systems Using Network Motifs: A Case Study on Bike-Sharing Systems," *ASME 2020 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, Virtual, Online, Aug 17-19, 2020.

### Conference Abstracts and Posters

- [16] M. Zhang, B. Thongmak, **Y. Xiao**, P. Gavino, Z. Sha, L. Zhao "Explore U.S. Megaregion Dynamics from a Network Science Perspective," *The 1st International Conference on Urban Science and Sustainability*, Xiamen, China, Dec. 14-18, 2023. *Accepted*.
- [17] **Y. Xiao**, Y. Cui, W. Chen, N. Contractor, J. Koskinen, Z. Sha, "Design for Market Systems with Network-Based Product Competition Analysis," *9th International Engineering Systems Symposium: CESUN 2023*, Evanston, Illinois, Nov 6-7, 2023.
- [18] **Y. Xiao**, Z. Sha, "Socio-Technical Systems Engineering and Design: A Meso-Level Network-Based Approach," DTM Student Poster Competition, *ASME 2022 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, St. Louis, Missouri, Aug. 14-17, 2022. (**Won the Trave Award**).
- [19] **Y. Xiao**, Y. Cui, W. Chen, J. Koskinen, N. Contractor, Z. Sha, "A Network-Based Approach to Modeling Product Co-consideration and Choice Relations," *Sunbelt 2022 – The XLII International Sunbelt Social Networks Conference*, Cairns, Australia, Jul 12-16, 2022.
- [20] Y. Cui, **Y. Xiao**, Z. Sha, N. Contractor, J. Koskinen, W. Chen, "Network-based Customer Preference Modeling," *Sunbelt 2022 – The XLII International Sunbelt Social Networks Conference*, Cairns, Australia, Jul 12-16, 2022.
- [21] **Y. Xiao**, Z. Sha, "Robust Design of Complex Socio-Technical Systems using Complex Networks," CIE Graduate Research Poster Competition, *ASME 2021 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, Virtual, Online, Aug 17-19, 2021. (**Won the Trave Award**).
- [22] **Y. Xiao**, Z. Sha, "A Network Motifs-Based Approach to Improving Robustness of Complex Socio-Technical Systems Against Seasonal Effects," *Networks 2021: A Joint Sunbelt and NetSci Conference*, Virtual, Online, Jul. 6-11, 2021. Extended Abstract and Oral Presentation.

### MS Thesis

**Y. Xiao**, "An Equivalent Modeling Method for the Electromagnetic Radiation of PCB Based on Near-Field Scanning," presented to the faculty of The School of Mechanical and Electrical Engineering, June 2018, University of Electronic Science and Technology of China, Sichuan, China.

### AWARDS

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|---|-----------|
| • <b>ASME IDETC-CIE, Student Hackathon — First Place</b>  | Aug. 2022 |
| Awarded by ASME Computer and Information in Engineering Division, <i>Award amount: \$1300</i> .                                 |           |
| • <b>ASME IDETC-CIE, DTM PhD Student Poster Session — Travel Award</b>  | Aug. 2022 |
| Awarded by ASME Design Engineering Division, <i>Award amount: \$1000</i> .<br>(Only the <b>top ten</b> abstracts were selected) |           |
| • <b>ASME IDETC-CIE, 2021 Graduate Research Poster Session — Travel Award</b>   | Aug. 2021 |
| Awarded by ASME Computer and Information in Engineering Division, <i>Award amount: \$200</i> .                                  |           |
| • <b>ASME IDETC-CIE, Student Hackathon — Third Place</b>  | Aug. 2021 |
| Awarded by ASME Computer and Information in Engineering Division, <i>Award amount: \$500</i> .                                  |           |
| • <b>ASME IMECE, Student Hackathon — Third Place</b>  | Nov. 2020 |
| Awarded by ASME Computer and Information in Engineering Division, <i>Award amount: \$500</i> .                                  |           |

### PROJECTS

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|---|---------------------|
| <b>Network-Based Approach to Customer Preference Modeling</b>   | Apr. 2020 - Present |
| <ul style="list-style-type: none"> <li>- Developed an exponential random graph model (ERGM)-based approach for new car buyer choice prediction.</li> <li>- Developed a systematic approach that combines information retrieval and survey design in support of data collection for EV and non-EV buyer preference modeling.</li> <li>- Formulated a network representation of the vehicle market system and conducted a comparative analysis of the network topology between EV-associated and non-EV-associated sub-networks.</li> <li>- Developed a network-based product optimization design framework with considering local-level market competition relationships to enhance EV competitiveness.</li> </ul> |                     |

<b>Electric Vehicle (EV) Charging Infrastructure Optimization for Future Demand</b>	Feb. 2022 - May. 2022
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- Developed a geographic charging demand estimation model by considering zone-based social attributes including population density, traffic flow, and point of interest.
- Taking the demand estimation model as an input, developed an optimization model for determining the ideal locations and capacities of charging stations in Austin.

#### **Link Prediction for Shared Mobility Networks**

Mar. 2021 - Sep. 2022

- Developed a graph neural network (GNN) based link prediction model to support shared mobility system engineering and design.

#### **Robust Design against Seasonal Effect in Socio-Technical Systems (STS)**

Mar. 2020 - Jan. 2021

- Analyzed and quantified STS seasonal robustness based on network motif theory.
- Developed a design approach to supporting the STS capacity planning decision-making to improve the system robustness against seasonal changes.

#### **Bike-Sharing System (BSS) Analysis based on Network Motif Theory**

Oct. 2019 - Feb. 2020

- Developed global-level trip networks, identified significant trip motif structures based on the network motif theory, and analyzed global-level and local-level trip features.
- Evaluated the coherence and variance between global-level and local-level trip networks.

### **TEACHING AND MENTORING**

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#### **Guest Lecturer**

Fall. 2022

- Course: ME 397 Data-Driven Design And Decision-Making In Complex Systems (Walker Department of Mechanical Engineering, UT Austin)
- Conducted engaging guest lectures on deep learning applications within the realm of complex socio-technical system engineering and design for ME 397.
- Developed supplemental materials and resources to enhance student understanding.
- Received positive feedback from students for clarity and effectiveness of presentations.

#### **Undergraduate Mentor**

Jun. 2021 - Aug. 2023

- Project: A Hierarchical Multidimensional Network-based Approach for Multi-Competitor Product Design (Collaborative Project Between UT Austin & Northwestern)
- Mentored undergraduate students in the REU program, guiding them through independent research projects focused on market system data collection and competition relationship extraction.
- Supervised undergraduate students from both UT Austin and Northwestern in year-long or semester-long research endeavors pertaining to network-based market system engineering and design, providing assistance in research proposal development, experimental design, and data analysis.
- Coordinated regular meetings to track progress and provide constructive feedback, contributing to successful project outcomes.
- Facilitated collaborative opportunities for undergraduate mentees in the preparation and presentation of conference papers for publication, with one mentee showcasing our work at the 2023 IDETC conference.

#### **Freshman Mentor**

Jun. 2012 - Aug. 2013

- Program: Freshman Mentorship Program at the University of Electronic Science and Technology of China
- Appointed as a freshman mentor, ranking in the **top 3%** for overall quality, to guide approximately 30 Mechanical Engineering freshmen in their transition to university life and academic studies.
- The major responsibilities include: organizing orientation events, coordinating regular learning activities like seminars and panel discussions, and offering academic guidance to students requiring assistance, etc.

### **CONTRIBUTION TO FUNDED RESEARCH**

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#### **A Multidimensional Network-Based Approach to Modeling Urban Growth in U.S. Megaregions (*In Review*)**

Mar. 2024 - Mar. 2025

- Funded By: The University of Texas at Austin Bold Inquiry Incubator Seed Fund
- Principal Investigator: Zhenghui Sha
- Amount: \$15,000
- Role: Developed preliminary draft of the proposal.

#### **INTERN DCL: Attribute Recommendation for Future Vehicles: A Network-Based Cost-Optimal Predictive Model**

Jun. 2023 - Dec. 2023

- Funded By: National Science Foundation
- Principal Investigator: Zhenghui Sha
- Company Host: Ford Motor Company
- Amount: \$50,000
- Role: Developed preliminary draft of the proposal.

#### **A Multidimensional Network-Based Approach to Modeling Urban Growth in Texas Triangle Megaregion**

Jan. 2023 - Aug. 2023

- Funded By: Department of Transportation via the Center for Cooperative Mobility for Competitive Megaregions (CM2)
- Principal Investigator: Zhenghui Sha
- Amount: \$55,161
- Role: Developed preliminary draft of the proposal.

#### **REU Supplement: A Hierarchical Multidimensional Network-based Approach for Multi-Competitor Product Design**

Jun. 2022 - May. 2023

- Funded By: National Science Foundation
- Principal Investigator: Zhenghui Sha
- Amount: \$16,000
- Role: Developed draft of the proposal and foundational technology, and provided preliminary data.

#### **SKILLS**

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- **Languages:** Python, R, MATLAB
- **Frameworks:** Scikit, TensorFlow, Keras, Seaborn, NetworkX, StellarGraph, ergm, igraph
- **Tools:** Gephi, ArcGIS

#### **SERVICE AND PROFESSIONAL MEMBERSHIP**

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- Volunteer of 9th International Engineering Systems Symposium: CESUN 2023
- Assistant reviewer for academic papers and research project reports.
- Lab tour volunteer for department visiting students
- ASME Student Member