Binyang Song

Assistant Professor| Industrial and Systems Engineering | Virginia Tech
binyangs@vt.edu | Google Scholar | LinkedIn | ResearchGate

Educational Background

Singapore University of Technology and Design, Singapore
Ph.D. Engineering Product Development Sep 2014 - Aug 2019
Advisor: Prof. Jianxi Luo

University of California, Berkeley, CA, U.S.
Exchange Student, Mechanical Engineering Feb 2018 - Aug 2018
Advisor: Prof. Alice Agogino

Tsinghua University, Beijing, China
M.S., Automotive Engineering Aug 2011 - Jul 2014
Advisor: Prof. Weilin Zhuge
B.S., Automotive Engineering Aug 2007 - Jul 2011

Research Interests

Machine learning for engineering design and human-AI hybrid teaming: machine learning, multimodal learning, generative modeling, deep neural networks, network analysis and graph theory, data analytics, hybrid teaming, natural language processing, information retrieval, design representation, complex systems.

Research Experience

Assistant Professor
Representation of 3D shapes for efficient and effective machine learning Aug 2023 – Present
Industrial and Systems Engineering, *Virginia Tech*

- Creating an effective representation of 3D shapes in CAD formats (e.g., obj, stl) that exhibits high data efficiency and informativeness for various machine learning tasks

Generative design for manufacturing using diffusion models Aug 2023 – Present
Industrial and Systems Engineering, *Virginia Tech*

- Developing different generative models using different representations to design fuel cells using diffusion models

Postdoctoral Researcher (Mechanical Engineering, *Massachusetts Institute of Technology*)
Multimodal learning for conceptual design and optimization (Sponsored by Toyota Research Institute)
Mar 2021 – Present

- Developed multimodal learning models that take text as input to generate 3D meshes of cars to facilitate car body conceptual design.
- Optimized car performance, such as aerodynamics, by integrating performance evaluation in the multimodal learning model.

Multimodal learning for design performance prediction and novelty evaluation Sep 2021 – Aug 2023

- Assessed machine learnability of different design representations (e.g., images and graphs) using convolutional neural networks and graph convolutional networks for performance prediction.
- Developed a deep learning model for evaluating novelty of design concepts that are represented using texts, images, and 3-dimensional computer aided design (CAD) models.

Natural language processing to accelerate evidence gathering for governmental decision making (Sponsored by USAID) Sep 2021 – Sep 2022

- Developed text classification models to prioritize papers that are relevant to a specified international development scope, such as Agriculture, Resilience, and Nutrition.
- Studied information fusion methods to utilize information of multiple screening criteria to improve models' classification performance.

Postdoctoral Researcher (Engineering Design, *The Pennsylvania State University*)

Human-artificial intelligence (AI) hybrid teaming (Sponsored by DARPA) Sep 2019 - Aug 2021

- Proposed and demonstrated five platform attributes for supporting human-AI hybrid teaming studies through an unmanned aerial vehicle (UAV) design research platform.
- Answered how and why human-AI hybrid teaming reshapes the behavior and performance of human individuals and teams during solving complex engineering systems through large human-subject experiments.

Graduate Researcher (Engineering Product Development, *Singapore University of Technology and Design*)

Data-driven design using network analysis on patent data (Sponsored by Singapore MOE) Sep 2014 - Aug 2019

- Developed a patent search method to locate a design domain. The method integrates keyword search, citation network search, and co-inventor network search to achieve a more comprehensive set of patents relevant to the design domain.
- Proposed a data-driven product platform design method to utilize design knowledge within the design domain. The method utilizes core-periphery structures in product function co-occurrence networks to identify common product platform functions.
- Studied the knowledge base expansion mechanism of a design agent and developed a data-driven method to identify promising technologies from the near field of a design domain using overlay networks.
- Proposed a data-driven methodology to guide design stimuli search from the entire patent database using community detection within patent networks.

Graduate Researcher (State Key Laboratory of Automotive Safety and Energy, *Tsinghua University*)

Waste heat recovery from internal combustion engines (China National Research Program) Feb 2011 - Sep 2014

- Configured and compared three Brayton cycle waste heat recovery systems for turbocharged diesel engines.
- Studied the influence of the parameters of the power turbine on the performance of the turbocharged engines.
- The waste heat recovery system reduced fuel consumption in the whole speed range and achieved the highest reduction rate of 8.6%.

Awards

Publication-related

- Paper of Distinction, 2023 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE): "Surrogate Modeling of Car Drag Coefficient with Depth and Normal Renderings"
- Paper of Distinction, 2023 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE): "ADVISE: AI-accelerated Design of Evidence Synthesis for Global Development"
- Reviewers' Favorite, 2021 International Conference on Engineering Design: "The Effects of Artificial Intelligence Agents on Team Communication During Solving an Interdisciplinary Drone Design Problem"

Grants

- National Science Foundation (NSF): SCH: Clinical Adaptive Performance Enhancement Through Human-AI Teaming (CAPE-HAT), USD 659,809 (Co-PI, Submitted, Under Review)
- Land Rover (UK): AI-driven Design and Optimization of Vehicle Suspension Knuckles, ~USD 100,000 (PI, Paper Work in Progress)
- SUTD-MIT International Design Center Grant - IDG31500101 (Co-PI)**:** Patent technology network analysis for innovative concept generation in rolling robot (re-)design, SGD 11,760. (2015 - 2016)
- SUTD-MIT International Design Center Grant - IDG11500101 (Co-PI): Vehicle Model Prototyping and Fabrication for F1 in Schools World Finals, SGD 6,000. (2015 - 2015)

Fellowships

- 2017-2018 Singapore University of Technology and Design Graduate Research Competition Prize
- 2012-2013 China's National Scholarship for Graduate Students
- 2011-2012 Tsinghua University Guanghua Prize scholarship, Department of Automotive Engineering Individual Scholarship of Social Work
- 2010-2011 Tsinghua University Individual Scholarship of Social Work, Tsinghua University Prize for Students Research Training Outstanding Program
- 2009-2010 Tsinghua University Individual Scholarship of Social Work, Tsinghua University Scholarship of Academic Excellence
- 2008-2009 Tsinghua University Guanghua Prize scholarship, 2nd Prize for Beijing College Students Physics Competition
- 2007-2008 Tsinghua University Scholarship of Academic Excellence

Peer-Reviewed Journal Publications

1. Binyang Song, Chenyang Yuan, Frank Permenter, Nikos Arechiga, Faez Ahmed. Data-driven Car Drag Coefficient Prediction with Depth and Normal Renderings. *Journal of Mechanical Design*. (Under review)
2. Binyang Song, Hanqi Su, Faez Ahmed. Multi-modal Machine Learning for Vehicle Rating Predictions using Image, Text, and Tabular Data. *Journal of Computing and Information Science in Engineering*. (Under review)
3. Kristen Edwards, Binyang Song (Co-first), Jaron Porciello, Mark Engelbert, Carolyn Huang, Faez Ahmed. ADVISE: AI-accelerated Design of Evidence Synthesis for Global Development. *Journal of Mechanical Design*. (Accepted)
4. Binyang Song, Rui Zhou, Faez Ahmed. Multi-modal Learning in Engineering Design: a Review and Future Directions. *Journal of Computing and Information Science in Engineering*, 2023. (Accepted)
5. Binyang Song, Scarlett Miller, Faez Ahmed. AEML: Attention-Enhanced Multimodal Learning for Conceptual Design Evaluation. *Journal of Mechanical Design*. *Journal of Mechanical Design*, 145(4) (2023): 0414105.

6. Binyang Song, Joshua Gyory, Guanglu Zhang, Gary Stump, Nicolas Soria Zurita, Corey Balon, Simon Miller, Michael Yukish, Jonathan Cagan, Christopher McComb. Decoding the Agility of Human-Artificial Intelligence Hybrid Teams on Complex Problem Solving. *Design Studies*, 79(3) (2022).
7. Shuo Jiang, Serhad Sarica, Binyang Song, Jie Hu, Jianxi Luo. Patent Data for Engineering Design: A Critical Review and Future Directions. *Journal of Computing and Information Science in Engineering.* 22(6) (2022).
8. Binyang Song, Nicolas Soria Zurita, Hannah Nolte, Harshika Singh, Jonathan Cagan, Christopher McComb. When Faced with Increasing Complexity: The Effectiveness of AI Assistance for Drone Design. *Journal of Mechanical Design*, 144(2) (2021): 021701.
9. Serhad Sarica, Binyang Song, Jianxi Luo, Kristin Wood. Idea Generation with Technology Semantic Network. *Artificial Intelligence for Engineering Design, Analysis and Manufacturing (AIEDAM)*, 35(3) (2021): pp265-283.
10. Zhang, G., Zurita, N.F.S., Stump, G., Song, B., Cagan, J. and McComb, C., 2021. Data on the design and operation of drones by both individuals and teams. *Data in Brief*, 36, p.107008.
11. Binyang Song, Bowen Yan, Giorgio Triulzi, Jeffrey Alstott, Jianxi Luo. Overlay Technology Space Map for Analyzing Design Knowledge Base of a Technology Domain: The Case of Hybrid Electric Vehicles. *Research in Engineering Design*, 30 (2019), pp405-423.
12. Binyang Song, Jianxi Luo, Kristin Wood. Data-Driven Function Network Analysis for Product Platform Planning: a Case Study of Spherical Rolling Robots. *Journal of Mechanical Design*, 141(2) (2019): 021101.
13. Srinivasan V, Binyang Song, Jianxi Luo, Karupppasamy Subburaj, Mohan Rajesh Elara, Lucienne Blessing, Kristin Wood. Does Analogical Distance Affect Performance of Ideation? *Journal of Mechanical Design*, 140(1) (2018): 071101.
14. Jianxi Luo, Binyang Song, Lucienne Blessing, Kristin Wood. Design Opportunity Conception Using the Total Technology Space Map. *Artificial Intelligence for Engineering Design, Analysis and Manufacturing (AIEDAM)*, 32(4) (2018), pp449-461.
15. Binyang Song, Jianxi Luo. Mining Patent Precedents for Data-Driven Design: The Case of Spherical Rolling Robots. *Journal of Mechanical Design*, 139.11 (2017): 111420.
16. Binyang Song, Srinivasan V, Jianxi Luo. Patent Stimuli Search and its Influence on Ideation Outcomes. *Design Science,* 3, (2017).
17. Keith Burghardt, CJO Verzijl, Junming Huang, Matthew Ingram, Binyang Song and Marie Pierre Hasne. Testing Modeling Assumptions in the West Africa Ebola Outbreak. *Scientific reports*, 6(2016), pp. 34598.
18. Binyang Song**,** Weilin Zhuge, Rongchao Zhao, Xinqian Zheng, Yangjun Zhang, Yong Yin, Yanting Zhao. An Investigation on the Performance of a Brayton Cycle Waste Heat Recovery System for Turbocharged Diesel Engines. *Journal of Mechanical Science and Technology*, 27 (6) (2013), pp1721-1729.

Patents

1. Weilin Zhuge, Binyang Song, Yangjun Zhang, Jizhong Zhang, Junyue Zhang. A Waste Heat Recovery System Based on Brayton Cycle and Engines Integrated with This System. 2012. ZL2012101249830. (Invention Patent, China)

Working Papers

1. Binyang Song, Emmett Meinzer, Akash Agrawal, Christopher McComb. Transfer Learning Based Topic Modeling of Social Media Data for User Need Elicitation.

2. Binyang Song, Sarah Zhao, Faez Ahmed. How Has Engineering Design Evolved and Where is it Going? An Analysis on Journal or Mechanical Design.
3. Binyang Song, Chenyang Yuan, Frank Permenter, Nikos Arechiga, Faez Ahmed. Text-guided and Drag-optimized Car Design Generation Using Diffusion Models.

Peer-Reviewed Conference Publications

1. Binyang Song, Qihao Zhu, Jianxi Luo. Human-AI Collaborative Innovation in Design. *18th International Design Conference*, 2024. (Under Review)
2. Premith Kumar Chilukuri, Binyang Song, Sungku Kang, Ran Jin. Generating Optimized 3D Designs for Manufacturing Using a Guided Voxel Diffusion Model. International Manufacturing Science and Engineering Conference (MSEC2024), 2024. (Under Review)
3. Nikos Arechiga, Frank Permenter, Chenyang Yuan, Binyang Song. Drag-guided Diffusion Models for Vehicle Image Generation. *Generative Design Workshop*, *NeurIPS*, 2023. (Accepted)
4. Binyang Song, Chenyang Yuan, Frank Permenter, Nikos Arechiga, Faez Ahmed. Surrogate Modeling of Car Drag Coefficient with Depth and Normal Renderings. *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE),* 2023.
5. Hanqi Su, Binyang Song, Faez Ahmed. Multi-modal Machine Learning for Vehicle Rating Predictions using Image, Text, and Tabular Data. *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE),* 2023.
6. Kristen Edwards, Binyang Song (Co-first), Jaron Porciello, Mark Engelbert, Carolyn Huang, Faez Ahmed. ADVISE: AI-accelerated Design of Evidence Synthesis for Global Development. *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE),* 2023.
7. Binyang Song, Scarlett Miller, Faez Ahmed. Hey, AI! Can You See What I See? Multimodal Transfer Learning-Based Design Metric Prediction for Sketches with Text Description. *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE),* 2022, August 14-17, 2022, St. Louis, Missouri, USA.
8. Binyang Song, Christopher McComb, Faez Ahmed. Assessing Machine Learnability of Image and Graph Representations for Drone Performance Prediction. *17th International Design Conference*, May 22-26, 2022, virtual conference.
9. Shuo Jiang, Serhad Sarica, Binyang Song, Jie Hu, Jianxi Luo. Patent Data for Engineering Design: A Review. *17th International Design Conference*, May 22-26, 2022, virtual conference.
10. Binyang Song, Nicolas Soria Zurita, Hannah Nolte, Harshika Singh, Jonathan Cagan, Christopher McComb. Addressing Challenges to Problem Complexity: Effectiveness of AI Assistance during the Design Process. *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE),* August 17-19, 2021, virtual conference.
11. Joshua Gyory, Binyang Song, Jonathan Cagan, Christopher McComb. The Effects of Artificial Intelligence Agents on Team Communication During Solving an Interdisciplinary Drone Design Problem. *International Conference on Engineering Design*, August 16-20, 2021, virtual conference.
12. Binyang Song, Nicolas Soria Zurita, Guanglu Zhang, Gary Stump, Corey Balon, Simon Miller, Michael Yukish, Jonathan Cagan, Christopher McComb. Toward Hybrid Teams: A Platform to Understand Human-Computer

Collaboration During the Design of Complex Engineered Systems. *16th International Design Conference*, October 26-29, 2020, virtual conference.

13. Binyang Song, Emmett Meinzer, Akash Agrawal, and Christopher McComb. Topic Modeling and Sentiment Analysis of Social Media Data to Drive Experiential Redesign. *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE)*, August 17-19, 2020, virtual conference.
14. Serhad Sarica, Binyang Song, Jianxi Luo, Kristin Wood. Technology Knowledge Graph for Design Exploration: Application to Designing the Future of Flying Cars. *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE)*, August 18-21, 2019, Anaheim, California, USA.
15. Serhad Sarica, Binyang Song, En Low, & Jianxi Luo. Engineering Knowledge Graph for Keyword Discovery in Patent Search. *Proceedings of the Design Society: International Conference on Engineering Design*, 1(1) (2019), pp2249-2258.
16. Binyang Song, Jianxi Luo, Mohan Rajesh Elara, Kristin Wood. Data-Driven Function Network Analysis for Product Platform Planning: A Case Study of Spherical Rolling Robots. *International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE)*, August 26-29, 2018, Quebec City, Quebec, Canada.
17. Binyang Song, Jianxi Luo. Identifying Patent Precedents for Engineering Design: An Iterative Heuristic Method of Mining Text, Citation and Inventor Information. *International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE)*, August 6-9, 2017, Cleveland, Ohio, USA
18. Srinivasan V, Binyang Song, Jianxi Luo, Karupppasamy Subburaj, Mohan Rajesh Elara, Lucienne Blessing, Kristin Wood. Investigating Effects of Analogical Distance on Ideation Performance. *International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE)*, August 6-9, 2017, Cleveland, Ohio, USA.
19. Srinivasan V, Binyang Song, Jianxi Luo, Karupppasamy Subburaj, Mohan Rajesh Elara, Lucienne Blessing, Kristin Wood. Investigating Effects of Stimuli on Ideation Outcomes. *ICED17: 21st International Conference on Engineering Design*, August 21-25, 2017, University of British Columbia, Vancouver, Canada.
20. Binyang Song, Bowen Yan, Jianxi Luo. Design Opportunity Conception Using Technology Space Map. *Conference on Design Computing and Cognition (DCC)*, June 27–29, 2016, Evanston (Chicago), USA.
21. Binyang Song, Giorgio Triulzi, Jefrrey Alstott, Bowen Yan, Jianxi Luo. Overlay Patent Network for Analyzing Design Space Evolution: The Case of Hybrid Electrical Vehicles. *14th International Design Conference,* May 16-19, 2016, Cavtat, Dubrovnik, Croatia.
22. Binyang Song**,** Weilin Zhuge, Xinqian Zheng, Yangjun Zhang, Yong Yin, Yanting Zhao. Parameter Study of a Brayton Cycle Waste Heat Recovery System for Turbocharged Diesel Engines. *ASME 2013 Fluids Engineering Summer Meeting*, FEDSM2013-16293, July 7-11, 2013, Incline Village, Nevada, USA.
23. Binyang Song**,** WeilinZhuge, Yangjun Zhang, Yong Yin, Yanting Zhao. An Investigation on the Performance of a Brayton Cycle Waste Heat Recovery System for Turbocharged Diesel Engines. *International Symposium on Fluid Machinery and Fluid Engineering*, REF-1206, October 24-27, 2012, Jeju, Korea.

Conference Presentations and Invited Talks

1. Binyang Song. Human-AI Collaborative Innovation. *Institute for Operations Research and the Management Sciences Annual Meeting (INFORMS)*, Oct 16, 2023, Phoenix, Arizona, USA.
2. Binyang Song. Surrogate Modeling of Car Drag Coefficient with Depth and Normal Renderings. *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE)*, August 21, 2023, Boston, Massachusetts, USA.
3. Binyang Song. Democratize Engineering Design and Manufacturing with Multi-modal Data and Artificial Intelligence (AI). ETH Zurich. March 2023.
4. Binyang Song. Democratize Engineering Problem-solving with Multi-modal Data and Artificial Intelligence (AI). Virginia Tech. March 2023.
5. Binyang Song. Assessing Machine Learnability of Image and Graph Representations for Drone Performance Prediction. *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE)*, August 16, 2022, virtual conference.
6. Binyang Song. Assessing Machine Learnability of Image and Graph Representations for Drone Performance Prediction. *17th International Design Conference*, May 25, 2022, virtual conference.
7. Binyang Song. Data-driven Design Contextualized in Human-Artificial Intelligence Teaming. University of California Berkeley. March 2022.
8. Binyang Song. Design Reformation Through Human-Artificial Intelligence Hybrid Teaming. University of Michigan Dearborn. January 2022.
9. Binyang Song. Addressing Challenges to Problem Complexity: Effectiveness of AI Assistance during the Design Process. *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE)*, August 19, 2021, virtual conference.
10. Binyang Song. Data-Driven Human-AI Collaboration in Engineering Design. School of Design, Shanghai Jiaotong University, virtual, April 23, 2021.
11. Binyang Song. Data-Driven Human-AI Collaboration to Advance Complex Problem Solving. School of System Design and Intelligent Manufacturing, South University of Science and Technology of China, virtual, April 13, 2021.
12. Binyang Song. Accelerating Design with Human-Machine Teaming. *Workshop at Design Computing Cognition 2020*, December 12, 2020, virtual conference.
13. Binyang Song. Toward Hybrid Teams: A Platform to Understand Human-Computer Collaboration During the Design of Complex Engineered Systems. *16th International Design Conference*, October 27, 2020, virtual conference.
14. Binyang Song. Topic Modeling and Sentiment Analysis of Social Media Data to Drive Experiential Redesign. *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE)*, August 18, 2020, virtual conference.
15. Binyang Song. Design Automation Driven by Machine Learning and Big Data. School of Automation, Southeast University, Nanjing, China, May 15, 2019.
16. Binyang Song. Data-Driven Design Methods Using Network Analysis on Patent Data. School of Automotive Engineering, Chongqing University, Chongqing, China, November 10, 2018.
17. Binyang Song. Data-Driven Design Methods Using Network Analysis on Patent Data. School of Mechanical Engineering, Shanghai Jiao Tong University, Shanghai, China, November 8, 2018.
18. Binyang Song. Innovative Design Driven by Big Data. Department of Industrial Design, Xi'an Jiaotong-Liverpool University, Suzhou, China, November 6, 2018.

19. Binyang Song. Data-Driven Function Network Analysis for Product Platform Planning: A Case Study of Spherical Rolling Robots. *International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE)*, August 29, 2018, Quebec City, Quebec, Canada.
20. Binyang Song. Identifying Patent Precedents for Engineering Design: An Iterative Heuristic Method of Mining Text, Citation and Inventor Information. *International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE)*, August 9, 2017, Cleveland, Ohio, USA.
21. Binyang Song. Overlay Patent Network for Analyzing Design Space Evolution: The Case of Hybrid Electrical Vehicles. *14th International Design Conference,* May 18, 2016, Cavtat, Dubrovnik, Croatia.
22. Binyang Song. Parameter Study of a Brayton Cycle Waste Heat Recovery System for Turbocharged Diesel Engines. *ASME 2013 Fluids Engineering Summer Meeting*, FEDSM2013-16293, July 10, 2013, Incline Village, Nevada, USA.
23. Binyang Song. An Investigation on the Performance of a Brayton Cycle Waste Heat Recovery System for Turbocharged Diesel Engines. *International Symposium on Fluid Machinery and Fluid Engineering*, REF-1206, October 26, 2012, Jeju, Korea.

Additional Training

- Complex Systems Summer School, St. John's College, Santa Fe, NM, Jun 7 - Jul 3, 2015

Teaching Experience

Instructor: Artificial Intelligence for Systems Engineering (Graduate - 9 students)
Virginia Tech Fall 2023

- Deliver lectures on machine learning techniques for systems engineering
- Supervise student projects

Teaching Staff: Large & Complex Systems Design (Graduate & Undergraduate - 10 students)
Massachusetts Institute of Technology Fall 2022

- Deliver lectures regarding the applications of AI in the design domain.
- Mentoring student projects and offering feedback.

Mentor: Artificial Intelligent and Machine Learning for Engineering Design (Graduate - 30 students)
Massachusetts Institute of Technology Fall 2021 & Fall 2022

- Supervise three student project teams on deep learning for building energy consumption optimization, molecule structure prediction, etc.
- Participate student projects review and evaluation.

Guest Lecturer: Data-Driven Design (Graduate - 28 students)
The Pennsylvania State University Spring 2020

- Delivered lectures regarding network analysis and data visualization.
- Supervised two student project teams on parcel delivery optimization and customer data analysis.

Tutor: Natural Language Processing (Graduate - 4 tutees)
The Pennsylvania State University Spring 2020

- Introduced the basic natural language processing techniques for textual data analysis and the coding demo to the graduate students and postdocs.

Teaching Assistant: Human-centered Design Methods: Reimagining Sensing and Mobility (Undergraduate-18 students)

University of California, Berkeley (Summer 2018)

- Organized the in-class discussion, prototyping, and Q&A activities.
- Assisted teams with their projects and reviewed team progress at each stage.

Teaching Assistant: Engineering Design and Project Engineering (Undergraduate - 105 students)

Singapore University of Technology and Design Spring 2015 & Spring 2016

- Designed and manufactured the initial robot demo.
- Developed assembly, test, and validation manuals for students.
- Delivered lectures in laboratory sessions on CAD modeling, App development, Arduino coding, etc.
- Tested new manufacturing approaches to assist students in making their customized parts.
- Guided and assisted teams in solving their project problems.

Teaching Assistant: Fluid Mechanics (Undergraduate - 91 student)

Tsinghua University Spring 2013

- Involved graded weekly assignments, quizzes, and examinations, and provided feedback to the instructor.
- Managed the Q&A sessions and laboratory sessions.
- Prepared and delivered lightning talks in lectures.

Mentoring

Graduates

- Mayuranath SureshKumar, *Representation of 3D Models for Efficient and Effective Machine Learning*, Virginia Tech, Aug 2023 - present.
- Premith Kumar Chilukuri, *Generative Design for Manufacturing Using Diffusion Models*, Virginia Tech, Aug 2023 - present.
- Rui Zhou, *Exploit Multimodal Learning to Facilitate the Exterior Design of Cars*, Massachusetts Institute of Technology, Sep 2022 - Aug 2023.
- Kristen Edwards, *Machine Learning Models for Information Extraction to Generate Evidence Gap Map*, Massachusetts Institute of Technology, Sep 2021 - Aug 2023.
- Akash Agrawal, *Sentiment Analysis of Customer-Generated Data for Engineering Design*, The Pennsylvania State University, Nov 2019 - Nov 2020.

Undergraduates

- Hanqi Su, *Multimodal Learning for Engineering Design Evaluation*, Massachusetts Institute of Technology, Sep 2022 – Aug 2023.
- Adnan Abbas, *Text-Guided Image Editing Using Multimodal Learning*, Massachusetts Institute of Technology, May 2022 - Aug 2023.
- Sarah Zhao, *Analyze Papers from the Journal of Mechanical Design to Get the Insight of the Development of Engineering Design*, Massachusetts Institute of Technology, Jan 2022 - May 2022.
- Emmett Meinzer, *Generating Customer Needs Statements from Recurrent Neural Networks to Drive Experiential Redesign*, The Pennsylvania State University (bachelor honor's thesis), 2019 Nov - 2021 Mar.

Service to Profession

Conferences

- Hackathon Event Chair, ASME International Design Engineering Technical Conferences, Aug 2023 – Present
- Scientific Advisory Board of the International Design Conference, Jul 2023 – Present
- Session Coordinator, ASME International Design Engineering Technical Conferences, Oct 2022 - Present
- Hackathon Committee Member, Problem Committee Member, ASME International Design Engineering Technical Conferences, May 2022 - Aug 2022
- Session Chair, 17th International Design Conference, May 2022
- Hackathon Committee Member, Tutorial Session Chair, ASME International Design Engineering Technical Conferences, Jun 2021 - Aug 2021
- Hackathon Committee Member, Tutorial Session Host and Judge, ASME International Mechanical Engineering Congress and Exposition, Sep 2020 - Nov 2020

Guest Editor

- Special issue on Advances of Knowledge Graph for Engineering Design in Journal of Engineering

Workshops

- Co-Chair, Accelerating Design with Human-Machine Teaming Workshop at Design Computing Cognition 2020, Jan 2020 - Dec 2020.

Seminars

- Panel Chair, Roundtable on the Experiences of International Postdoctoral Scholars, Oct 2020 - Nov 2020.
- Organizer, Forum for Chinese Overseas Students: A Dialogue with the Educational Counsellor, Singapore University of Technology and Design, Oct 2015 - Nov 2015.

Reviewer for:

- United States Air Force Scientific Research Agency Grants
- Journal of Mechanical Design
- Design Science
- Journal of Computing and Information Science in Engineering
- Technology Forecasting and Social Change
- Technology Analysis & Strategic Management
- Concurrent Engineering: Research and Applications
- Technovation
- Topics in Cognitive Science
- Artificial Intelligence for Engineering Design, Analysis and Manufacturing
- Symmetry
- Frontiers
- IEEE Transaction on Engineering Management
- Journal of Cleaner Production
- Concurrent Engineering: Research and Applications
- Data and Policy
- International Journal of Information Management
- Design Research Society
- ASME Proceedings of International Design Engineering Technical Conferences & Computers and Information in Engineering Conference

Professional Associations

Member, American Society of Mechanical Engineers (ASME) (2017 - Present)
Member, The Design Society, (2020 - present)

References

Jianxi Luo, Ph.D.
Associate Professor
Engineering Product Development (EPD)
Singapore University of Technology and Design (SUTD)
Phone: +65 6499 4504
Email: luo@sutd.edu.sg

Faez Ahmed, Ph.D.
Assistant Professor
Mechanical Engineering
Massachusetts Institute of Technology
Phone: +1 (240) 470 8832
Email: faez@mit.edu

Christopher C. McComb, Ph.D.
Associate Professor
Mechanical Engineering
Carnegie Mellon University
Phone: +1 (559) 859 8459
Email: ccm@cmu.edu