

YAPAN LIU

Built Environment Science and Technology (BEST) Laboratory
Department of Mechanical and Aerospace Engineering
College of Engineering and Computer Science
Syracuse University
Email: yliu88@syr.edu
(Online Version. Updated 1/11/2024)

EDUCATION

- Ph.D. in Mechanical and Aerospace Engineering** August 2019 – May 2024 (Expected)
Syracuse University, College of Engineering and Computer Science *Syracuse, NY*
- Specialization: Building Control and Simulation, Human Mobility, Data Analysis and Visualization
 - Advisor: Dr. Bing Dong
- M.S. in Mechanical and Aerospace Engineering** August 2016 – May 2018
Syracuse University, College of Engineering and Computer Science *Syracuse, NY*
- Specialization: Design and Manufacturing, 3D Modeling, Quality Engineering
 - Advisor: Dr. Young B. Moon
- B.E. in Mechanical Engineering** September 2010 – June 2014
Yangzhou University, College of Mechanical Engineering *Yangzhou, China*
- Specialization: Mechanical Design, Manufacturing and Automation

ACADEMIC DISTINCTIONS

- 2024 - Homer Addams Award Nomination, ASHRAE [[LINK](#)]
- 2024 - Cover Article, Journal of Building Simulation [[LINK](#)]
- 2023 - Student Features, Center of Excellence (CoE), *Syracuse University* [[LINK](#)]
- 2023 - Research Highlights, *Syracuse University News* [[LINK](#)]
- 2022 - Best Paper Award, *Journal of Building and Environment* [[LINK](#)]

TEACHING INTEREST

- Statics
- CAD/CAM Systems
- Simulation and Data Analytics
- Mechanical Engineering Laboratory
- Statistics for Engineers
- Machine Learning for Engineers
- Control and Optimization for Building Energy Systems

TEACHING EXPERIENCE

- ECS 221: Statics (Undergraduate)** January - May 2022
Teaching Assistant, Dr. Teng Zhang *Syracuse University*
- Taught weekly recitation sessions, solidifying students' understanding of course materials on topics including Fundamentals of static equilibrium, Vector algebra, Forces, moments, equivalent force systems, free body diagrams and equilibrium problems in two and three dimensions, analysis of structures and machines and centroids and moments of inertia
 - Assisted in preparing and grading homework, quizzes, and exams
- MAE 600: Machine Learning for Mechanical Engineers (Graduate)** Fall 2020 and Fall 2021
Guest Speaker, Dr. Bing Dong *Syracuse University*
- Gave lectures on the topic of "Reinforcement Learning"
 - Presented recent research on building control utilizing Reinforcement Learning

MEE 416: Mechanical Engineering Laboratory (Undergraduate)

August - December 2021

Teaching Assistant, Dr. Jianshun “Jensen” Zhang

Syracuse University

- Taught students to conduct various mechanical engineering labs on topics including Beam Bending, Forced Convection Heat Transfer, Linear Inverted Pendulum, and Air Conditioning and Refrigeration
- Graded homework, presentations and reports, and answered students’ questions

MAE 600: Control and Operation of Building Energy Systems (Graduate, Undergraduate)

February - May 2021

Teaching Assistant, Dr. Bing Dong

Syracuse University

- Taught on topics including Indoor Air Quality, Convex Optimization, Model Predictive Control (MPC), State Space Model, etc.
- Assisted in designing and grading homework, projects, and presentations
- Hosted office hours and answered students’ questions

MFE: 634 Product Quality and Engineering (Graduate)

January – May 2018

Teaching Assistant, Dr. Jorge Luis Romeu

Syracuse University

- Mentored graduate students to analyze data in Minitab and manage projects in Companion software
- Graded 36 quizzes on a weekly basis and assisted in grade analysis and distribution
- Hosted office hours and addressed students’ questions from lectures and assignments

PROFESSIONAL EXPERIENCE**Mechanical Engineer**

September 2018 – August 2019

UsPLM, Inc.

Syracuse, NY

- Presented UsPLM product at various domestic and international conferences
- Designed 3D drone models and created animations using Onshape and Blender software
- Analyzed flight log data and simulated drone missions in 3D environments

Product Development Engineer

July 2014 – April 2015

Jiangsu Olive Sensors High-tech Co. Ltd.

Yangzhou, China

- Collaborated with a team of 10 engineers to develop 6 new products using the process of Advanced Product Quality Planning (APQP)
- Reviewed product design using NX software and led the pre-production process

RESEARCH AREA

- | | |
|-------------------------------------|--|
| • Big Data Analytics | • Machine Learning in Building Control |
| • Experimental Sensing | • Building to Grid Integration |
| • Internet of Things | • Spatial Temporal Data Analysis |
| • Building Controls and Diagnostics | • EV Charging Behavior and Control |

PUBLICATION

- Liu, Y., & Dong, B. (2023, August). Modeling urban scale human mobility through big data analysis and machine learning. In *Building Simulation* (pp. 1-19). Beijing: Tsinghua University Press.
- Li, H., Johra, H., de Andrade Pereira, F., Hong, T., Le Dréau, J., Maturo, A., ... & Dong, B. (2023). Data-driven key performance indicators and datasets for building energy flexibility: A review and perspectives. *Applied Energy*, 343, 121217.
- Liu, Y., Dong, B., Hong, T., Olesen, B., Lawrence, T., & O'Neill, Z. (2023). ASHRAE URP-1883: Development and Analysis of the ASHRAE Global Occupant Behavior Database. *Science and Technology for the Built Environment*, 1-33.
- Luo, N., Fierro, G., Liu, Y., Dong, B., & Hong, T. (2022). Extending the Brick schema to represent metadata of occupants. *Automation in Construction*, 139, 104307.
- Dong, B., Liu, Y., Mu, W., Jiang, Z., Pandey, P., Hong, T., ... & Zhou, X. (2022). A global building occupant behavior database. *Scientific data*, 9(1), 1-15.
- Dong, B., Markovic, R., Carlucci, S., Liu, Y., Wagner, A., Liguori, A., ... & Kang, X. (2022). A guideline to document occupant behavior models for advanced building controls. *Building and Environment*, 109195.

- Pisello, A. L., Pigliautile, I., Andargie, M., Berger, C., Bluyssen, P. M., Carlucci, S., ... & Wei, S. (2021). Test rooms to study human comfort in buildings: A review of controlled experiments and facilities. *Renewable and Sustainable Energy Reviews*, 149, 111359.
- Dong, B., **Liu, Y.**, Fontenot, H., Ouf, M., Osman, M., Chong, A., ... & Carlucci, S. (2021). Occupant behavior modeling methods for resilient building design, operation and policy at urban scale: A review. *Applied Energy*, 293, 116856.
- Wu, W., Dong, B., Wang, Q. R., Kong, M., Yan, D., An, J., & **Liu, Y.** (2020). A novel mobility-based approach to derive urban-scale building occupant profiles and analyze impacts on building energy consumption. *Applied Energy*, 278, 115656.
- Salim, F. D., Dong, B., Ouf, M., Wang, Q., Pigliautile, I., Kang, X., ... & Yan, D. (2020). Modelling urban-scale occupant behaviour, mobility, and energy in buildings: A survey. *Building and Environment*, 183, 106964.
- Wu, M., Song, J., Lin, L. W. L., Aurelle, N., **Liu, Y.**, Ding, B., ... & Moon, Y. B. (2018). Establishment of intrusion detection testbed for CyberManufacturing systems. *Procedia Manufacturing*, 26, 1053-1064.

RESEARCH EXPERIENCE

Research Assistant

August 2019 – Present

BEST Lab, Syracuse University

Syracuse, NY

- Set up building energy monitoring network with automated data acquisition for student dorms
- Led the development of Global Building Occupant Behavior Database for ASHRAE
- Processed geospatial data and time-series data through big data analytics
- Designed a benchmarking website for machine learning models focused on occupant behavior
- Leveraged machine learning to study human mobility and occupant behaviors at an urban scale
- Created advanced building-to-grid and HVAC control algorithms (e.g., MPC, Reinforcement Learning)
- Developed various advanced data visualization techniques to present research outcomes

Graduate Research Assistant

May – September 2017

Dept. of Mechanical and Aerospace Engineering, Syracuse University

Syracuse, NY

- Evaluated the vulnerability of a sample CyberManufacturing System (CMS)
- Enhanced the security of CMS through data analysis and image processing

Project Team Leader

September – December 2017

Syracuse University Libraries

Syracuse, NY

- Led a team to build a tobacco-free environment and improve the accessibility of Bird Library of Syracuse University
- Developed and tested two products, and received positive feedback from students and library staff

Project Team Co-Lead

July – September 2017

Marquardt Switches Inc.

Cazenovia, NY

- Collaborated with 6 engineers in a cross-functional team to build an assembly line model
- Collected data and implemented simulation using Arena software
- Analyzed and optimized simulation results reducing the number of operators from 6 to 5

Project Team Leader

January – May 2017

Course-based projects

Syracuse, NY

- Optimized “A Weather Disaster Management” process applying the skills of Six Sigma, DOE, SPC, PFMEA, etc. - *course MFE 634 Productivity and Quality Engineering*
- Designed a model for a simulated grocery store to minimize the labor cost in Arena – *course ECS 630 Simulation and Data Analytics*

CONFERENCES

Presentations

Occupant Centric Building HVAC System Control (Demo)

2022 NYS Innovation Summit

October, 2022

Buffalo, NY, U.S.A

Exploring Urban Scale Human Mobility Through Big Data Analysis and Machine Learning	September, 2022
<i>9th Expert Meeting of Annex 79 and OB-22 Symposium</i>	<i>NUS, Singapore and Online</i>
Occupant Centric Building HVAC System Control (Demo)	May, 2022
<i>2022 ARPA-E Energy Innovation Summit</i>	<i>Denver, Colorado, U.S.A.</i>
Deriving Urban-scale Building Occupant Behavior Patterns through Big Data Analysis	April, 2021
<i>6th Expert Meeting of Annex 79 and OB-21 Symposium</i>	<i>NTNU, Trondheim, Norway and Online</i>

Conference Attendance

9th Expert Meeting of Annex 79 and OB Symposium	September 2022 - <i>Online</i>
4th Plenary Meeting of Annex 81	April 2022 - <i>Online</i>
2nd Working Meeting of Annex 82	May 2022 - <i>Online</i>
6th - 8th Expert meeting of Annex 79	2021 - 2022 - <i>Online</i>
4th - 5th Expert Meeting of Annex 79 and OB Symposium	2020 - <i>Online</i>
ACM BuildSys 2019	November 2019 - <i>Columbia University</i>
Design Future Building Management Tools	October 2019 - <i>Carleton University</i>

TECHNICAL SKILLS

Programming languages: Python, MATLAB, R, C, Javascript, Energy Plus, ArcGIS, QGIS

Skills: 3D Modeling, Building Sensing and Simulation, Data Visualization and Analytics, Web Development

SERVICE

Invited Reviewer , <i>IEEE Transactions on Smart Grid</i>	2023
Invited Reviewer , <i>Journal of Thermal Science and Engineering Applications</i>	2022
Invited Reviewer , <i>Journal of Building Simulation</i>	2020
Student President , ASHRAE Student Branch, Syracuse University, Syracuse, NY	November 2022 – Present
Student Leader , Chinese American Friendship Association, Syracuse, NY	August 2017 – June 2018
Disaster Relief Volunteer , NAMB, Johnsonville, SC and Carolina, Puerto Rico	March and December 2017
Global Graduate Ambassadors Orientation Leader , Syracuse University, Syracuse, NY	August 2017