Check for updates

ASME Journal of Engineering for Sustainable Buildings and Cities
Online journal at:
https://asmedigitalcollection.asme.org/sustainablebuildings

ASME Journal of Engineering for Sustainable Buildings and Cities

Editorial

Special Issue on Advanced Data Analytics and Technologies for Decoding Human Health and Well-Being in Built Environments

This special issue (SI) on advanced data analytics and technologies for decoding human health and well-being in built environments that comes to partial closure in this issue is a necessary first step in a larger and longer conversation centered on the well-being of the people within built environments. The discussion started in 2022 with an International Workshop in Nottingham, UK, funded by the US National Science Foundation. The workshop, titled "Biosensing-Enabled, Wellbeing-Centric Sustainable Built Environment Ecosystems," covers the topics of human health and well-being, and the use of data and building energy technologies were discussed amply by a group of experts from the USA and the UK. Fundamental questions in this conversation include how it may be possible to measure and quantify human well-being in different contexts of indoor and outdoor environments, workplaces, or health centers and how technology at different scales and components, from the individual scale to the outdoor, community environments, can enable a reasonable state of well-being.

The subject is also becoming increasingly relevant as a warming global climate is challenging the normal state of well-being with extreme heat events that are becoming far more frequent and intense. The summer of 2023 was among the most intense in the western hemisphere, with cascading consequences in sectors not typically impacted by heat [1], such as school systems closing for days. This summer, 2024, is already on track to surpass 2023 with new record-breaking temperatures and heat indices above 100 °F for most of the North American Continent.

The collection of articles in this SI includes a series of contributions addressing this relevant topic. The work by Sharp [2] in exploring the extreme meteorological years and impacts on energy demands is a sound contribution to expanding our knowledge of new norms, with clear suggestions for building energy strategies to accommodate these extreme conditions in different geographical contexts. The work by Klavekoske et al. [3] links indoor air quality, a human-centric variable, to energy efficiency strategies in commercial buildings, which is followed by the work of Fil and Sözer [4] exploring energy efficiency strategies to control the indoor thermal environment using multi-zones, a human-centered approach. These works are accompanied by the contributions of Yang et al. [5] in exploring the control of humidity and latent thermal loads using a novel entropy-based approach and by the work of McMullen and Wemhoff [6] in optimizing data centers, a key component of data-driven approaches, using on-site generation.

The SI will likely be followed by several contributions in the near future that expand the conversation of human-centered approaches for building systems and the use of data-driven methods to monitor and enable acceptable levels of well-being in different contexts and under a changing climate.

The guest editors of this SI wish to express our gratitude for the support from the US National Science Foundation under award number #1947444. Any opinions, findings, conclusions, or recommendations expressed in this SI are those of the authors and do not necessarily reflect those of the National Science Foundation.

Yimin Zhu
Professor
Department of Construction Management,
Louisiana State University,
Baton Rouge, LA 70803
e-mail: yiminzhu@lsu.edu

Ming Sun
Professor
School of Architecture, Design and the Built Environment,
Nottingham Trent University,
Nottingham NG1 4FQ, UK
e-mail: ming.sun@ntu.ac.uk

Yong Tao
Professor
Department of Mechanical Engineering,
Cleveland State University,
Cleveland, OH 44115
e-mail: y.tao19@csuohio.edu

References

[1] Lucarini, V., Galfi, V. M., Riboldi, J., and Messori, G., 2023, "Typicality of the 2021 Western North America Summer Heatwave," J. Eng. Sustain. Build. Cities, **18**(1), p. 015004.
[2] Sharp, M. K., 2024, "Model-Based Extreme Weather Data for Predicting the Performance of Buildings Entirely Conditioned by Ambient Energy," ASME J. Eng. Sustain. Build. Cities, **5**(2), p. 021002.
[3] Klavekoske, A. B., Cushing, V. J., and Henze, G. P., 2024, "Evaluation of the Demand Flexibility Potential Through Joint Optimization of Building Thermal Response and Indoor Air Quality in Commercial Buildings," ASME J. Eng. Sustain. Build. Cities, **5**(2), p. 021003.
[4] Fil, B., and Sözer, H., 2024, "Maximizing Building Energy Efficiency Through Zone Based Conditions: An Advanced Dynamic Simulation Approach," ASME J. Eng. Sustain. Build. Cities, **5**(2), p. 021005.
[5] Yang, C., Chen, H., Miyazaki, T., Kim, Y., Khargotra, R., and Thu, K., 2024, "Local Entropy Generation Analysis of the Counter-Flow Dew-Point Evaporative Coolers," ASME J. Eng. Sustain. Build. Cities, **5**(2), p. 021004.
[6] McMullen, M., and Wemhoff, A. P., 2024, "Data Center Environmental Burden Reduction Through On-Site Renewable Power Generation," ASME J. Eng. Sustain. Build. Cities, **5**(2), p. 021001.

Copyright © 2024 by ASME

Downloaded from http://asmedigitalcollection.asme.org/sustainablebuildings/article-pdf/5/2/020201/7357024/jesbc_5_2_020201.pdf by guest on 13 October 2024