EDITORS' INTRODUCTION

Authors

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With the exception of a handful of organizers, this entire symposium was presented virtually, without any glitches, at the height of the pandemic. It brought to the forefront radical differences between real and virtual spaces, and therefore, especially interesting, tied to the theme of the symposium.

Human behavior is a fundamental metric assessing the performance of built environments at the social, climatic, economic, and political level. The disconnection of human interaction with the built environment can lead to remote and isolated communities, especially in an urban context. For centuries, cities have evolved in many ways, ranging from suburban sprawls in developed countries to rural exoduses in developing nations. Irrespective of the nature of the urban issue, a commonly observed problem is the negligence of small, sensitive issues closer to human existence, like human behavior. Although small and complex, human behavior and its interaction with the built environment holds a special place in design and research.

It contributes significantly to the performance of environmental, social, cultural, economic, and health aspects of livable communities and sustainable cities. For instance, it is found that human behaviors in buildings are a key contributor to energy consumption and performance of design elements. Factoring this through high-performance building designs can help in the bigger cause of global warming and climate change. On the other hand, careful programmatic planning at an urban level can support an economic upliftment bringing social justice to the cities. Moreover, human participation in outdoor spaces can help in reducing the morbidity rates in cities caused due to chronic stress and physical inactivity.

All in all, research in human behavior, performance, and built environments has become a pressing need for the present and the future betterment of societies. This (the current) issue of *Prometheus* serves as an intellectual platform to bring together scholarly articles and discussions centered around this theme "human behavior, performance, and built environments." Essentially, it builds around the fifth annual international graduate student symposium curated around the same theme. The symposium was open to discuss different research methodologies, techniques, and research topics revolving around the proposed theme. This included, but was not limited to,

From left: Zahida Khan, Michelangelo Sabatino, and Yohan Kim. Photo courtesy of Piyush Khairnar.

quantitative methods such as big data analysis, simulation techniques (agent-based modeling, computational fluid dynamics, machine learning, etc.), and qualitative methods such as interviews, archives, etc.

This issue focuses on the ways in which built environments impact human behavior and vice versa. Apart from keynote speech abstracts and transcribed talk from academicians, practitioners, and scientists, it also includes scientific articles from researchers and doctoral students who presented their work at the symposium. Bringing together the works of more than 40 participants, this volume becomes the voice of interdisciplinary scholar communities investigating human behavior and high-performance built environments.

This issue has four parts: (a) Human Behavior, Built Environments, and Resiliency; (b) Human Behavior and Building Performance; (c) Human Behavior in Urban Environments; and (d) Research in Design Practice. Sections (a), (b), and (c) are based on the three key events of the symposium featuring a keynote speech, a mini keynote speech, and a panel discussion on the subject theme. In this volume, we have compiled the abstracts of each keynote and mini-keynote speaker, and the student participants' articles. All the papers published here went through a blind peer review process by the scientific committee. The symposium featured paper presenters who pursued research in the field of Human Behavior, Performance, and Built Environments from the University of Cambridge, University of Pennsylvania, Virginia Tech, and Illinois Institute of Technology.

This publication features abstracts of the keynote speeches by: Dr. Ralph T. Muehleisen, Argonne National Laboratory; Dr. Ajla Akšamija, University of Massachusetts Amherst; and Professor Matthew Herman, Buro Happold. It also features mini-keynotes by: Dr. Ullica Segerstråle, IIT; Dr. Carlos Teixeira, IIT; and Professor Ron Henderson, IIT. Section (d) covers a transcribed talk by the Chicago architect Professor Carol Ross Barney on her experiences and views about the importance of human behavior and performance research in architectural design practice. She refers to research in Human Behavior, Built Environments, and Resiliency as the *"new demands for predictive design."*

Acknowledgments

To turn this symposium and *Prometheus 05* into a reality, under the circumstances of a pandemic, we have had huge support. First and foremost, we would like to thank the Director of the PhD program, Dr. Michelangelo Sabatino, for his immense support, guidance, and mentorship in this venture. Also, we would like to thank Provost Peter Kilpatrick, Dean Reed Kroloff, and Vice Provost for Research Fred J. Hickernell for their continuous encouragement of the symposium. We are also grateful to our keynote speakers, panelists, and paper presenters for contributing to the key events of the symposium and adding value to the interdisciplinary aspects of the symposium. A special gratitude goes to our scientific committee for their insightful comments in the peer-review process. We extend special gratitude to Professor Barney for sharing her experiences in the research-based projects in accordance with the symposium theme. We would also like to thank Dr. Rahman Azari for his guidance in building the scientific committee.

A special thank you to our previous organizers/editors for their time and advice in organizing the symposium, especially: Dr. Narjes Abbasabadi, Dr. Ezgi Bay, and Dr. Mehdi Ashayeri. We would also like to acknowledge the College of Architecture and IIT staff for their immense support in making this event successful. Specifically, Mark Osorio and Rick Ciurej for their help in the symposium logistics, and Christine Manuel for her constant encouragement to boost our confidence with online event logistics, helping with mock-up sessions and recording sessions. Additionally, we would like to thank our undergraduate students, Daniel Allen and Andrew Jiang, for sharing their experience in organizing the online events.

Special thanks to our colleagues PhD candidate Piyush Khairnar for creating the symposium website that anchored our marketing premise, and PhD candidate Lijian Ma for his exceptional photography of downtown Chicago for the cover image. We are also grateful to Donghyun Lee for his assistance during the mock-up sessions, as well as on the symposium day. We would like to thank PhD program Administrative Assistant Alejandro Saldaña Perales for his hard work and contributions for the PhD program overview and interviews in Part II. We extend our thanks to all registered participants for being a part of the symposium and stimulating productive conversations. Last but not the least, we want to express our special thanks to Melinda Van Leer for the copyediting process and Bud Rodecker for the design of *Prometheus 05.*

SYMPOSIUM OVERVIEW

***Human Behavior, Performance, and Built Environments*:**
November 13–14, 2020

Built environments are created without much consideration to how it will affect human users. Although standards and policies exist for built environment design, not all of them tend to have a humanistic approach. How do we help to enhance these standards toward a human-centered design? Moreover, human behavior in the built environment is a complex phenomenon; highly subjective and difficult to generalize. We would like to question whether the traditional methods are enough, or do they limit our research? What are the possibilities of big data approach methods in human behavioral research? We know that human behavior is a key determinant to high performance of buildings. What simulation methods exist to predict human behavior and, hence, improve the building performance? Would simulation encompass all the complexities of human behavior and built environment performance? How do different components of building design (i.e., building envelopes, materials, and structures) and urban fabric (i.e., buildings, streets, and public spaces) come together to address human behavior and performance of the built environment?

We seek to gather answers to similar questions and many more through the 2020 International Graduate Student Symposium in its 5th consecutive year, organized by the Doctoral students at College of Architecture, IIT. The conference ideates to bring together researchers and professionals to brainstorm and address the problems related to human behavior and performance of the built environments.

FRIDAY, NOVEMBER 13

Welcome and Introductions
Peter Kilpatrick, PhD, Provost and Senior Vice President of Academic Affairs; Reed Kroloff, Dean of College of Architecture; Fred Hickernell, PhD, Vice Provost for Research; Michelangelo Sabatino, PhD, Professor and Director of PhD Program in Architecture *IIT*

Keynote
Dr. Ralph T. Muehleisen *Argonne National Laboratory*

Panel Discussion: Human Behavior, Built Environments, and Resiliency
Mini-keynote: Dr. Ullica Segerstråle *IIT*
Moderator: Professor Michelangelo Sabatino *IIT*
Panel: Dr. Ullica Segerstråle (*IIT*), Professor Vedran Mimica (*IIT*), Professor Nicole Ditchman (*IIT*), and Dr. Ralph T. Muehleisen (*Argonne National Laboratory*)

Interview with Chicago Architect Carol Ross Barney

SATURDAY, NOVEMBER 14

Introduction by Co-Organizers
Zahida Khan and Yohan Kim *IIT*

Greetings
Hazem Rashed-Ali, President of ARCC and Associate Professor Architecture *The University of Texas at San Antonio*

Keynote
Dr. Ajla Akšamija *University of Massachusetts Amherst*

Panel Discussion: Human Behavior and Building Performance
Mini-keynote: Dr. Carlos Teixeira *IIT*
Moderator: Professor Edoarda Corradi Dell'Acqua *IIT*
Panel: Dr. Ajla Akšamija (*UMass Amherst*), Dr. Carlos Teixeira (*IIT*), Professor Mohammad Heidarinejad (*IIT*), Professor Thomas Leslie (*ISU*)

Overview of *Prometheus*: Journal of the PhD Program in Architecture

INTRODUCTION PAPER AND Q&A SESSION 1 — ZAHIDA KHAN

A Method to Assess the Geometric Purity of Shadow Lines: A Case Study of Daylighting Conditions
Alsaleh Sugati *Virginia Tech*

The Impact of Double-Skin Facade Configurations on Wind-Driven Ventilation in Tall Office Buildings
Yohan Kim *Illinois Institute of Technology*

Conducting the Smart Way of Life: Can Increased Order Be Considered Equivalent to Increased Quality? A Foucault-Inspired Discourse Analysis of the Smart City Rhetoric
Aisha Sobey *University of Cambridge*

Residential Indoor Air Quality and Environmental Conditions Among Asthmatic Adults in Chicago, IL
Insung Kang *Illinois Institute of Technology*

A Review of Hybrid Mode of Inpatient Care and Homecare Design Based on IoMT Technology
Tian Li and Yi Lu *Illinois Institute of Technology and University of Pennsylvania*

A BIM-Based Life Cycle Assessment Tool of Embodied Energy and Environmental Impacts of Tall Buildings
Lijian Ma *Illinois Institute of Technology*

Biophilia, LEED-ing the Way to Ecological Living Through Responsible Design for High-Rise Building
Camélia Mina Geng *Illinois Institute of Technology*

INTRODUCTION PAPER AND Q&A SESSION 2 — YOHAN KIM

Understanding the Links Between Thermal Comfort and Occupant Adaptive Behaviors in Naturally Ventilated Multi-Patient Wards in a Post-Epidemic Context
Stavroula Koutroumpi *University of Cambridge*

Human Spatial Behavior and Microclimates in Urban Public Spaces Using Agent-Based Simulation Modeling
Zahida Khan *Illinois Institute of Technology*

Active Environments — Behaviors, Emotions, and Pandemics
Anat Mor-Avi *Illinois Institute of Technology*

The Crown Re-Viewed: Reflections on Student Thermal Satisfaction in IIT Crown Hall
Lobna Mitkees *Illinois Institute of Technology*

Radical Resistance or Active Agency — The Case of Korangi Town
Nadia Shah *Illinois Institute of Technology*

The Missing Link: Chicago's Underperforming Public Infrastructure and Connective Urban Strategies for Bronzeville
Alejandro Saldaña Perales *Illinois Institute of Technology*

Keynote
Professor Matthew Herman *Buro Happold*

Panel Discussion: Human Behavior in Urban Environments
Mini-keynote: Professor Ron Henderson *IIT*
Moderator: Professor Ron Henderson *IIT*
Panel: Professor Matthew Herman (*Buro Happold*), Professor Martin Felsen (*IIT*), Professor Maria Villalobos Hernandez (*IIT*), Professor Peng Du (*TTU*)

Concluding Remarks, and Announcement of Best Paper Winners and Next Year's Symposium Theme
Professor Michelangelo Sabatino *IIT*

Nota bene: Presentation information, titles and affiliations are reproduced as they appeared in the symposium program in 2020. Responding to the spread of COVID-19, the symposium was held online.