Program Booklet

humARCH
Human Centric Performance Simulations in Architecture
ETH-EPFL Summer School
www.humarch.ethz.ch

Dates: 26-30 August 2019
## Schedule

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<td>09:15</td>
<td>Opening Keynote</td>
<td>Occupant Simulations Keynote (A. Khan)</td>
<td>Daylight Keynote (A. Jakubiec)</td>
<td>Architect Keynote (R. Dominguez)</td>
<td>Students' Presentations 1</td>
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<td>11:00</td>
<td>Wayfinding Keynote (M. Gath, R. Dubey)</td>
<td>Concept and Goal Generation (M. Gath, G. Quek, V. Soto)</td>
<td>Daylighting Workshop (A. Jakubiec)</td>
<td>Guided Tour of NEST</td>
<td>Students' Presentations 2</td>
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MONDAY, August 26th

Opening keynote
“Embedded Architectures” by Michael Hensel (TU Wien)

The talk will focus on aims and principles of embedded architectures, which are constructions that enter into intense interaction with their specific bio-physical environment including local climate, terrain, and ecosystem. This type of work is multi-scalar in character and located at the intersection between architecture, landscape architecture, urban design, ecology and micro-climatology. Exemplary works for will be discussed and areas of further research will be elaborated.

Wayfinding keynotes
“Simulating occupant-centric performance in buildings - the case of wayfinding”
by Michal Gath-Morad (ETH Zurich)

The ability to foresee how configuration and function related design decisions impact occupants’ wayfinding is a fundamental task in architectural design. Nevertheless, the majority of simulation tools in architectural design focus on simulating physical performance aspects, such as acoustics, energy efficiency and wind flow. In contrast, the development of building simulation tools that account for human-centric performance and experience in, and of buildings, have developed more slowly. The talk will focus on the use of virtual simulations calibrated with empirical and theoretical findings from cognitive science to simulate occupants wayfinding under various building scenarios.

“Computational Cognition”
by Rohit Kumar-Dubey (ETH, Future Cities Laboratory)

The talk will introduce computational cognition—the study of human cognitive processes (motivation, perception, emotions) through mathematical modelling, conducting behavioural experiments, and computer simulation. Given the complexity and uncertainty involved in cognitive processing, the inner working of the human mind cannot be fully understood purely on the basis of behavioural experiments. Thus, both theoretical development and empirical findings from behavioural experiments should go hand in hand. We will briefly discuss these individual processes specifically by considering the scenario of human wayfinding in built environments.

Wayfinding Simulation workshop
by Michal Gath-Morad and Rohit Kumar Dubey (ETH Zurich)

The wayfinding workshop teaches students the fundamentals of wayfinding simulations in architecture through hands-on experimentation. The workshop consists of four parts: (1) processing a BIM model and importing it into Unity3D video game engine (2) conducting a VR walkthrough to simulate wayfinding from the perspective of typical occupants while
collecting quantitative and qualitative performance data (3) setting up and running a basic shortest path simulation while collecting data from agents (4) analyzing occupants wayfinding performance. Results obtained would be used to inform students as they approach the wayfinding sketch.

TUESDAY, August 27th

Occupant simulations keynote
“Embuildinged Embodied Cognition” by Azam Khan (Autodesk Research)

If human cognition is shaped by being embedded in our bodies, then we would expect that buildings shape human cognition when we inhabit them. This sentiment was conveyed in the popular quote by Winston Churchill that “We shape our buildings, and afterwards, our buildings shape us.” If we can simulate how buildings shape us while we are shaping a building, we can develop a system that can help us support the human behaviours that are intended. For example, a school building should support learning, while a hospital building should support healing.

In the context of an office building, we have started an experiment by constructing a new office designed with multi-objective optimization around six human-centric goals. To better understand how the occupants behave in the new office, we have embarked on both data collection and systems modelling of the people in the office. We present the findings to date and propose a community project to create a systems model ensemble of Embuildinged Embodied Cognition.

Concept and goal generation
by Michal Gath-Morad, Geraldine Quek and Victoria Soto Magán

Throughout the summer school students will experiment with daylighting and wayfinding simulations applied to the same building case. In this session, performance objectives with respect to daylighting and wayfinding will be set. in the following sessions students will proposed design variations to enhance the building performance with respect to each set of criteria. The use of simulation will help students determine the degree to which their designs meet the objectives set.

Wayfinding sketch
by Michal Gath-Morad

The wayfinding sketch builds on students' results and insights gained from the wayfinding simulation workshop. Based on their findings and pre-set performance objectives students will propose a variation to the existing building and apply the same simulation tools to test if and to what degree wayfinding performance has changed.
WEDNESDAY, August 28th

Daylight keynote
“Daylighting History and Human Factors” by Alstan Jakubiec (University of Toronto)

This keynote will navigate between the historical, technical, and experiential as a way to frame the daylighting design and simulation workshop to come later in the afternoon. First a history of daylighting measures and metrics used in practice will be presented. Then we will discuss the experience of daylight and tie that in to post-occupancy and laboratory studies assessing the interface between the human experience of daylight and daylighting metrics. Finally, we will look towards the future of lighting design and research.

Daylighting workshop
by Alstan Jakubiec and Geraldine Quek (University of Toronto + EPFL)

A daylighting workshop stripped to the basics, we will be using DIVA for Rhino, through the grasshopper plugin for a flexible simple workflow for physically-correct daylighting simulations in architectural design. Annual daylighting simulations that includes geometry, climate, materials and other input parameters will be introduced through a simplified daylighting model. Students will be able to integrate this workflow to their design process through the group projects during the summer school and beyond.

Daylighting keynote
“Daylighting Research: routes to real-world Impact [often occur where you’d least expect]” by John Mardaljevic (Loughborough University)

Building science is an applied science. As such, building scientists are encouraged to demonstrate that their research has had some substantive impact in the real-world. In contrast to what is typically portrayed by funding bodies, the routes to real-world impact are largely hidden, or at best poorly delineated. Often it is only with hindsight that one can see how things unfolded. This talk describes a diverse collection of case-studies where ‘blue skies’ building science research ended up being applied to either notable building projects or leading to major changes in standards/guidelines. It concludes with some (radical?) new ideas on daylighting assessment that originated from a most unlikely source.

CULTURAL NIGHT

At 2,850 feet above sea level, Uetliberg towers over the rooftops of Zürich. The mountain affords an impressive panoramic view of the city, the lake and the Alps. We will take the train to the mountain top, go the the observatory and enjoy a typical Swiss forest experience. We will then head out to eat some typical cheese fondue.
*please bring your hiking shoes and rain coat.
THURSDAY, August 29th

Daylight keynote
“Daylighting in building design” by Ruth Domínguez Sánchez (European Commission + IE University)

The climate, location and function of buildings are key parameters according to which volume and space are shaped. Beyond this, intangible building components, such as voids, sound or daylight have a high potential to interact with users in a deeper and more irrational way. Daylight specifically plays a key role in people perception, blending functionality, emotion and well-being in a natural and subtle way. The principal aim of this talk is to reflect about the impact of daylight as one of the main design tools and building features. We will walk through different typologies around the world analyzing which are the main design strategies and the most cutting-edge construction technologies, in order to extract clear and applicable conclusions for future architectural projects.

GUIDED TOUR AT NEST

Daylighting sketch
by Geraldine Quek, Victoria Soto Magán (EPFL)

The daylighting sketch builds on students' results and insights gained from the daylighting simulation workshop. Based on their findings and performance objectives, students will propose a variation to the existing building orientation, façade, indoor materials or room configuration, and apply simulation tools (DIVA for Rhino through Grasshopper plugin) to test if and to what degree daylighting performance has changed.

FRIDAY, August 30th

Final presentations
by students + INVITED JURY

APERO

Final keynote
by Christian Veddeler (UNstudio)

Christian Veddeler
Christian Veddeler is a Director at UNStudio. Alongside his role in UNStudio’s Board of Directors, he is leading several projects in Europe and the US with a focus on system thinking in architecture. Together with Ben van Berkel, Christian Veddeler is in charge of the Four Frankfurt Project on the former Deutsche Bank Areal in Frankfurt, Germany, which was recently awarded first prizes both in the urban and the architectural competition. He has also led projects including the Campus for the Singapore University of Technology and Design and the K4 office section of Arnhem Central Station Masterplan. Christian also led a series of pavilion projects aiming on integral design processes, such as the Holiday Home at UPenn’s ICA, the Changing Room for the Venice Biennale, the Burnham Pavilion in Chicago, the New Amsterdam Pavilion
in New York City, and the Motion Matters Series at Harvard GSD. Christian is a frequent speaker and lectures among others at Harvard University, MIT, University of Illinois in Chicago and the Acadia Conference. Veddeler is a registered architect in the Netherlands and has received a Master of Science with Honours degree in Architecture from the Delft University of Technology.

UNstudio
UNStudio is one of the leading architecture, design and planning firms in Europe with award-winning projects around the world. UNStudio specializes in creating ground-breaking architecture and design at all scales, from bridges to public buildings, offices, residences, exhibitions, products and urban master plans. The name UNStudio stands for United Network Studio and refers to the collaborative nature of the practice. Throughout more than 30 years of international project experience, UNStudio has continually expanded its capabilities through prolonged collaboration with an extended network of international consultants, partners, and advisors. Its centrally located offices in Amsterdam, Shanghai and Hong Kong enable it to work efficiently anywhere in the world.

CONCLUDING REFLECTIONS