Between Space & Time: Transformable Architecture in Early Design Education

Negar Kalantar + Alireza Borhani
Texas A&M University

> *"We dwell in time as much as in space, and architecture mediates equally our relationship with this mysterious dimension, giving it its human measure".*[1]
> *Juhani Pallasmaa*

TIME IN ARCHITECTURE

Much of the historical tradition of Western architecture has a long history recognizing load-bearing buildings as long lasting monuments where apparent with an abstracted aesthetic. Recognized as the art of permanence, the architecture traditions of the West give us illusions of stability to slow the flow of time. In this paradigm, "the language of timeless reality" is considered as the language of beauty in the art of building[2].

Within this tradition, what is built for being timeless should be remained the same, despite of the destructive effects of the weathering, natural erosion, processes of decadence, wear, or traces of use by people. One could say that the idea of "permanent" is generally evolved around the notion of being unaffected by the passage of time. Despite of the architectural ideology of permanence and suspending the presence of time, the forces of time and the inevitable processes of aging have been negatively threatened the classic architecture of the west.

Immune to the passing of time, the mere image of the classic architecture in our memory infatuates with the splendor of space. Based on the space-like strategies of this architecture, our imagination tends to mold the grandeur of spaces of in its strong resistance to time. In the other words, in architecture that revolves around experience of space, time is almost treated as subservient to space or as an independent dimension.

Although modern architecture was founded on "space- time continuum" theory, but this architecture is not really time-bound to concretize the passing of time. In general, without any temporal essence, the abstract and mute architectural surfaces in most of modernist buildings cannot capture a sense of time. The flatness and immaterial abstractness of modern architecture have been vulnerable by the revenge of time and the inevitability of decay. In the modern architecture, not only the exterior of most buildings are essentially static, but their indoor environments are generally designed to support a

[1] Pallasmaa, J. 2016, "Inhabiting Time", AD (Architectural Design), Special Issue: Architecture Timed: Designing with Time in Mind, Volume 86, Issue 1, January/February 2016
[2] Harries, K. 1982, "Building and the Terror of Time", Perspecta, The Yale Architectural Journal, 19, pp 59–69.

timeless architecture of permanence. Even after many years of reading Judith Heerwagen's essay, the majority of interior spaces in buildings are still "largely devoid of sensory change, and deliberately so. Buildings are kept at constant temperatures and ventilation rates, the light from overhead fluorescent lights is the same day in and day out, the furnishings and colors in the environment remain constant"[3].

THE TRANSITORY AND EPHEMERAL NATURE OF MOTION

Both space and time are the dimensions of human's experiences. The notion of time is a special basis of our very humanity. Time structures our experiences of world, making us experience ourselves. As time unfolds around and within us, this experience helps build knowledge about the world.

A good architecture should house our memories and sensory imagination. Motion in architecture involves an experience of the flow of time while causing more traces in memory. By transforming one's relationship with space and time, the qualities inherent in transformable architecture create deep effects on our perceptions and memories (see Figure 1).

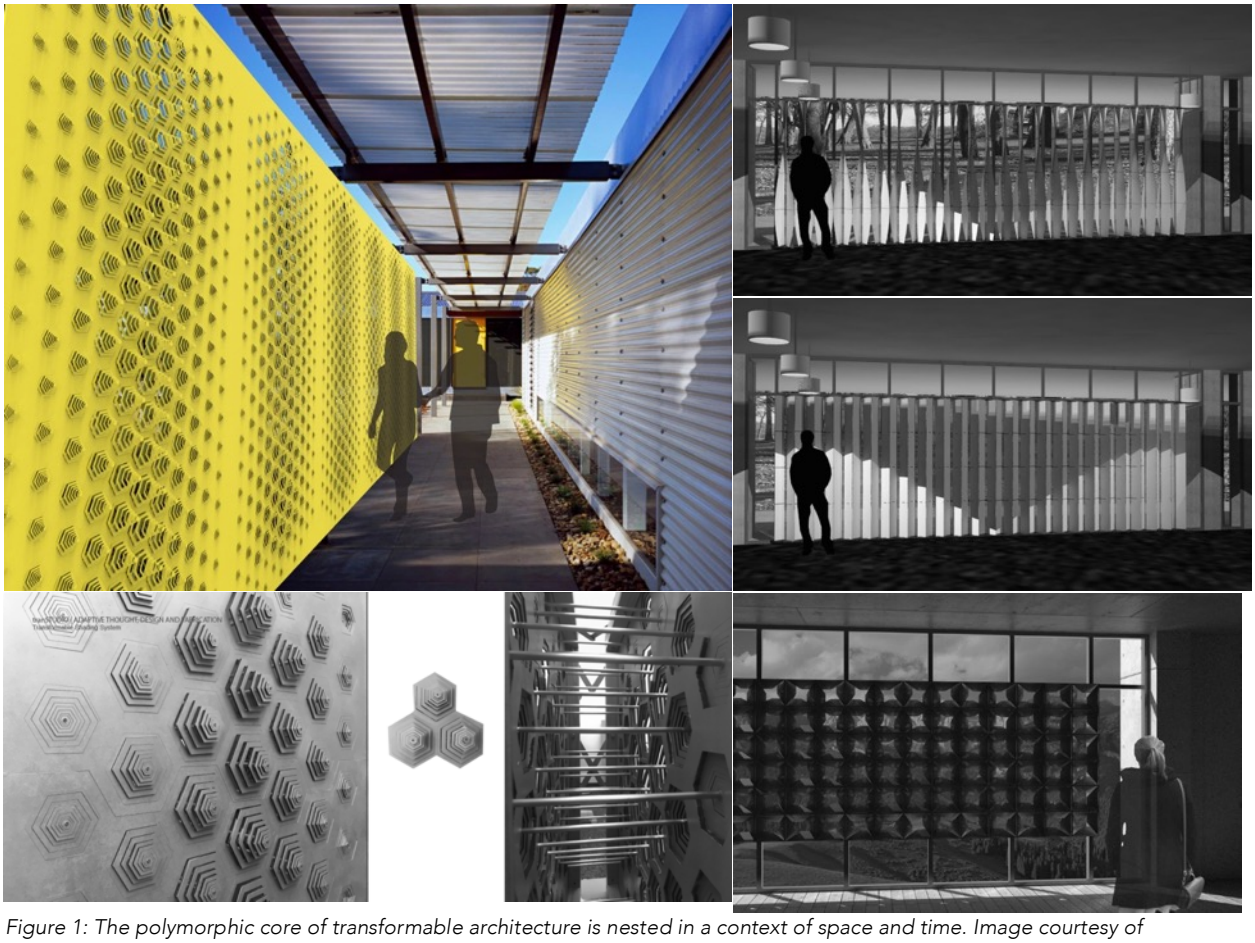

Figure 1: The polymorphic core of transformable architecture is nested in a context of space and time. Image courtesy of TranSTUDIO

[3] Heerwagen, J. 1990, "The Psychological Aspects of Windows and Window Design", Proceedings of the Twenty-First Annual Conference of the Environmental Design Research Association, EDRA (Oklahoma City), 1990, pp 270.

The experience of time is not achieved by an isolated and momentary motion but to the continuum of movement. In addition, an alienation from perceptions of time weakens our sense of place. Changes in the perception of time while looking at motion are linked to our assumptions about physical, mental or emotional space. Therefore, transformable architecture can help us to not only dwell in a place, but to mingle physical place and mental space, reality and memory. By living in the course of time, motion can help us to register architecture as a place while triggering our memory (see Figure 2).

Figure 2: In Transformable architecture, the gradual shift of moving components in time and space thrives on the tension between before and after, between now and then. Image courtesy of TranSTUDIO

DESIGNING A BUILDING IN A CONSTANT STATE OF BECOMING

Motion allows the progression of time and its sense of continuity to be understood. Therefore, motion ties architecture to the continuum of time. Transformable architecture mediates between the two physical dimensions of space and time. Here, time and space mutually fuse into one another in an intertwining fashion. Since motion can help us explore architecture beyond the confines of measured space, transformable architecture shapes and changes our experiences of time as much as of space. In this architecture, by embracing time as the fourth dimension, time is not subordinate to space any more. Since transformable architecture does not break down time or space separate entities, the notion of space-time is emerged.

In transformable architecture, the change in our relationship with space and time constitutes our consciousness. By integrating time into architecture, transformable architecture does not anchor buildings to the same temporal reality they exist. Traversing time through the movements of different parts, the psychic dimension of time is made up of people's perception of motion instead of the actual duration of time. Causing the flow of motion to slow down, halt, speed up, or reverse can humanize the terror of time and restructure our temporal experience.

tranSTUDIO

Motion, as the essence of all being, should be more prominent in architectural education. Utilizing movement is a natural mapping for interaction, reflecting the fact that human beings possess a deeply rooted response to motion, recognizing innately in it a quality of "being alive"[4]. Designers are arriving at a brave new world of fluid and corporeal solutions. Potentially this is world where products and buildings respond dynamically.

Transformable systems are introducing new design challenges, as Leupen, Heijne, and Zwol explained, "Designing for the unknown, the unpredictable, is the new challenge facing architects today. 'Form follows function' is giving way to concepts like polyvalence, changeability, flexibility, disassembly and semi-permanence"[5].Contemporary activities in the field of transformable architecture are evidence of the lack of holistic framework for the study of motion. Except for a few works, the body of literature related to kinetic study does not explicitly identify any design methodology. The lack of content provides a challenge for the study of kinetic design and highlights the need for further study[6].

The need to establish design strategies when designing transformable systems to assist beginning designers in discovering the constructability and workability during the early design stage is vital in achieving the intended goal of integrating adaptive systems into the building.

Exploring the nature of time and sensing the environment created by time are practices that should be integrated early on in the design process. Currently, architectural education's relationship to motion is typically posed as a battle against the paradigms of stasis. For far too long, the education of future architects has – with rare exceptions – been conceived of as the creative effort behind static buildings frozen in time; this notion has isolated students from their world. Future architects are still predominantly educated to build outside of time. Intended to remain static, students' building proposals are expected to dispel the workings of time. In other words, architecture students, as designers of future buildings, are trained to be less intolerant of the future and changes to their designs[7].

---

[4] Parkes, A. 2009. "Phrases of the kinetic: Dynamic physicality as a dimension of the design process", MIT.

[5] Leupen. B, Heijne. R, Zwol. J. 2005, "Time-based architecture". Rotterdam: 010 Publishers.

[6] Kalantar, N., & Borhani, A. 2015, "Beginnings in Transformable Design Pedagogy". In M. Jackson (Editor). Engaging Media: Proceeding of 31st National Conference on the Beginning Design Student (NCBDS), Houston, USA (pp. 282-290). Houston, Texas: University of Houston.

[7] Kalantar, N., & Borhani, A. 2016. "Studio in Transformation: Transformation in Studio", Journal of Architectural Education, 70(1), 107-115. doi:10.1080/10464883.2016.1122497. Print ISSN: 1046-4883 Online ISSN: 1531-314X.

As vehicles embracing time in architecture, two design studios called "tranSTUDIO" in two schools of architecture at Virginia Tech and Texas A&M University has been offered. By exploring design process of transformable system and reviewing the relevant case studies analysis, information, attributes, and theories around motion in architecture, undergraduate students can methodologically study the possible range of kinetic forms through a shared set of terms (see Figure 3).

To respond to the dynamic real world, tranSTUDIO aims to shift from space-based to more time-like design education[8]. In the proposed nonlinear time-like pedagogy of the studio, time is not treated as a constant parameter. By developing transformable architecture within the curriculum, tranSTUDIO educates future architects beyond the boundaries of the orthodox static spatial conditions that neglect or ignore temporality. Being no longer inferior to space, transformable projects help beginning design students propound time as a new design dimension, allowing them to physically experience and psychologically interact with their proposed spaces.

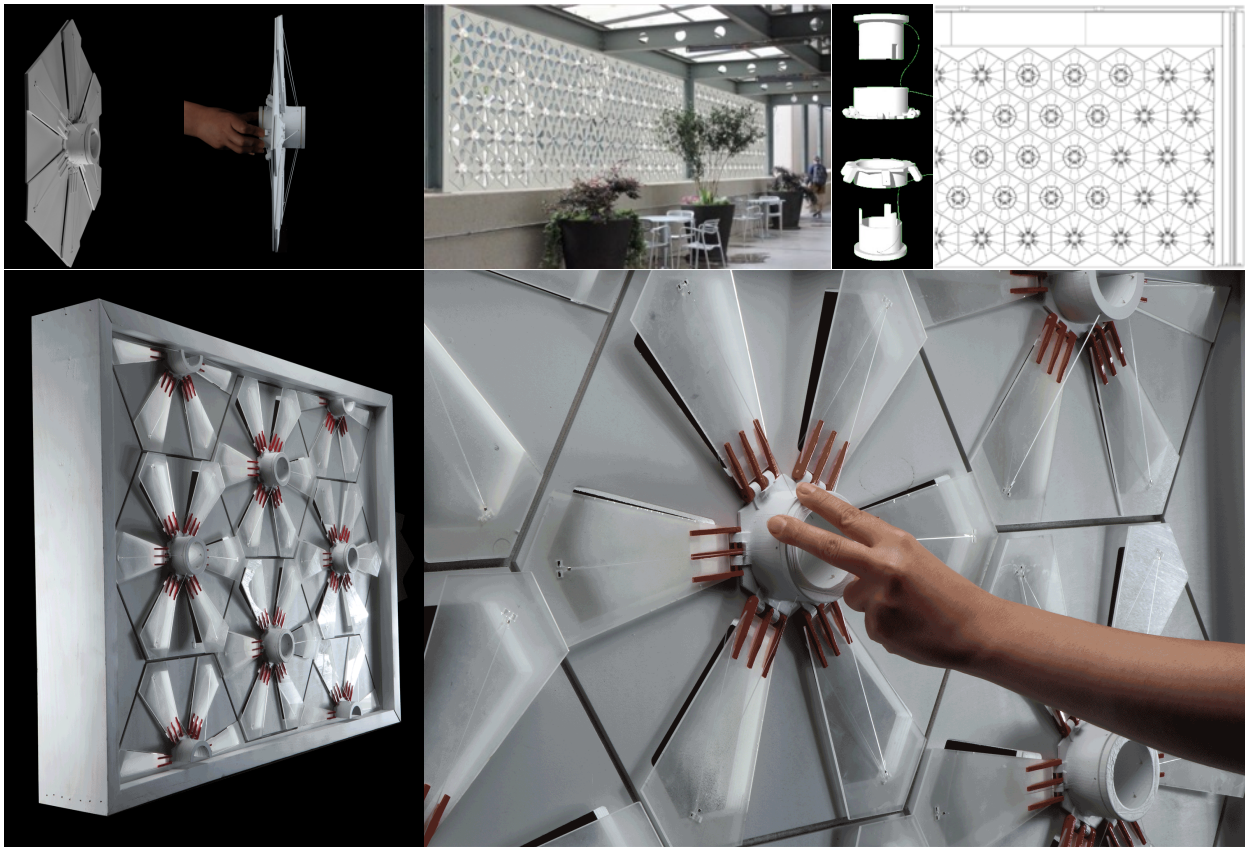

Figure 3: tranSTUDIO is a step in the direction of better understanding the key knowledge exchanges within the design process of transformable shading systems. Image courtesy of TranSTUDIO

[8] Kalantar, N. 2017, "Toward Time Like Oriented Approaches in Architectural Education": The13th European Architectural Envisioning Conference (EAEA13): Space/Time/Meaning, Glasgow, England.

In tranSTUDIO, architectural education is not only concerned with space and spatial configurations, but also with time. The objective of tranSTUDIO is to extend the education of future architects across both dimensions of space and time. In this studio, time has been considered to be positive elements of students' designs. Through motion, space is reconciled to time (see Figure 4).

Transformable architecture values time-dependent buildings and their components that are highly adaptable to embrace environmental conditions. The capacity of motion applied on the building envelope is a way to prolong life cycle of buildings while responding and adapting to environmental forces. In order to accommodate dynamic environmental conditions, transformability is an adaptive design strategy that tries to achieve an acceptable level of performance through adaptation of functions, configuration, features or behavior. The envelope of a building is normally considered as borderline between its inside and outside. In the studio, via thinking about the capacity of transformation to make a permeable building skin, students are asked to soften such a boundary by using transformable devices, allowing the inside to flow into the outside and vice versa (see Figure 5).

The movements of different components in a transformable building envelop can influence our perception of time. In this architecture, the time scales may range from seconds to hour or days. The time scales of different motion periods fluctuate our capacities of understanding the physical reality of time. The speed of movement, its length, continuity, rhythm, and duration of gaps between them effect the impact of transformation on the estimation of time, giving time its human measure. Depending on how many moving components are bound together and the continuity of their movement, motion may influence the passage of time as being faster or slower, making different senses of spatial continuum.

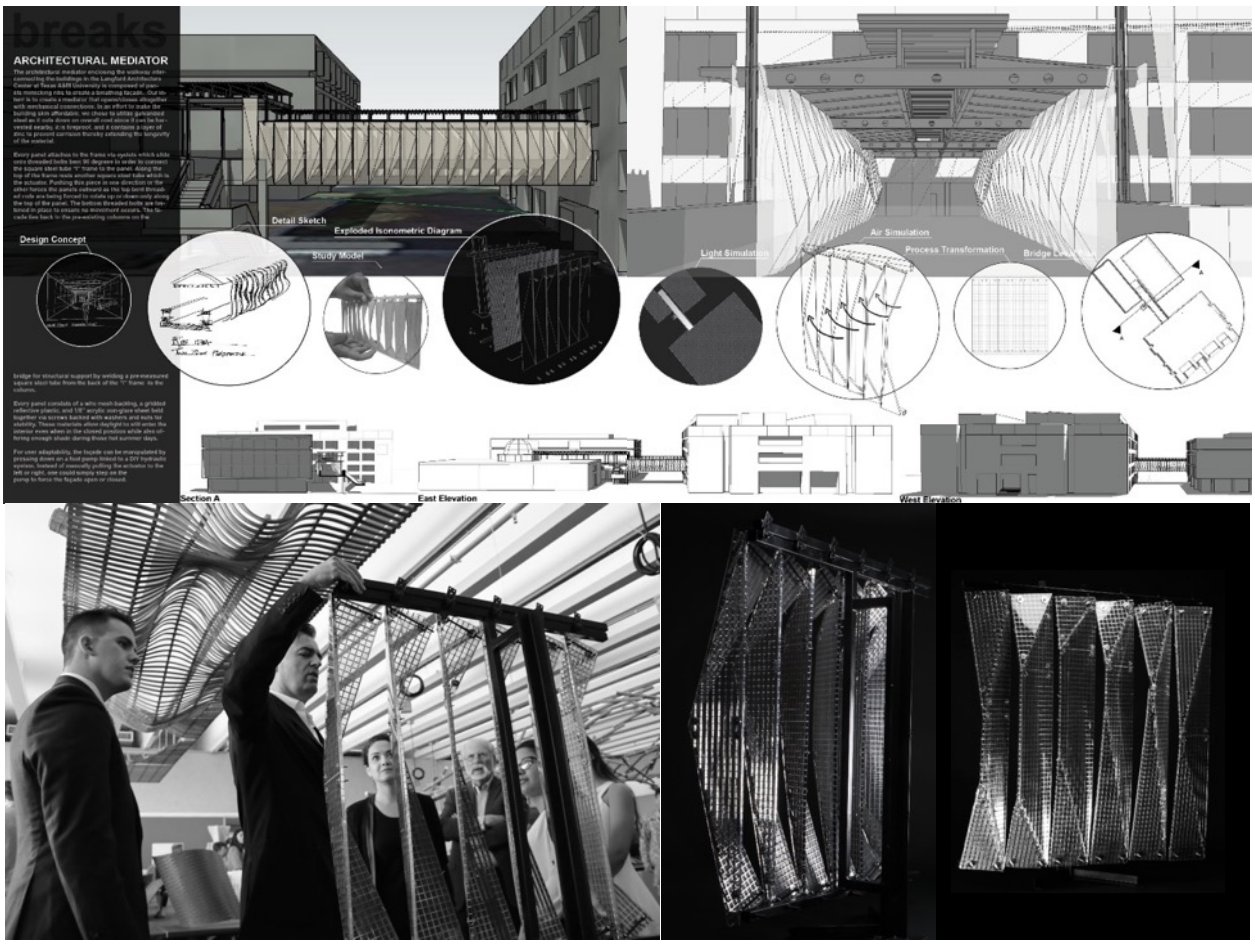

Figure 4: Through encouraging a shift in sensibility from the spatial to the temporal, students understood how the necessitated time to move their transformable design parts could build their perception of movement. Image courtesy of TranSTUDIO

In the studio, since transformation is instrument of displaying the flow of time, students are encouraged to think about the transformation of their designs in different time cycles to look beyond the scope of just one particular circumstance.

CONCLUSION

Transformation possesses the capacity to concretize architecture as spatial and temporal beings. By settling time in a place and residing the place in time, transformable architecture contributes to the temporalization of of space. This architecture helps us dwell in a constructed time.

Lending significance to both space and time, transformation is to relate architecture to time as much as to space (see Figure 6). In traSTUDIO, when attention is captivated by motion, space ceases to be the only important design criteria. The authors believe demonetizing of space is to disparage time. What they plead against is the lack of time-like approach in the education of architecture and its captivity to the notion of space. Here, the main objective is not to deprecate space-like architecture and overlook the importance of space. The goal is to interrelate time and space and transform them into one

another. Domesticating both time and space, motion in architecture can safeguard our experience of the space.

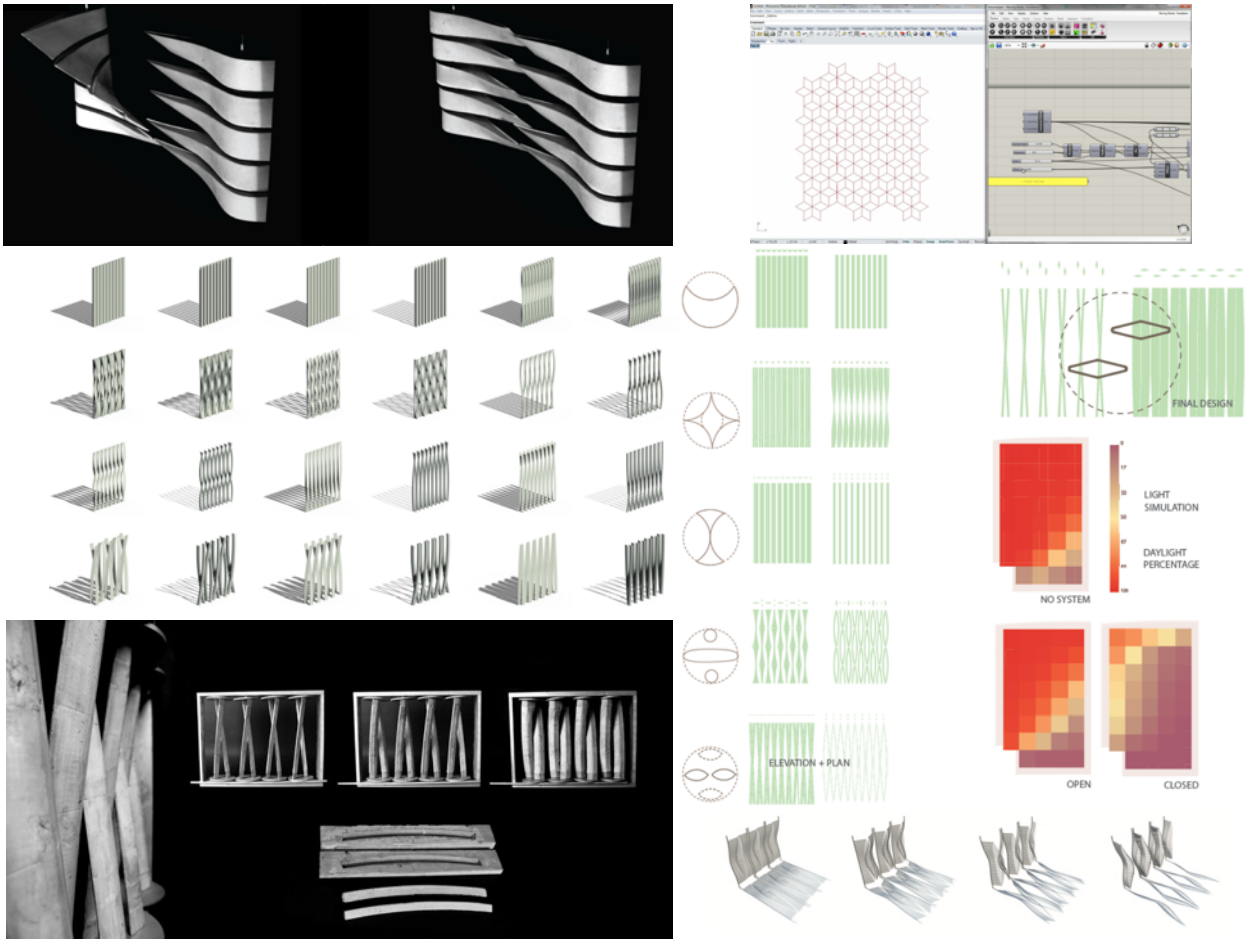

Figure 5: transformability is an important way of actively responding to ambient conditions while also meeting the needs of occupants and addressing issues of building performance. Image courtesy of TranSTUDIO.

By celebrating the presence of time and establishing dynamic spatial relationships within schools of architecture, the fundamental premise upon which motion rests becomes the binding together of the concepts of time, space, and meaning in the education of future architects.

By incorporating motion into architectural education, schools of architecture should address the role of motion design principles in restructuring the curriculum of transformable architecture.

Figure 6: tranSTUDIO promotes students to think in an architectural mind frame for addressing the time-like environment by mediating between space and time. In the studio, as students realize, transformable architecture invariably is as much about mechanism and performance as it is about space and form. Image courtesy of TranSTUDIO