Immaterial-Material Reality, Computation and Architectural Design

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Abstract: Computational design technologies are providing the conditions to advance the ways of design thinking and making. Though there are diverse approaches in the current architectural ideations and applications, the images produced by these technologies grab the most attention. These images mostly show off how different architecture can be by the use of computation. This paper will be criticizing this existing condition by discussing the change in the concept of “reality” with the advance of digital technologies, and its effects on our understanding of architectural materiality. So besides being a critique on current ‘picture’ of architecture, this paper aims at dragging attention to the implicit potential of the current computational technologies in a different perspective.

Keywords: Computation; immaterial; material; architectural space; reality.

Introduction

The recent hardwork with computational technologies in architecture seem to have a hypnotizing effect that, there emerge a need to set back and question what is going on. The works of computational design are mostly presented by the images of very high graphic quality that, fascination with that impressive visual bombardment, captivates our faculties of architectural evaluation most of the times. We find ourselves charmed by the elegant images; and the very sterile world exhibited thereby (figure 1).

Use of computational technologies in architectural design, though introduces farther realms of computation and calculation to design, somehow seem to tear architecture away from its own nature. It is usual that the image and conception of architecture change, when the tools of its design change. However, the initiators of design are mostly some biological, molecular, natural, geometrical or mathematical analogies in digital era (Hwang, 2006). The essential qualities of space are searched for, on other domains. Building becomes ‘representation’ of something else in a sense. Architectural space is thought in analogy to some biologic, natural, microscopic or mathematical reality, where some outer reference gains more importance (figure 2). In most of these cases, digital technologies are used as post-rationalization tools of a preset design idea as form.

Thus, this very busy indulgence with computation seems to underestimate an essential condition in architecture. That is the condition concerning the reality of computed architectural space. So, according to this paper the following questions need reconsideration for a further understanding of architecture in relation to computation and reality to
develop: What kind of reality do digital technologies have? Is there an emergence of different reality by the use of digital technologies? What is the materiality of digital? And finally, in relation to computational technologies how does the material understanding of architecture change?

This paper is not in the ambition of answering all these questions, but will be opening them to discussion through a studio work done with graduate students. The problematic of the studio was to develop computational skills for designing a skate-boarding park that is going to be built in a university campus setting.

**Digital or real: The example of money**

Digital technologies though seem to offer tools for advancing our mental or physical capabilities, are more than that. Digital world has the power of introducing new modes of reality in our lives. To be able to discuss the potential of computational design technologies in relation to architecture, a closer look into digital-real relation is necessary. Though digital is accepted as devoid of material quality, digital technologies permeate in all areas of our lives in such a way that, there emerges a different understanding of material reality. To understand this new material reality we should be discussing the question ‘is digital really devoid of material value?’

An overview on everyday life, where computers and digital technologies are indispensable, helps at this point. What I am going to focus on is the conception of reality brought forth by the intense use of digital technologies in our daily lives. This recently emerging situation stirs our understanding of material and immaterial as two distinct realms. It is best
exemplified by the reality of money.

Money, the most material and constructive power of substantial world, has been going through an immaterial existence, besides the material one, made possible by digital technologies. Money is slowly disappearing physically from daily use. We don’t need to have cash money in hand to spend it. Each of us can make EFTs by internet with ease. Just in seconds one can transfer any amount of money from one bank account to another one. Credit cards, debits and internet bank accounts are the concrete surrogates of our real money. Money is a numeric value in our bank accounts. Though it is mostly invisible, it is no less value. Money is still the most important wealth value of material world. And, paradoxically, so much as it becomes immaterial it gains further significance in substantial world. Material reality and immateriality support and enrich each others’ existence and being, in the case of money, which I think is the most intricate reality or materiality of the world we live in. Undoubtedly, it is made possible by the use of digital technologies.

Thus, we can say that, by the use of digital technologies we are facing a new understanding of reality, which is ‘neither only this nor only that’; but, ‘both this and that’ (Heidegger, 1977). Money is both the material cash in hand and the some immaterial numeric amount on a signed credit card slip, or in a bank account. It is an uneasy reality to explain though. You can operate digitally but in fact substantially. You can have it cash in hand. But you don’t need to. Its immaterial reality is equally material whereas, more easy to achieve and more practical and time-saving to operate with –which means a lot in a society of speed, where things are more valuable when they get faster. However, in the lack of this immaterial reality, life becomes really hard; and even perhaps impossible in many aspects. Thus, money is the most concrete proof of the emergence of an immaterial-material reality. It is real without a doubt. However, its ‘both this and that’ being or existence requires an understanding of reality, which is stripped from the clichés or prejudices like ‘real or material should be substantial’. It doesn’t need to be so. Material can equally be immaterial (Heidegger, 1985).

Thinking through that analogy we can bring closer the gap between the concrete world of architectural space and the immaterial world of computation, where this relation will be revealing the reality of architectural space in our era. The tools of computational design like scripting, algorithmic thinking, parametric modeling etc. lead by concrete demands of architectural space have the potential of showing us the further immaterial dimensions of computation and space. It is not the subordination of either space or the computational design facilities to another reality as a representation or post-rationalization medium. The studio works that is going to be presented in this paper will be discussing computation and design in that reciprocity.
supports design ideas and to search for systems of CAM that can be utilized for the project developed. Besides that, by this project we had the chance to discuss how any design problem can be approached by the tools of parametric thinking and modeling; and what geometry provides through that process (Pottman et al, 2007).

So, in 2008 spring semester in the Graduate Studio II of Computational Design Graduate program at Yıldız Technical University, conducted by myself, Asst.Prof.Dr. Togan Tong and Dr. Fulya Özsel Akipek, we worked on the design of skateboarding park both as a parametric modeling and a CAM problem with 10 students. Students were first introduced with GC (Generative Components) to have skills in parametric thinking and modeling. They worked in two groups. The project that is going to be presented here is the proposal of one of these groups, members of which were Arman Yaşa, Aydin Avunduk, Can Yücel Korkut, Serkan Uysal, and Tülay Kiler. Their idea was to use the basic elements of skateboarding parks as a starting point (figure 3).

**Skate-boarding park in Santralistanbul**

Computation in architectural education is an unsettling challenge, since its technologies change faster than any other design technology. Universities are in a position to adapt, advance and question these technologies. Recently, studies on computation bring academicians, office architects and builders into collaboration, because of the CAM technologies; since design has a much closer relation with tectonic reality. Thus, design research is an interest of wider communities, because of its integration with realization. So in this studio project, the reason for choosing a real demand, i.e., the demand for a skateboarding park at Santralistanbul campus of Istanbul Bilgi University was to introduce students with such an experience. That is the experience of being in contact with the client and considering their demands, handling a problem in all its dimensions, talking to professional skateboarders, to develop a computational model of the design logic that can respond to further dimensions, to search for the materials that

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Figure 3
Basic elements in a skateboarding park

Launch Box
Grind Box
Banked Wall
Hand Rail-Ramp
Fly Box
Quarter Pipe
The dimensions, curvatures, slopes and heights of these elements have minimum and maximum measures calculated according to the sizes of skateboards to provide safe and comfortable skating. By using these dimensions, slopes and proportions of these basic elements, this group developed the park not as an assembly of these elements as distinct units but in a cohesive unity and continuity (figure 4). And by using the scripting interface of GC by calculating the in-between distances, other skateboarding elements are proposed to be added to the appropriate spans; such as the flybox as seen in the middle part of figure 4, 5c; and the quarter pipe in figure 5a, 5d.

By setting the ranges and using the required values in the parametric model and in scripting interface, the alternative proposals for skateboarding park are produced considering the constraints and requirements (figure 5). All the proposals are computed according to the required distances, slopes, curvatures and sizes that provide comfortable and safe skateboarding derived from basic elements.

Besides developing the parametric understanding for the park they design, the students were also asked to produce a partial prototype for their proposals. The aim was to develop their material knowledge and to help them comprehend CAD/CAM integration in experience (Sheil, 2008). After making research on existing skateboarding park materials, outdoor materials, materials that resist skateboarding jumps, they decided to work with OSB (oriented strand board), a kind of timber for outdoor. It was easy to cut and shape, durable and a rather soft material when falling down is considered as a part of the skateboarding activity. To reinforce and isolate it, they preferred vinilester resin and fiberglass. And finally they developed the construction/manufacturing system with those materials in consideration and produced a scaled model of their project (figure 6).

The representatives from İstanbul Bilgi University, professional skateboarders, and architects dealing with CAD/CAM technologies were with us all through the project process. They joined the studio-work in lectures and critics. The application of the park is unfortunately suspended because of economical crisis. It can be claimed that, it is also a part of professional reality for students to go through. Nevertheless, it is still a valuable experience, since it helped us to discern the importance of reality, which is developing by the use of computation: immaterial-material reality.
Conclusion

With the use of computational technologies, a further dimension of existence emerges for the architectural projects. Needless to say, without these technologies such projects cannot be developed; but at the same time these technologies determine the conditions of existence for the projects developed; either they are constructed or not. However, it is different from the on-paper existence of visionary or experimental projects. Computation has a realm of its own. It is concerned with parameters, the relations, ranges, rules etc. Applying rules and operations on the determined parameters and values turns design into a process. And since without this process of operations we cannot talk about design, the immaterial reality of computation becomes an essential part of material existence of the projects. It can also be claimed that such an understanding of reality gains importance, also, when education is concerned. Because, when architectural space is concerned, immaterial reality is where education operates. And, with the advance of computational technologies the definition of that immaterial reality begins to evolve.

Thus, the above mentioned project for the skateboarding park can be claimed to be existing in its own immaterial-material reality, since it is developed as a system of relations with concerned parameters. Besides that, this mode of existence harbors the possibility of realization sometime in future. Because, computational projects are not static projects, frozen at the time of their design, but are organic systems of relations, silently waiting for the time and conditions
of their realization (figure 7). The change in the conditions will still be responded by this system of relations developed by the project, which makes the relation with material reality much stronger. So rather than having an analogical relation with nature, and adding to the image construction concerns of current computational use; developing a much down-to-earth attitude may give the chance of understanding the reality of computational technologies in a different perspective; and in a different depth.

Finally, it can be stated that architectural design in digital era can be claimed to be a more intellectual and philosophical challenge than it has been before. But it doesn’t mean that design is getting more complicated. On the contrary, it means that earthly dimensions and demands of design problems -counting on the immaterial computational capabilities of computers- can be revealed more.

References
