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## GRASPING CLOUDS

with Dennis Häusler, Momoyo Kaijima, Hideyuki Nakayama, Noah Pasqualini,  
Hideyuki Nakayama, Cathelijne Nuijsink, Laurent Stalder, Kentaro Takeguchi,  
Yoshiharu Tsukamoto, Inge Vinck, Matthias Vollmer, and Jan De Vylder.

Moderated by Christophe Girot and Erwin Viray.

**Girot** The point cloud is often much more a technology of analysis than one of production. There is a fundamental difference between these two worlds, even when design methods are applied to the point cloud. But in the present context, there are completely different dimensions where the point cloud becomes capable of modeling atmospheric and fluid dynamics, including climate, temperature, pollution, river flows, and air movement. At our chair, we have been making simulations of flooding in landscapes, for instance.

**Viray** It would be interesting to hear from a student what they learned through the experience of visiting these houses and making point clouds of them.

**Pasqualini** It is satisfying to see our collective efforts brought together in these beautiful animations. I was impressed that they feel so much like the actual environments we experienced. The point cloud can consider spaces not only as built matter but social accumulations and atmospheres. Augmented with sound, I was really taken back to these places we visited two years ago.

**Girot** Now you are being quite uncritical in your admiration. Does the point cloud change your way of thinking about space?

**Pasqualini** For me, it's about the perception of space that changes from one of line drawings and images to one that's inverted—inside out. For the moment, as an analysis tool or visual representation, it works perfectly fine, but I see difficulties in designing with it. I would struggle getting away from conventional drawing because this complex form of representation requires a lot of knowledge and time.

**Nakayama** The point cloud is interesting for feeling and tracking a particular way of thinking. In a way, it has a super-objective point of view because its vision ignores the distinction between elements, like the house and the ground. Every single object, including the design and the environment, suddenly loses its history and meaning. I personally feel a mysterious comfort. I am very interested in this kind of new feeling.

Imagine a train journey: the train is approaching a curve; you see the rear

car from the window next to you—it's like looking at yourself from the outside and seeing your own body from the inside—a creepy but fascinating feeling. I am interested in that super-objective point of view because the single-family house is a very subjective topic, which is not always comfortable for me. The same happens in the Split Machiya by Atelier Bow-Wow, where the inhabitants observe their own life from the window. From time to time, we must forget and ignore the system of this world and look at our bodies from the inside. This point of view is mysteriously comfortable for me.

**Giro** I like this idea of mysterious comfort. Yoshiharu, do you feel that same psycho-analytical experience walking through your house?

**Tsukamoto** I think I feel mysterious discomfort. Both comfort and discomfort exist within this new graphic system and its way of representing architecture. Nakayama-san described it as super-objective, but it is also superficial. Earlier, I compared the lines with the dots or points. The line always has a definition. Only through a certain intention does it appear as a line. The dots are totally released from any intention.

Noah noted that the point cloud is an excellent way to represent architecture and that it works well as a research tool, but that it is still challenging to transform the technology into means of design production. If there was the possibility of introducing artificial intelligence to the application, it could find the lines within these clouds of points. And the lines could lead to a decision towards better architecture. I don't know if it is an evolution or a loss of possibilities because it would go back to a conventional way of drawing the section again.

**Kaijima** Objectively the point cloud is very interesting because it contains many kinds of information, including materiality. However, I also wonder about the fact that it just shows the surface of things, but behind the surface—inside a stone or inside a piece of wood or inside the soil—there is more “information.” Instead of only in the airy part, I think that the material part could be integrated into the cloud to be able to design with it. That means even the objective possibility of utilizing the point-world, also the methods could be integrated in the design process.

**Tsukamoto** It is interesting because a building casts light. And there is no division between the interior space of a building and the space between buildings. This is why Tokyo is quite an exciting context for the point cloud, because there is not so much difference between the dimension of a space between buildings and an interior space. And Momoyo, it is very difficult to scan everything—even inside the wall.

**Girot** It is easy to do geometric recognition in a point cloud or what you named a line detector because you are in a geographically positioned system with an x-, y-, and z-coordinate. Mechanically you can find the point of departure of a line. The main problem with point clouds is what we call “feature recognition” in digital jargon, which is not able to differentiate between a teacup, a plant, a wall, a door. It is a cloud, and the cloud is always the same, whether it is architecture or other objects.

What Nakayama-san said is true when he talked about the feeling of mysterious comfort because everything becomes an incredibly beautiful digital salad. What you are talking about exists already. When you scan an existing building, you can easily extract essential information. It becomes relevant in adaptive reuse, also in the light of Lacaton & Vassal’s Pritzker Prize. The line is there if you want it.

Inge, you had the courage to express your discomfort in the strangeness of it all. Could you comment on the mysterious comfort or discomfort?

**Vinck** Yes, I can relate to this feeling. So far, you have used the technology to scan existing buildings. How could we use it to develop a project? To be honest—I really don’t know. I’m curious to work with it, and to discover it I would love to see how you have been working with it so far.

**De Vylder** For a wine cellar project we actually once worked with point clouds as a tool to understand cave geometry that we were not otherwise able to perceive adequately. At the time, we used them as an instrument. My point is: you cannot talk about working in architecture with one instrument alone. The point cloud is a new instrument that can be added to the ones we already use. While we as architects evolve to adopt such technologies, we also seem at the same time to return to the analogue, manual work. It is about a good balance, and I am quite optimistic. We work a lot with the existing context, and when we are in a remote position, it might help a lot to bring things closer to our tables. Besides, it is nice to look at, isn’t it?

**Girot** There is poetry in it. It reminds me of a conversation we had in the preparatory discussion with Alphaville Architects. Kentaro Takeguchi had a critical view on transparency, this lack of materiality.

**Takeguchi** The resolution of the point cloud is very useful material. But for an architect like Tadao Ando, who always uses drawings or abstraction, I don’t know how he could use this kind of technology. Also, Cathelijne was talking about the life of the object as the original commodity. A kind of abstracted resolution of this data is still beautiful, and including this kind of real life is important, for example for Atelier Bow-Wow.



**Stalder** I have the impression that it is a very contemporary way of dealing with the point cloud; Peter Sloterdijk has given designers the task of designing the whole environment. I think this is somehow what the point cloud can do. It is a tool that allows us to take different perspectives, not only the human view; it can challenge different points of view and involves different perspectives in the design.

We should be cautious when we speak about objective or super-objective. The history of representation has shown us that all the different tools have certain advantages and certain deficiencies. Obviously, this is also the case here. So, we have a certain degree of abstraction, which allows us to communicate about light, sound, temperature, wind, etc. But, on the other hand, there are many other things that we are not able to represent.

I agree with Jan, and I wouldn't see the point cloud as a replacement for anything but an enrichment of the tools we know. So, I want to see it neither as an analysis tool nor a design tool. But from the moment that we begin to qualify the points, it becomes a design tool.

**Nuijsink** Christophe, I'm curious: Why did you and your team choose to scan Japanese houses? If I am not wrong, you worked with the point cloud already on larger landscapes. Was it because you are interested in this transitional space and then came to the Japanese houses? Or do you think the point cloud technology is especially relevant in researching Japanese houses?

**Girot** This is a good question. We have been working in Kyoto for seven years now. We started first with gardens, and it worked incredibly well. From the garden, we came towards the inside. The next logical step was to investigate how people live in Japan in relationship between inside and outside. In the early scans, we always looked at very traditional houses in Kyoto. We wanted to move towards a contemporary gaze on the situation. What we find incredible in these small houses is that there is always this threshold and play between inside and outside.

**Nuijsink** So, what do you have planned next?

**Vollmer** I think Christophe already explained this relationship between the gardens and the houses quite well, but there is also a bridge between scales. Here in Switzerland spaces are rougher and larger. But in Japan we went to smaller and smaller scales because we realized we had to be careful not to step on things we shouldn't step on. These houses were the smallest scale that we had ever scanned. But these spaces are incredibly rich and filled with traditions. It was an experiment that we enjoyed a lot.

I will react to a few other remarks; I appreciated them a lot—also the critical ones—because we need this view from the outside to think further about





Garden Alley House



what we are doing. Once again, I want to focus on the point itself. The point cloud is an unstructured mass. There is no further information than the position and the color. But this information is enough to create an impression of geometry and materiality. This phenomenon is like what we find in nature. First, the smallest element is recognized as a point or ball; then, they come together to form a body, a line, or anything. Someone from the audience asked whether the line was more human than the point—I cannot answer that.

But the interesting fact about this system is that it is a surveying method. Maybe that is why it creates this discomfort sometimes. It is a surveillance method which is kind of objective. I'm saying "kind of" because we always think that the point cloud is generated from a laser scan that creates a realistic model. But it's not measuring reality—it approximates reality. Laser scanners don't measure the same thing when you measure twice. There is also the emotional part. We can react very fast to the point cloud because we recognize many details and small things that we know from our lives, from our real world. This creates an ambiguity between these two worlds. It is high-precision surveillance that is creating this direct anchor to our reality and our bodies.

Coming back to the question of transparency: obviously, a point cloud is very unnatural. But for us, it is a benefit to take a view and position that we cannot take otherwise. We can see layers behind layers that are not perceivable in reality. Therefore, it creates a new perception of these spaces. We appreciate this, but of course that can be a point of critique too. It distorts and creates this ambiguity again: Is it real? Is it unreal? Or is it a metaphorical, symbolic layer? It is fascinating to observe how these details come together in a frozen world. We are thrilled that we can use movement and sound to let these spaces come to life again. This is how we come to a perception that can contribute to a discussion, such as the one we are having today.

As it is a new technology for most people, the question is how to approach something very new: Do you try completely new methods, or do you first apply known methods? Every architect recognizes a section and knows how to read it. And therefore, it can be a helpful tool, a first approach, to create readability. But obviously, in this case, we were conservative in how we edited the model.

**Girot**        The surveying techniques you describe were invented by NASA for lunar missions in the mid-1960s, so as an idea it's surprisingly old.

**Häusler**      If we work with the point cloud, it doesn't feel objective; it feels like any other tool. The subjectivity starts on site: What you scan? How you scan it? With what resolution? This results in a different density or transparency in the end. If you manipulate the color of single points within the process, it feels similar to other tools, almost like sketching, for example.

I want to explain why we investigated Japanese houses with point clouds and whether it is suited for small scales. What we tried to examine during our research were subtle spatial differences. If we wanted to prove the use of the point cloud as the number-one tool in the future, we would have chosen more complex spatial structures, which would have been more challenging to map. But by having these point clouds of different buildings next to each other, we can discuss them and examine where point clouds can be of use: where a combination of tools is more logical or where we don't need to use a point cloud at all. For instance, the texture of the Arimaston Building is hard to map, but the Nihonbashi House could be easily be represented in CAD.

**Giro** I want to thank all the participants, our students, and my team here at ETH Zurich. A special thank you to you, Erwin, for guiding us through the discussions. I also wanted to thank the whole teaching team from KIT and Professor Ono for his time. I see this symposium as a beginning of a broader discussion, which I look forward to, because we are now really just at the beginning of understanding the potential of the point cloud.



O-House



