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UNDERSTANDING JAPANESE GARDENS THROUGH POINT CLOUDS

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How many Japanese architects refer to a Japanese garden as a precedent for their own designs in this day and age? While we can easily visit a traditional garden, most of us can't make good use of the experience. And although we may recognize that there is a distinct atmosphere found in these gardens, we have no way of grasping this ephemeral quality. In our architectural training, we learn that the Japanese garden has an important place within architectural history but not how to integrate its principles into our own designs. One reason why we fail to make reference to these traditional gardens within contemporary practice may be due to the challenge of understanding and describing its structure and forms using common design tools or drawing conventions such as the plan, section, or elevation. We are only able to refer to something which can be broken down into accessible parts using design tools that are available to us. If this is true, then how has the practice of Japanese garden design been passed on or taught over the centuries? Elements such as the choreography of watercourses, the arrangement of various stone forms and tree types, and the engagement with and incorporation of natural sounds require a gardener's experience and intuition. Until now, we have not found a way of working with and manipulating these elements using the standard technologies available to architects.

The joint project which the Kyoto Institute of Technology has embarked on together with Professor Christophe Girot and the MediaLab from the Institute of Landscape Architecture at the ETH Zurich, marks the moment I first began to regard Japanese gardens as a reference for contemporary architectural design. The project strove to capture the physical environment and atmosphere of several Kyoto gardens. We recorded visual information with the aid of a portable laser scanner which can capture three-dimensional objects from a distance of 0.6–130 meters and the gardens's spatial sound qualities using a B-format SoundField microphone. Our aim was to extract more ephemeral and previously unmeasurable or unquantifiable information from Japanese gardens and to represent this in the form of audiovisual point cloud models.

A point cloud model captures visual information—not only positional but also color information—in three dimensions. As such,

everything, regardless of scale, can be captured and simultaneously represented in such a model. This capacity allows the technology to reveal connections between city and landscape, building and garden, stone and tree. Building on this model, we developed a dense grid of sound recordings across the garden to help us understand its acoustics in terms of a spatial structure. Each sound in a Japanese garden, whether from stepping stones or flowing water, is not only layered on the "sound" of silence but also duly positioned within the space. And because it is impossible to shut out external noise completely or even to adjust it easily in an urban setting, it is harder to operate sound than light. Silence is therefore a very important element in Japanese gardens. We have tried to capture both sound and silence by arranging our surround-sound recordings from various Kyoto gardens into sound maps. Then, by carefully embedding these within three-dimensional point clouds, we are able to better grasp the complex audiovisual spaces of Japanese gardens.

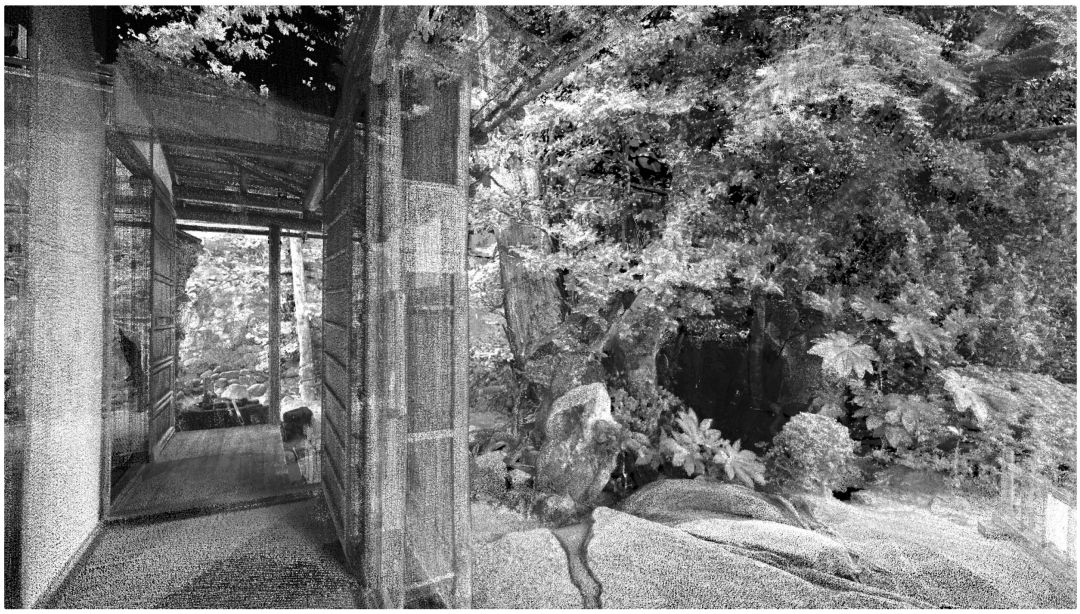
These models enable the designer to rapidly produce three-dimensional animations as well as guide the viewer through these spaces in two-dimensional sequences. The perspectives generated by these digital animations, however, differ fundamentally from the perspectives captured by a standard camera in that any and all viewpoints inside the transparent model may be chosen. In this way, the viewer can access a level of perception that transcends our ordinary *sense* perception. In our everyday experience it is impossible to assume an omniscient viewpoint within a garden, to glide across a still water surface like a bird, or to crawl close to the ground like a small insect. When it comes to the point cloud model of a Japanese garden, we are unlimited; an animation can take us straight through a wall. As viewers, then, our viewpoint can change constantly and so, too, our course through the garden as visitors. Suddenly, we can see a fluid connection between the house and the garden—an experience which had previously been difficult to achieve relying on the imagination alone.

Still, nothing can substitute everyday lived experience as perceived directly through the five senses. While I am sure that the opportunity to revisit these gardens through point clouds presents an entirely different experience, it must be noted that this is not a

technique aimed at reproducing a singular or "true" experience of a Japanese garden. These audiovisual models represent a technology which strives to understand the garden's structure and the results of a certain design philosophy which, in turn, may produce any such "true" experiences for visitors. The three-dimensional data of a point cloud model not only makes it possible to collect more detailed color, sound, and location information, but also to express a multiplicity of more personal and individual experiences which conventional design tools—again, the plan, elevation, and section—could not provide.

By being able to measure and analyze form, color, and sound in such great detail, we can begin to capture the qualities of a Japanese garden that have been handed down from generation to generation as tacit knowledge. We may also finally learn to incorporate some of the identified and recorded principles into contemporary architectural practice. Toward this end, a point cloud model is capable of representing many aspects of the traditional Japanese garden with a higher resolution than any conventional design tools ever could. Moreover, the capacity to edit the garden cloud directly without compromising the model's resolution may present unforeseen potential for contemporary Japanese designers seeking to build on a long tradition.

A new design technology, a new architecture?



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