# Millefleur
Floral Geometries and Participatory Application

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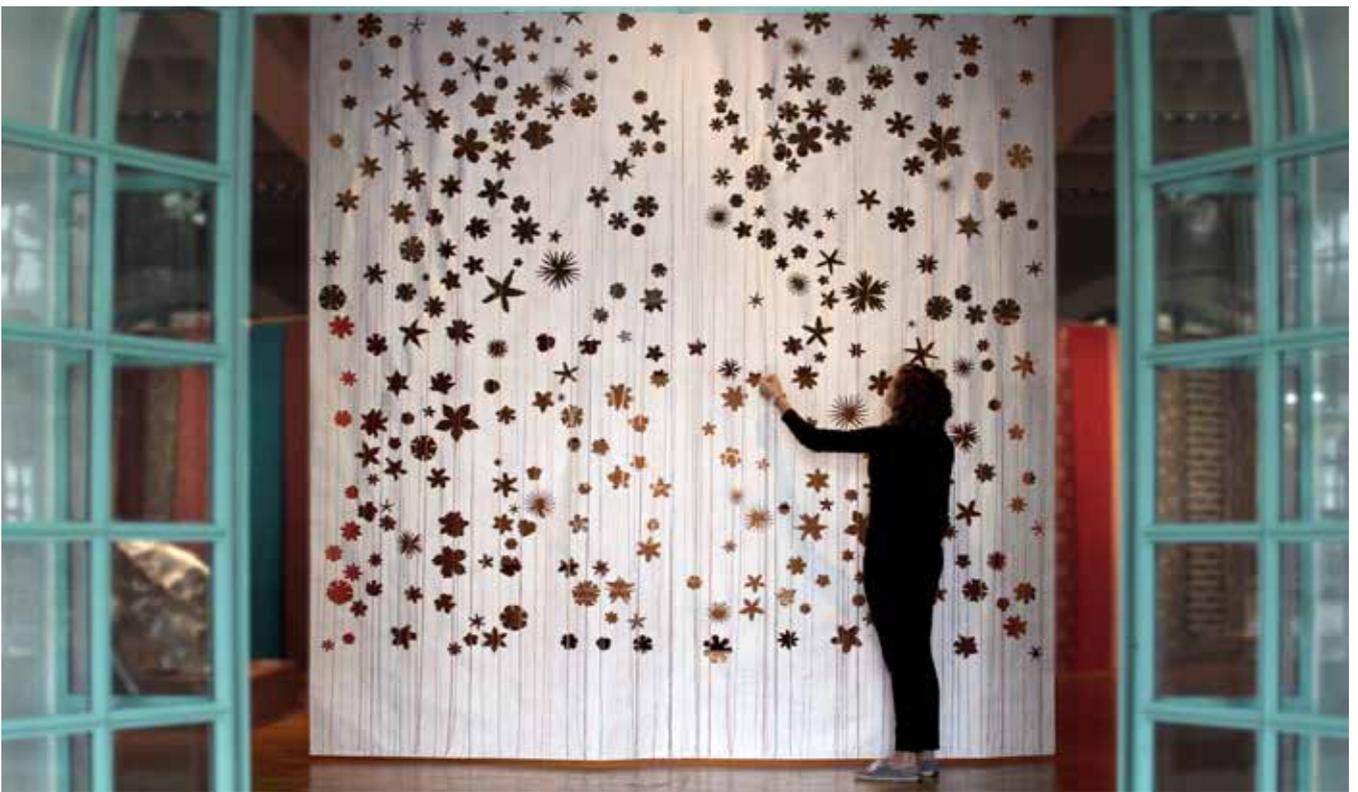
View of Millefleur (Wallflower) at the entrance to Mebane Gallery

"What is the felt experience of cognition at the moment one stands in the presence of a beautiful boy or flower or bird? It seems to incite, even to require, an act of replication."

- Elaine Scarry

Introduction

As artistic subject matter, flowers ubiquitously appear across historical eras, geographies, and cultures. Persistently associated with varying notions of beauty, the proliferation of floral representations may be explained by Elaine Scarry's speculation that "beauty brings copies of itself into being."[1] The notion of reproduction plays a critical role in the historical development of floral forms in design. Such manmade forms—whether they reference natural flora through representation, resemblance or some other association—reflect not only cultural values like taste and beauty, but also foreground technological conditions that make them possible. Today's blossom-inspired products, surfaces, and architectural environments produced by designers like Tord Boontje, Patrick Jouin, Elena Manferdini, and Florencia Pita in this way engage a historically significant aesthetic lineage with recently emerged design and production technologies. Millefleur (Wallflower), a site-specific installation that we produced for the Mebane Gallery at The University of Texas at Austin, focuses on a particular floral style from traditional decorative arts and interprets it in contemporary terms.

Millefleur

Millefleur—a surface crafted from a dense pattern of floral motifs—appears as a stylistic feature in medieval European decorative artworks such as The Lady and the Unicorn, the exquisite series of six woven tapestries described in Rainer Maria Rilke's 1910 novel The Notebooks of Malte Laurids Brigge. French for 'a thousand flowers,' the term also appears in the Italian language as 'millefiori' where it typically refers to a traditional glasswork technique that yields similar surface effects. Exemplary works produced in the millefleur style combine a high resolution of detail at the scale of the individual motif with intricate patterns of arrangement across the whole field, accentuating the beauty, intensity, and painstaking nature of pre-industrial craftsmanship. Millefleur (Wallflower) recalls this tradition and explores its potential within the context of contemporary design. The installation focuses on the emergence of floral geometries through digitally driven design processes, while addressing the impact of human agency and group participation throughout fabrication and assembly. The aim is to explore the disconnects between the digital and the physical as productive sites for the articulation of robust design strategies, while forging new connections between decoration's historical legacy and its innovative potential today.

Millefleur (Wallflower) is a floor-to-ceiling curtain, ten feet wide. Constructed from soft Tyvek fabric in white on one side and silver on the other, it features three hundred flower-shaped perforations that transform the material's surface from opaque to lace-like. Each shape is different from another; the arrangement of perforations reveals no obvious pattern. At the gallery entrance, the curtain's white side shows itself first. A thin layer of multicolor pinstripes extends vertically across its surface, a drawing-like arrangement of parallel strings. On the other side, the surface has a more elaborate texture, the result of loosely layered floral appliqué, silver on silver. For every cutout there is an applied motif, the latter produced as an outcome of the former. Overall the installation is thin, but not flat. Multiple layers of information are compressed into minimal thickness, with a tangible difference between how the curtain appears from a distance as opposed to up-close. Subtle changes in lighting and air circulation animate the surface as petals and strands shimmer and move. The floral appliqué plays an important role in drawing the observer in, but its other significance is in how it collaboratively engaged the makers involved in the design and fabrication process.

View of the appliqué process with spools of colored thread
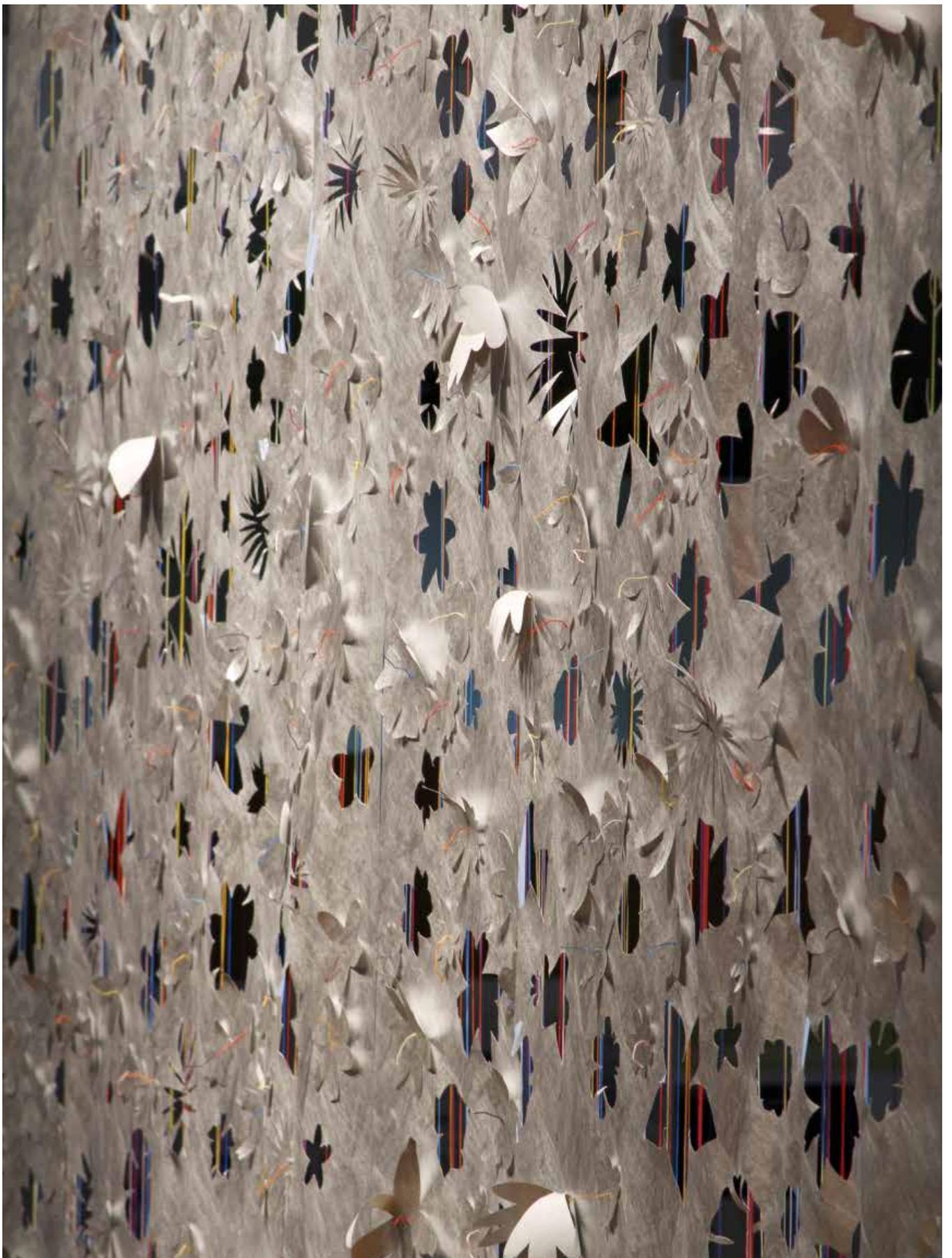
Detail view of appliqué on the silver side of the curtain _ Overall view of the millefleur pattern produced through subtraction and addition of floral motifs

Detail view of the colored thread indexing individual participants

Floral Geometries and Participatory Application

The project's initial objective was to design a parametric process that automatically generates a differentiated series of singular floral geometries for distribution across a surface. Instead of representing actual species of flowers as they appear in nature, however, the approach was to sample basic part-to-whole relationships of actinomorphic flowers in order to establish a generative design process. An actinomorphic flower is radial in form, with three or more petals arranged around a center point. Examples of such radially symmetrical blooms include daisies, dandelions, petunias, and lilies, among many other species. A polygon that is both equiangular and equilateral abstractly describes their basic morphological organization. In the initial parametric definition, such a polygon serves as a base geometry whose number of sides as well as its overall size are numerically variable. The sides are identical curves rotationally arrayed around the polygon's centroid to form a closed geometry. Symmetrically distributed points and knots along the curves—constrained to produce convex edges—result in a range of petal profiles, from smooth to serrated. The crosspollination of radially symmetrical shapes of different numbers of sides/petals produces new morphologies, namely those that in nature are referred to as zygomorphic. Orchids are an example of a zygomorphic flower, one whose symmetry is bilateral rather than radial. Each iteration of the process yields a mixture of actinomorphic and zygomorphic forms described by individual sets of closed curves, ready for output as cutting paths in digital fabrication.

The discrepancy in size between available fabrication machinery and the much larger surface of the material required a successive combination of digital and manual cuts. First we fabricated laser-cut templates from the initial digital files. Then, we could incise the motifs onto the larger material by tracing the templates' outlines with a cutting tool. This moment of translation marked a break from the digital workflow, a problem that posed itself as a new opportunity. We recognized that the physical realization of the piece from that point on depended not only on manual labor, but also on additional judgment and creativity. To produce the millefleur effect on the surface, the hundreds of floral motifs

required a set of manageable rules for their distribution. Though this could have been simulated with little effort digitally, such an option would have required a potentially tedious process of translation from the computer screen to the material itself. Instead, the decision was to invite a group of participants to collaborate on the project and collectively determine how the pattern would evolve throughout the process of making. Rules, in this way, would emerge in real space and time through the interactions of participants—a combination of individual choices and group dynamic—rather than through computation.

A workshop took place at the University Co-op Materials Resources Center, organized by curator Jennifer Wong. Twenty-two participants produced three hundred highly detailed floral cutouts in a period of four hours. The participants selected both the templates that they wished to work with and the placement of motif on the material. The only predetermined guideline was to distribute the motifs across the surface without producing any discernable regularity or repetition in the pattern. As a group, the workshop participants negotiated how to organize themselves around the work area as well as collectively discussed the qualities of the overall pattern as it gradually emerged: Was it evenly distributed? Would it benefit from changes in density? How might a particular motif frame a view through the material? Each team member kept a log of the particular motifs that they cut out as a means of tracking authorship within the group process. Based on this information, each participant is identified by a specific color of thread used for applying the floral cutouts back onto the Tyvek substrate. The method is simple: a single stitch is made at the center of each flower, with tight knots on both sides of the material to keep the assembly in place. On the side with the floral applique, the thread is trimmed to a consistent one-inch length; on the other, it hangs all the way to the floor. Cumulatively, the long strands of multicolored thread produce another material layer that adds depth and detail to the surface. This layer—a floor-to-ceiling fringe—registers as a gradient of density cascading from top to bottom, with the densest accumulation of strands occurring closest to the floor. The strings surrender to gravity as they freely drape, a collection of seemingly perfect vertical lines

Fabrication during the participatory workshop, photograph by Alison Steele

Colored thread based on authorship

Detail view of the floral cutouts

that upon closer inspection reveal the material's unruly behavior; hair-like, the strands clump together and move apart under the influence of air circulation. One may be compelled to brush it back into order, tangle it into a bigger mess, or maybe braid it. By allowing the minimal stitch to extend into a seemingly excessive long strand, the thread's role is expanded from that of a material connection to an indexical device. The presence of each participant in the process is made visible through the array of colors, with the overall pinstripe fringe serving as a diagram of the group's collaboration.

Innovative applications of digital fabrication technologies at the scale of architectural installations have over the past decade produced an interesting, if paradoxical, problem of excessive manual labor.[2] While digital technologies allow for both the design and fabrication of highly differentiated components, their accumulation into the final physical form often necessitates tedious assembly procedures requiring many sets of hands. Quite frequently, individual choice and action of the multiple participants during assembly are minimized in favor of the overall digitally-driven order already established during the earlier phases of design. This project's participatory nature is motivated by the desire to embed the possibility for authorship throughout the process of assembly that is simultaneously team-based and individual, while allowing for variation among the multiple parts to register as outcomes of both digital and social processes. The aim as such is to transform what may be experienced as repetitive manual labor into a creative, interactive and open-ended endeavor. It is telling that there was not a single drawing or other representational document of Millefleur (Wallflower) that was or could have been made before the piece was installed in the gallery. Not only does the installation resist conventional architectural representation altogether (It is too thin to draw in plan as anything other than a single line, for example, while the texture and unruly nature of the material at the scale of the detail make any attempt at drawing it in its entirety practically impossible.), it also insists that the design process does not end and thus cannot be fully represented until the work is fully realized materially and spatially.[3]

Conclusion
As a material artifact Millefleur (Wallflower) occupies the space of the gallery as a textured textile, a curtain, and a synthetic vertical garden of digitally generated floral species. It also occupies a moment at which cultural associations with floral décor and ornamentation seem to be shifting. The current reemergence of floral forms and patterns in design, under the influence of digital technologies, may perhaps signal a transformative evolution of a historically continuous aesthetic vocabulary. Or, it may instead be understood as a series of attempts to link not with history, but rather with popular culture, referencing as such on-trend fashion,

street style, and ephemeral home décor—not unlike Robert Venturi's 1978 façade for the Best Showroom with its array of red and white Warhol-like flowers. Either way, I would argue that digital technology in design has fundamentally transformed the relationship between the natural (flower) and the synthetic (floral motif) in a way that differentiates cutting-edge flower-inspired design today from any of its past precedents. More precisely I am suggesting that what is appealing about floral forms (as well as other natural species) in design today is not how they may be represented through images, but rather how their morphologies may be captured as a basis for a computationally driven generative process. With Millefleur (Wallflower) then, the attempt was to sample such geometries in order to produce a generative process for parametric pattern-making, rather illustrating actual species of flowers. At the same time, the intent was to fine-tune the process so that the resulting forms still resembled flowers in some way. This was important because we wished for the observer to find something in the abstract geometry that they could project their prior experiences onto, sort of like a Rorschach blot that leads one on to read the form in a particular way. Despite the forms' actual, entirely algorithmic origin, such a recognition on the observer's part broadens the context for the work in a way that we find enriches the experience of encountering and interacting with it. In other words, by seeing a field of flowers—rather than an array of abstract blobs—the installation can be simultaneously associated with the natural world of plants and the cultural tradition of floral embellishments. Flowers—growing, cut, painted, and digitally generated—have a powerful role in the material world, with associations that range from exquisite beauty to bad taste. The making of Millefleur (Wallflower) as we know it would not have been possible without the digital tools with which it was realized. The hope is that an artifact made in a new way also has a capacity to elicit new kinds of experiences and perceptions.

Notes
1_Elaine Scarry, On Beauty and Being Just (Princeton: Princeton University Press, 2001), 3.
2_Exceptions to this claim – at least in the context of academically recognized works of architecture – do of course exist, but they occurred outside of established cannons. A noted example is Robert Venturi's façade for the Best Showroom from 1978. Though no longer in existence, façade panels are archived at the Museum of Modern Art in New York.