
Vitalized Geometry

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This research project presents a new form of digital pattern making over architectural surfaces by looking at Walter Crane's notion of figures and scaffolds. In "Form and Line" Crane states that the "law governing extension of design over surface" is build upon "emphatic structural lines". A "satisfactory pattern" has to be developed based on constructive lines that can either be integrated into the design as a motive or concealed by placing the primary pattern over those lines. The scaffold allows for variation and richness: it is not perceived as a restriction. W. Crane applies his approach to friezes, ceiling decorations, wallpaper – in short: to 2-dimensional pattern making, which is based on a rectangular or triangular grid within certain boundaries. This approach is applied through a similar approach to both – the scaffold and the pattern – as an application for structuring a 3-dimensional surface.

In his designs, Crane uses a grid-like tessellation to control the pattern propagation and interrelation of tiles. This grid could also be further subdivided into triangles to produce alternating repetitions of figures and interlocking relations. Although these subdivisions mainly follow orthogonal scaffolds, triangular scaffolds could instead be applied to any shape and any three dimensional form by starting with triangles instead of grids.

This notion of triangulation produces various challenges on the notion of pattern making. Since the adjacency of tiles and the figures to

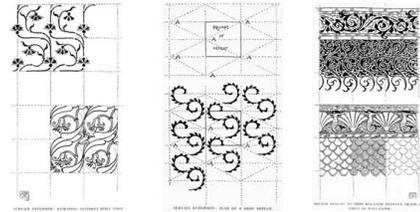
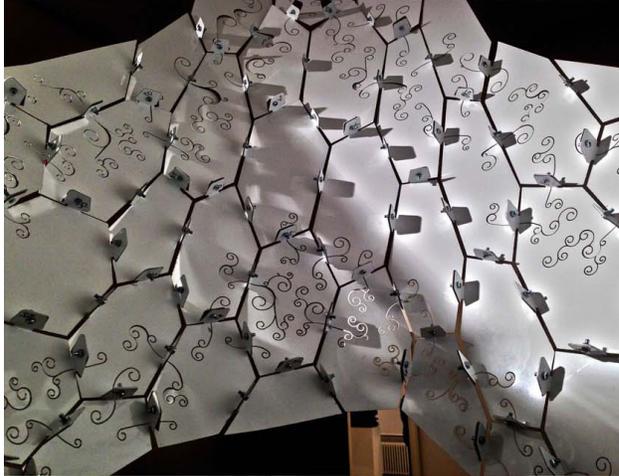
be placed on top of the triangulation become more dynamic, thus, the end result can disturb the continuity and regularity of pattern. To solve this issue our project introduces another dimension to scaffolding using Poisson disk distribution (Bridson, 2007). Rather than placing figures directly inside triangle patches, the triangles will be used to generate a uniform point cloud and twig figures will be placed over the triangulation.

A prototype was fabricated to test the visual and material properties. The exhibition was located at the former villa ..., which was build at the turn of the twentieth century. The museum is characterized through its ornamentations, painted ceilings, wooden paneling and stucco works. Those characteristic structures would have been almost destroyed during the restoration in 1995, if the department of building protection of the city ... had not intervened.

In reference to the history of the building we designed an installation, which shows an interpretation of one of the existing baroque ceiling motives. The room, even though located in the old building, is one of the few rooms without such pre-existing ornaments. The stereometric stucco cast is transferred into a tectonic form of polygonal metal elements, which form a suspended structure through aggregation of planar facets. Relief becomes space, the single-sided surface is doubled into interior and exterior, solidness becomes thinness.

A Semperian Stoffwechsel, a change of matter, takes place, where one material is informed by the properties of another.

Tendrils, which are cut out of the individual facets, grow within the artifact as well as within the surrounding space through shadows that are cast through the openings.



pattern diagrams by Walter Crane, Form and Line, 1900

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Keywords: Tendrils; Patterning; Making; Facets.

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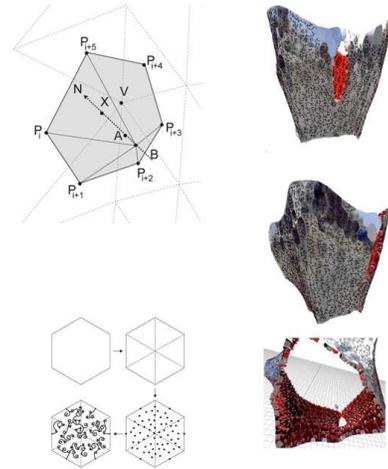
This notion of triangulation produces various challenges on the notion of pattern making. Since the adjacency of tiles and the figures to be placed on top of the triangulation become more dynamic, thus, the end result can disturb the continuity and regularity of pattern. To solve this issue our project introduces another dimension to scaffolding using Poisson disk distribution (Bridson, 2007). Rather than placing figures directly inside triangle patches, the triangles will be used to generate a uniform point cloud. These points will then be used to define the placement of twig figures over the triangulation. As a result, the uniformity, continuity and overall density of the pattern could be maintained.

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Tendrils, which are cut out of the individual facets, grow within the artefact as well as within the surrounding space through shadows that are cast through the openings.

References
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 Bridson, R., 2007, "Fast Poisson disk sampling in arbitrary dimensions." ACM SIGGRAPH, Vol. 2007, D.Cohen-Steiner, P.Alliez, P., and M. Desbrun, Variational shape Approximation, ACM Transactions on Graphics, 23(3), Aug. 2004, pp. 905-914.



Left top: diagram showing a planar cell
 Left bottom: pattern generation within one cell
 Right: digital prototype