This project sought to explore parallels between techniques of two-dimensional image construction and the tectonic considerations present in the design and fabrication of building enclosure. Through rigorous examination of digital image manipulation and reproduction techniques, such as error diffusion, dithering, half-toning, and lossy-compression quantization, a strategy for the articulation of complex arrangements of patterns and edges across a building façade was developed. The primary conceptual intention behind this project was two-fold:

1. To interrogate the notion of “optimization” with respect to a contemporary understanding of fabrication, using the “image” as conceptual link between the efficiency of a digital system and the performance of a real-world tectonic system.

2. To exploit the effects of such optimization strategies, such that the resultant reduction in “resolution” of the system works to enhance the spatial qualities. In this way, optimization becomes an asset to spatial conditioning, rather than a necessary compromise.
THE IMAGE IN CONTEMPORARY DIGITAL ARCHITECTURE

The use of digital image mapping and pixel data extraction techniques in the development of architectural form is neither new nor groundbreaking. In fact, examination of “the pixel” is arguably the most rudimentary means of extracting data for digital abstraction and manipulation. For instance, the extraction of color and brightness values from an image as a means of manipulating some systemic design parameter across a field condition features heavily in even the most conceptually superficial attempts at digital design. And yet, very rarely is the construction of the digital image itself examined with any degree of rigor.

In the development of the May/September façade, examination of the “image” began further upstream—at the point at which the image itself is created, taking into account the distortion, abstraction and optical processing that occurs so that the image may be efficiently projected onto a screen. This process of altering the “actual” image data through techniques such as error diffusion, dithering, half-toning, and lossy-compression quantization, not only increases the efficiency of the digital file but, in fact, also brings the image closer to its real-world likeness.

Noise, as both a concept and as a function becomes an important tool in the development of the façade. While noise is often understood as an unfortunate byproduct of image or sound reproduction, in this case it becomes a modifier of a condition. In the same way that grain can impart a tonal contribution to a photographic image, it can also be synthesized into a numeric data set in such a way that obscurity is controlled. Introduction of noise is therefore extremely useful—both in a quantitative sense (by minimizing necessary resources or processing power) and a qualitative sense (by improving the likeness of the resultant digital image).
INCREASE OR REDUCE DIFFERENTIATION?

Contemporary modes of digital production often strive to capitalize on the potential for unrestrained differentiation in design and output. Mass-customization of components is rapidly becoming the status quo—and yet, how much of this differentiation is actually necessary for the articulation of gradient spatial conditions?

There is an ongoing trend to embrace infinite variability of components within the academic discourse of architecture, though the theoretical ideal of mass customization remains at odds with reality of mainstream contemporary construction and fabrication techniques, particularly on an architectural scale. In a typical fabrication context, every variation in assembly component is coupled with a substantial increase in time, labor and cost—and it would be naïve to believe otherwise. This brings the notion of “waste” to the forefront, both conceptually and pragmatically. As techniques and technology continue to bring variability of componentization, an inevitable tipping point may be seen on the horizon; one where one may ask “Just because we can, doesn’t mean we should”.

The obvious goal of optimization, then, is to reduce the number of different components necessary to create a spatial effect before the system “breaks” or the overarching design intention is no longer coherent. Further than that, though, there is potential for this process of reductive optimization to actually improve the spatial integrity of the system. And so, it becomes both necessary and beneficial to exploit moments of commonality and repetition within the system.

ERROR DIFFUSION

The production of images has naturally followed the historic limitations of print (and later digital) technology. Most are familiar with the moveable type Gutenberg press as well as the woodblock printing that came before. These early technologies, and the improved versions centuries later, allowed for the relatively quick production of printed type. As technology advanced, so did the capability of including images along with type through various mechanically reproducible means. Of particular interest in the project is how binary conditions in the printmaking world resulted in an increased focus on obtaining the most from the least. The ability
to produce complex images, including perceived shades of gray or various color hues, while still being produced with a single color. Half-toning is the most commonly used method today and is a good example of a technique that uses a very limited palette of colors, along with spacing and dot sizing to create a complex image.

May/September engages phenomenal qualities seen in both dithering and error diffusion processes in printmaking to leverage a “palette” of architectural components to derive a noise-based textural building enclosure. In this way, three basic typologies, with three sized subsets, along with part mirroring to produce a palette of eighteen unique parts. These components, along with a yellow/blue binary color palette, work to produce a complex, though nuanced condition using a relatively small set of variables. The manipulation and translation of a limited set of components becomes a more interesting challenge rather than just adding more unique parts.

**IMAGES CREDITS**

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**ROB LEY** is the founding principal of Urbana, an architecture and design studio based in Los Angeles. Mr. Ley’s studio engages current material and formal technologies to develop environments that respond to human inhabitation and experience. Urbana’s recent experimental work includes installations at the Storefront for Art and Architecture in New York, The Taubman Museum of Art, Materials & Applications in Los Angeles, and Florida State University. Ley has been awarded several notable grants including a Graham Foundation grant, multiple AIA research grants, and an IDEC Special Projects grant. In 2010, Urbana was presented with the Best Storefront Design award by the Municipal Art Society of New York for Reef at the Storefront for Art and Architecture.