

Rethinking Egyptian Crafts Through Parametric Design

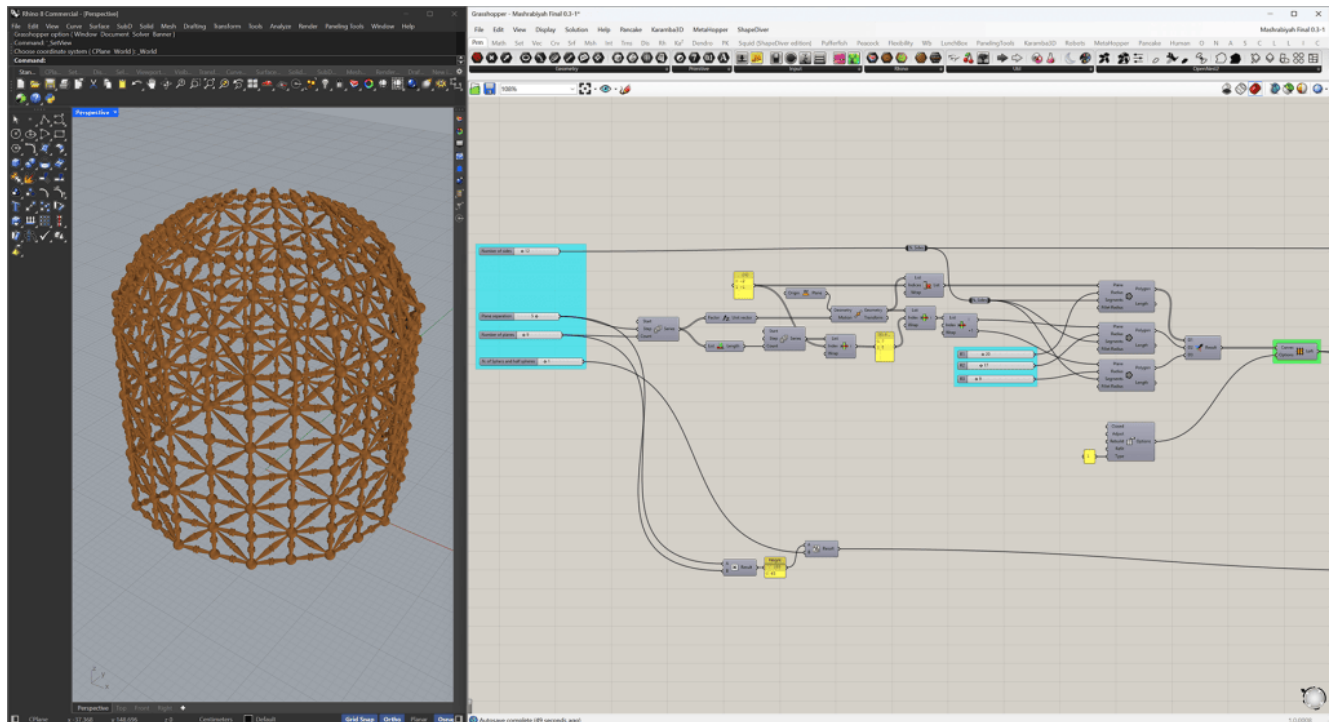
Traditional crafts are often discussed as cultural artifacts that should be preserved. However, preservation alone can sometimes leave these practices disconnected from contemporary markets, production methods, and design opportunities. At the [German International University](#) (GIU) in Egypt, thesis supervisor María José Nicholls proposed a different approach through the Industrial Design bachelor's thesis theme "Rethinking Egyptian Crafts through Parametric Design."



Render made on adobe firefly

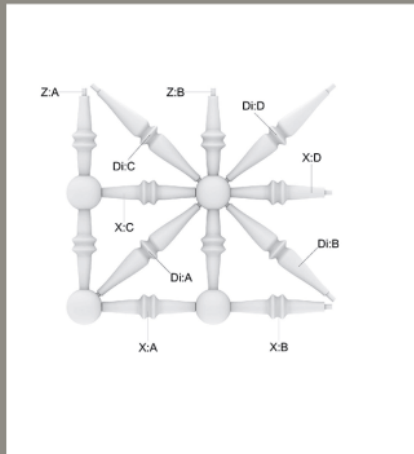
Final furniture proposal generated from the Mashrabiya parametric system. The workflow enables multiple design variations while maintaining the underlying craft logic.

The objective was not to digitize or automate traditional crafts, but to explore how computational design could help them evolve while keeping artisans at the center of the process. Through [Rhino](#) and [Grasshopper](#), students investigated how traditional craft knowledge could be translated into adaptable systems capable of generating new applications, products, and production workflows.



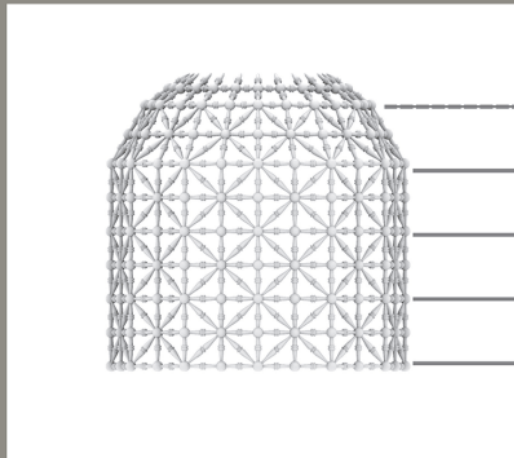
Grasshopper definition used to generate alternative volumetric configurations by controlling parameters such as proportions, levels, and overall geometry.

What makes these projects particularly notable is that both students began the process with only a basic understanding of Grasshopper. Throughout the development of their theses, they learned computational design methods while simultaneously applying them to real design challenges, using Rhino and Grasshopper not only as modeling tools but as frameworks for thinking about fabrication, modularity, production logic, and craft preservation.



One Module

Made of two verticals, one main vertical, and a mid vertical.



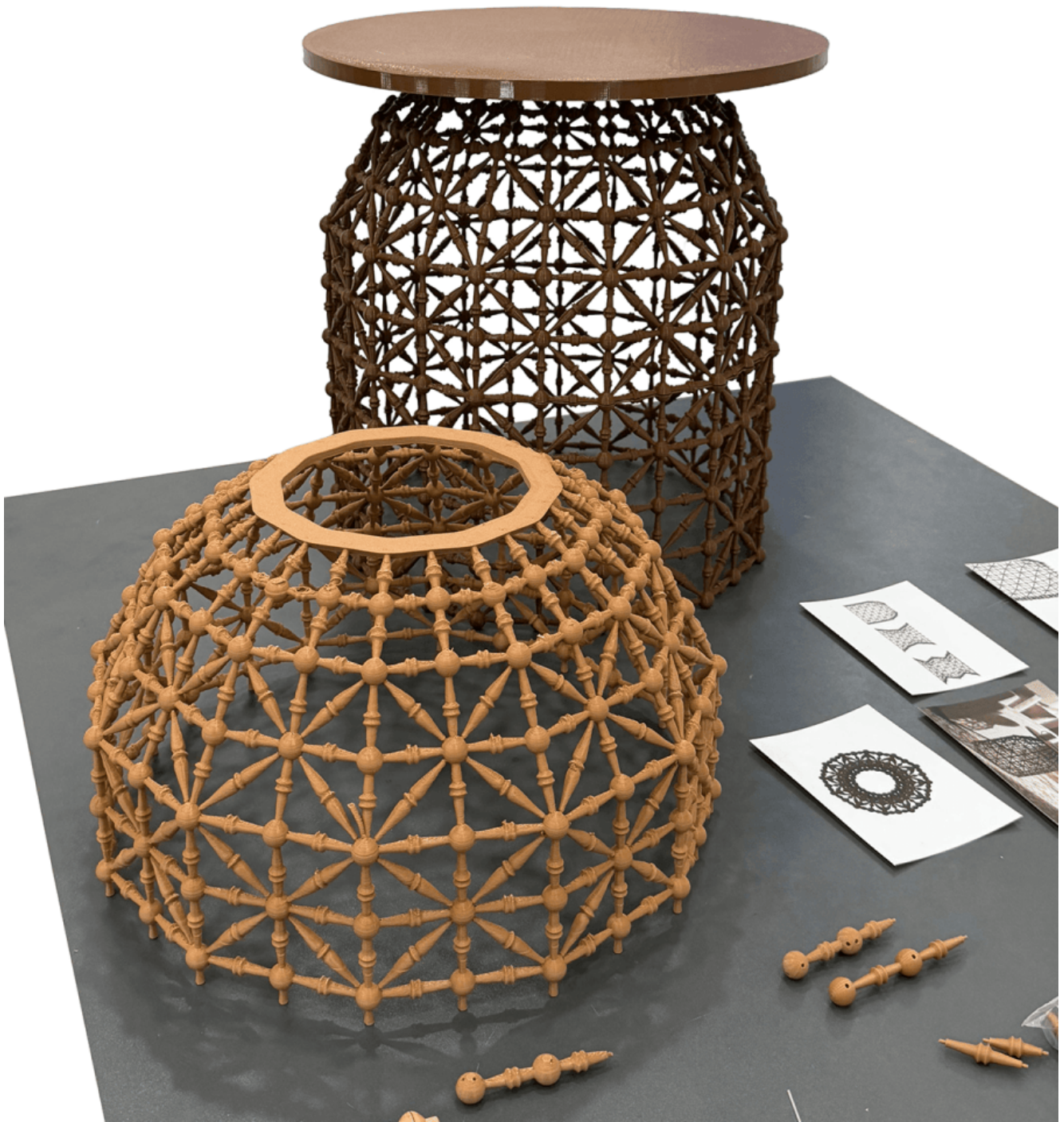
The levels are contained of repeated modules.

Parametrically generated component layouts used to organize and prepare individual pieces for fabrication and assembly.

MASHRABIYAH REDEFINED

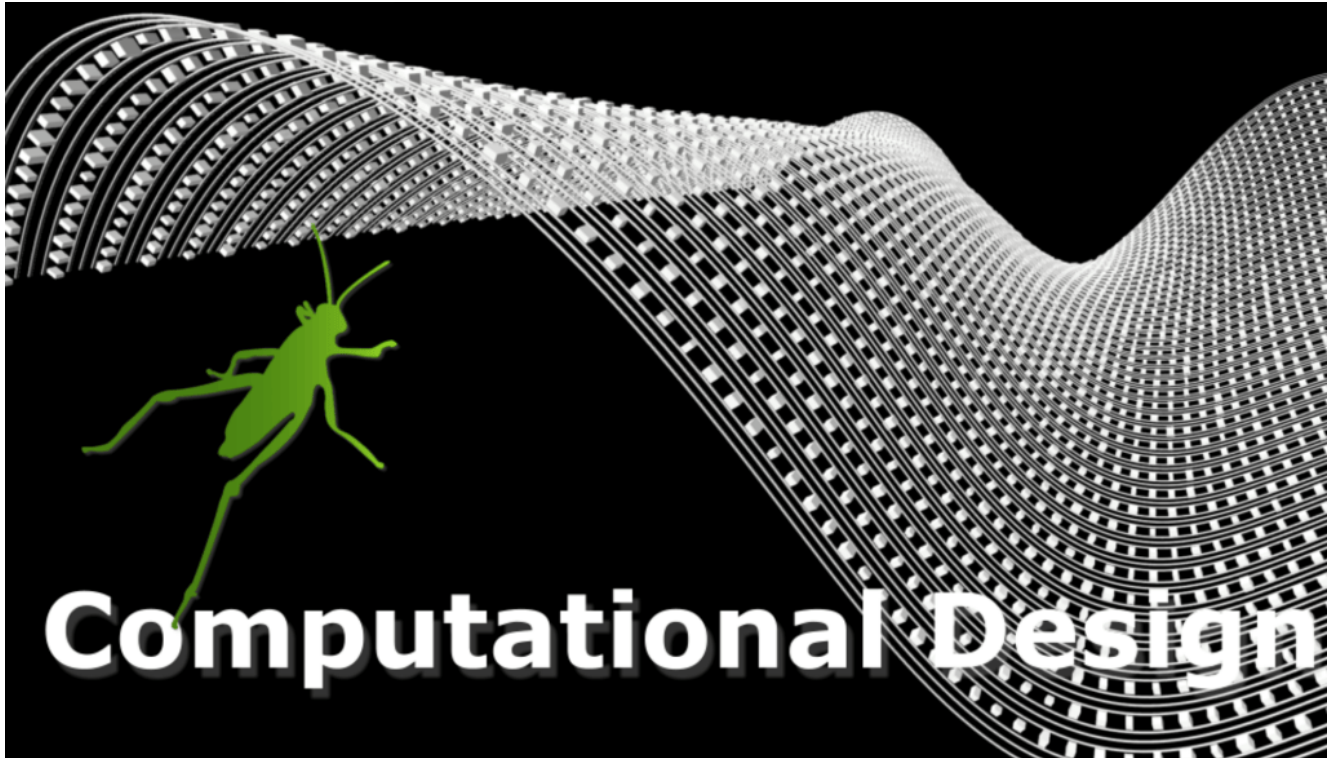
The first thesis, developed by Malak Fares, focused on Mashrabiya, a traditional Arab architectural element composed of carved wooden lattice screens commonly found in windows, balconies, and furniture. Beyond its decorative qualities, Mashrabiya has historically been used to control privacy, airflow, and light.

Through field research and analysis of traditional construction logic, the project sought to translate one of the most common Mashrabiya patterns into a parametric design system that could generate new forms while remaining compatible with traditional woodworking techniques.



3D-printed proof-of-concept prototype used to validate the assembly logic and modular structure of the system.

Using Grasshopper, Malak developed a modular workflow that transforms simple geometries into complex lattice structures composed of individual manufacturable components. The system parametrically controls proportions, curvature, density, and module distribution, allowing multiple variations to be generated from the same underlying logic.



[See Also](#)

[COMPUTATIONAL DESIGN WITH GRASSHOPPER](#)

Rather than producing a single fixed design, the project functions as a scalable generative system. The workflow breaks each design into individual components and generates fabrication data for every element. It also creates assembly aids, such as custom jigs, that help craftsmen manufacture and assemble pieces with greater precision.



Judy Yahya and thesis supervisor María José Nicholls with Illuminated Narratives, a thesis inspired by the traditional Egyptian craft of Talli embroidery.

As a proof of concept, the thesis culminated in a table prototype that demonstrates how traditional Mashrabiya construction principles can be extended beyond their conventional two-dimensional applications into contemporary furniture forms.

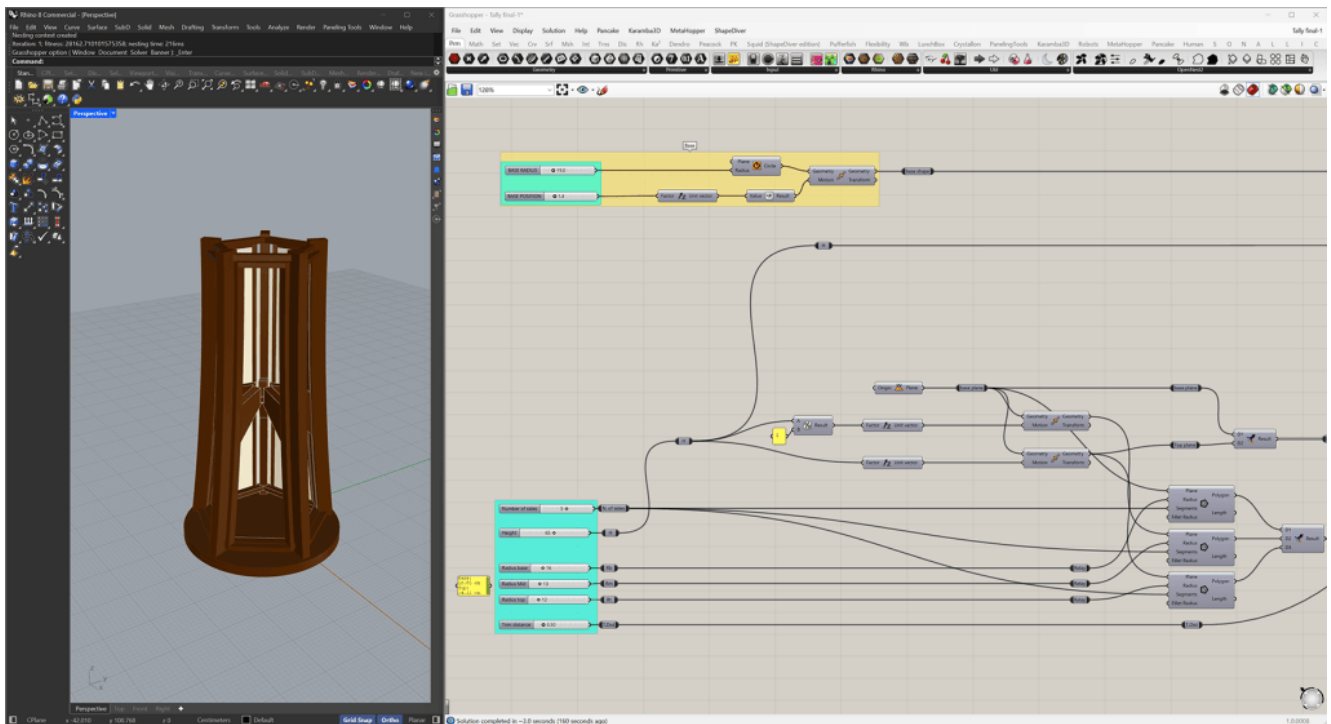


The completed lamp uses embroidered Talli panels to create changing narratives through projected light and shadow.

ILLUMINATED NARRATIVES

The second thesis, developed by Judy Yahya, explored Tulle bi Telli, commonly known as Talli, a traditional embroidery craft from Upper Egypt in which thin metal strips are hand-embroidered into fabric to

create decorative and narrative motifs.



Rhino and Grasshopper workflow controlling the lamp's geometry, dimensions, proportions, and structural configuration.

Historically associated with garments and textiles, Talli carries visual stories that reflect everyday life, local culture, and community traditions. Judy's project investigated how these narrative qualities could be reinterpreted through a contemporary product while creating new opportunities for the craft.

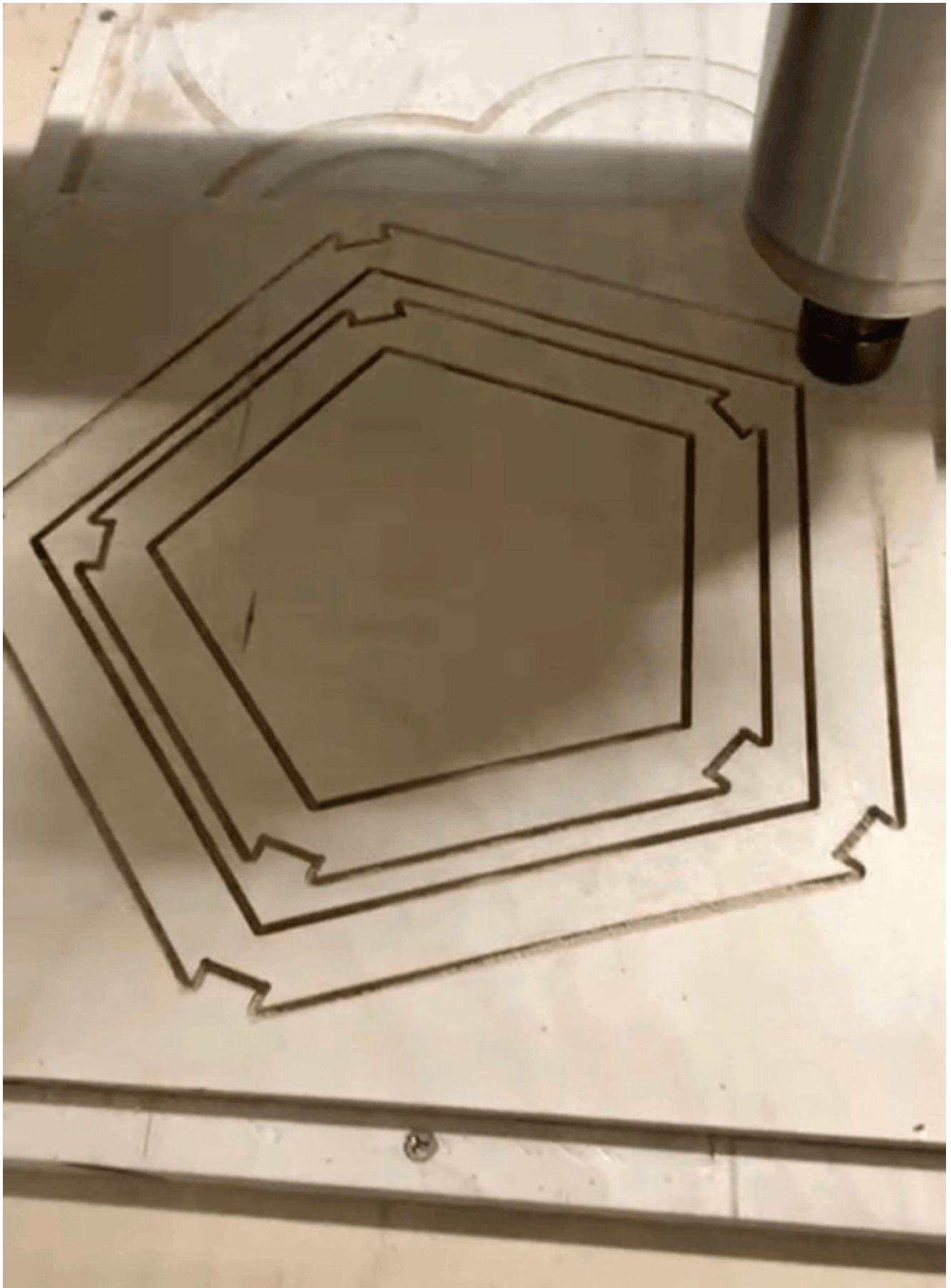
The result was a parametric lighting system that transforms embroidered motifs into storytelling devices through light and shadow. The lamp consists of interchangeable embroidered panels that allow users to alter the visual narrative by rotating or replacing individual sections.



Detail of a handmade Talli embroidery panel incorporated into the final lighting system.

Developed with Rhino and Grasshopper, the system controls multiple aspects of the design, including overall geometry, dimensions, number of sides, structural configuration, and lighting behavior. Beyond form generation, the computational workflow also manages fabrication-related tasks such as nesting optimization, assembly logic, and adaptive light placement according to the lamp's dimensions.

Digital fabrication methods, including CNC routing and laser cutting, were used to produce the structural components, while the embroidered panels remained handcrafted, maintaining the direct involvement of Talli craftswomen within the final product.



Digital fabrication process used to manufacture structural components for the lamp.

BRIDGING HERITAGE & CONTEMPORARY PRODUCTION

Although the two projects work with different crafts, both share a common objective: treating traditional crafts not as static traditions, but as living systems capable of adaptation.

By combining Rhino, Grasshopper, digital fabrication, and traditional craftsmanship, the projects demonstrate how computational design can function as a bridge between heritage and contemporary production. Rather than replacing the knowledge embedded within these crafts, the workflows seek to create new opportunities for their application, helping traditional practices remain relevant within modern design contexts.



Assembly of the lamp structure combining CNC-produced.

Together, the theses illustrate how computational design can be used not only to generate form, but also to rethink relationships between design, fabrication, culture, and craft.

CREDITS

Thesis Supervisor: María José Nicholls

Students: Malak Fares, Judy Yahya