Figure 1. Photograph of bronze door knockers mounted for exhibition at the Rochester Institute of Technology. Photograph by Nate Tangeman, used under permission.

Modern Tools, Ancient Skills: An Attempted Dialogue between AI, Design and Traditional Craft

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Premise

Since Industrial Design made its debut as a foundational element of the Industrial Revolution in the 19th century, the dialogue between artifacts, humans, and machines has become increasingly more complex. Issues of ownership over technological progress and the unequal systems of power that followed have further complicated this dialogue. From the resistance of the Arts and Crafts movement to the enthusiastic machine-oriented aesthetics of Bauhaus, the relationship between those who design and those who produce—whether human or machine—has frequently reconfigured the value of the different roles involved in the production process. In modern Western societies, the reaction to the capitalist economic system has fostered a revival of craft as an elitist "designer as makers" trend. In contrast, in the Global South, the vast majority of artisans, who preserve traditions and possess endangered skills, are still relegated to the lowest part of society and typically do not possess the tools and technologies to evolve their production. They are often considered mere executors of others' ideas or, even worse, forced to copy mainstream products and styles. Moreover, the artifacts they produce are often stereotyped and locked into the past, either preserved as simulacra of local traditions or relegated to mere souvenirs, which hugely limits their potential present value. In opposition to the static preservation of traditional craft, the advent of algorithm-based creation platforms is carving a totally different path. The ease of producing infinite digital versions of the same object, access to an infinite (and controversial) storage of creative stimuli, and an almost uncontrollable evolutionary speed has once again set machine technologies and human craft on very opposite stands.

In this paper, we aim to investigate how the advent of new means of creation, specifically machine and deep learning, can offer the chance to reflect on how these two extremes can relate to each other. Additionally, we explore how they both relate to the design practice and how they can all contribute to a common discourse. Our scope is exploratory and must be understood within the disciplinary frame of Research through Design. "Research through design (RtD) is an approach to scientific inquiry that takes advantage of the unique insights gained through design practice to provide a better understanding of complex and future-oriented issues in the design field" (Godin, Zahedi, 2014). Our goal is not a quantitative analysis of the influence of AI on traditional craft, but rather an embryonic observation of how a new technological phenomenon relates to vernacular knowledge and how the representation of digital images collides with their physical production. This work seeks to open a discussion around creativity, ownership, and certain criticisms of AI; however, we preferred not to pursue the path of design as a problem-solving activity but rather focus on its ability to unveil more questions around a topic that is as controversial as it is promising.

While the conversation around AI extends far beyond what is discussed in this context and touches on many critical angles from environmental sustainability to the ethics of labor, we have decided to limit our observations to the specific realm of product design at the convergence of material culture and technological access.

The nature of this work is collaborative, and the artisans who took part in this work must be seen as partners and not research subjects. Our process developed from procedural to propositional knowledge (Niedderer, 2021). Procedural knowledge is the experimental knowledge-in-action; free of preliminary constructs, it emerged during the ideation and —

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development of the design projects and manifests through the exploratory attitude of the collaboration. Propositional knowledge, by contrast, "helps to grasp and formalize experiential knowledge by conceptualizing it in the form of language," (Niedderer, 2021) and it manifests mainly in this paper as a post-rationalization phase through which we share some reflections on what we observed during the design process.

Despite our best intentions and a very careful ethical conduct in developing this work, we are acutely aware of the dynamics of power that can emerge within projects of this kind. We will discuss in the following paragraphs how we operate to mitigate them and ensure that the experience was built on the principles of intellectual honesty and reciprocal benefit.

For the purpose of this research, we looked at Guatemalan traditional craft as the ideal context in which to conduct our study. The artisans were taught how to engage with a generative AI algorithm using only their mobile phones to co-create alternatives to their traditional production. The algorithm in this case is utilized to speed up the evolutionary process of vernacular items under the careful supervision and approval of the artisans. The latter are then responsible for translating the two-dimensional images created with AI into three-dimensional objects, to which they will add their final unique contribution to this interspecies creative conversation.

In choosing the specific geographical context of Central America, we are particularly interested in a couple of critical points. The first concerns digital representation and how the totality of machine learning algorithms is trained with datasets that have often proven to be biased, over-weighting or over-representing characteristics belonging to the dominant cultures within which those datasets were created (Buolamwini et al., 2018). The second involves reflection on how new tools and methods could help rewrite the relationship between pre-colonial and post-colonial artifacts, granting vernacular practices a place within the present and future of material production.

Historical Background

According to UNESCO's definition of craft, "Artisanal products are those produced by artisans, either completely by hand, or with the help of hand tools or even mechanical means, as long as the direct manual contribution of the artisan remains the most substantial component of the finished product..." (UNESCO, 2003). The relationship between hands and tools, one of the focal points of this investigation, has a long and turbulent history. Following Edward Lucie-Smith's analysis of the history of craft, which primarily follows a Western-oriented and Eurocentric narrative, craft can be explained through three different phases (Lucie-Smith, 1981). The first phase refers to a time when everything was made by hand or with simple tools; whether decorative, ritualistic, or utilitarian, everything was a crafted object. The second phase, at least in Europe, begins during the Renaissance and sees the start of the intellectual separation between craft and fine art, with the latter coming to be regarded as superior. Finally, the third phase, often connected to the Industrial Revolution but actually extending over a wider time frame, consists of the separation between crafted objects and machine-made products. With the introduction of Computer-Aided Design tools and digital manufacturing, along with recent advances in machine learning (ML) and Artificial

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Intelligence (AI), that separation is growing exponentially, separating craft and digital making in two very distinct categories.

Recently developed tools significantly impact the way designers operate and the nature of the work produced (Akhtar, Janajarajan, 2024). They fuel great expectations, promise unbeatable efficiency, but also spark profound criticisms (Crawford, 2021). Text-to-3D and image-to-3D ML models remain in their infancy, with nearly all the outcomes of AI tools operating within the digital realm, making it difficult to predict their integration with handcrafting processes.

The triad of artisans, designers, and tools may soon undergo another reorganization. Historically, the development of tools and production methods has significantly reshaped the relationships among the stakeholders in the design process. From the 17th century onwards, production was seen as a series of actions performed by different individuals, embedding the division of labor to eliminate variations and personal methods. This created a fragmented process where designers, seen as more intellectual, were separated from those using the tools or operating machines. The intellectual status of designers increased, while the roles of tool operators became more mechanical and routine. For artisans, the historical trajectory can be slightly different. Depending on their cultural context, geographical location, the quality of their artifacts, and class status, they can fit into two different categories. One sees them as fine artists whose work is appreciated and compensated on par with one-off or limited-series sculptures (Adamson, 2022). Artisans may maintain the ownership of their productions or be acknowledged by the artists or designers who commissioned the work; they are directly or indirectly exposed to the global market. The other category, which is the most globally common and the one around which this work is built, sees artisans residing in the lower part of society, often in economic struggle and forced into the reiteration of traditional techniques and canons.

From the Arts and Crafts movement's rejection of the "new tools" to the Bauhaus's full integration of arts, craft, and machines, we are now facing a new paradigm in which more powerful tools may once again contribute to reshuffling the power dynamics around product ideation. However, while the implications and opportunities of these new tools are easier to imagine for designers, what has sparked our curiosity, and is indeed explored in this investigation, is the relationship between the digital and physical, and the potential role that craft will play in a predominantly visual and intangible creation of content.

One final element of this research that deserves introduction is the relationship between technology and colonialism. The narrative of dichotomies is one of the many lenses through which colonial regimes underpin their hegemonic claims (Anderson, 2002). Along with global/local, first-world/third-world, modern/traditional, and developed/underdeveloped, the binary model low-tech/high-tech is the one that specifically relates to this work. The disparities evident in Western societies, where the tech industry is catalyzing capital and better-paid workforces, making the gap between the rich and the rest larger and larger (Johnson, 1989), are even harsher from a global perspective. The AI economy is a monopoly in the hands of a few and, most importantly, built within a specific cultural context with embedded biases. While gender and race discrimination have been highlighted and discussed (Benjamin, 2019; Buolamwini, 2018), the relationship between AI and more subtle —

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subjects like cultural nuances, or what UNESCO defines as Intangible Cultural Heritage (Bortolotto, 2007), of which craft is a part, is still unclear, with its consequences and implications not yet fully revealed. If we add to this equation the fact that local craft and indigenous practices are constantly facing cultural appropriation issues, as well described in the case of Guatemalan traditional textiles (Couillard Sosa, 2022), careful consideration must be given to cultural representation and technological inclusivity.

Project Setup

The first step of our research consisted of assembling all the necessary elements to ensure that a dialogue between artisan, designer, and AI-based tool could take place. As mentioned above, the participants we aimed to bring to the table were: an artisan, a designer, and an AI-based tool.

Regarding the AI tools, we opted for generative AI platforms, specifically popular text-to-image algorithms. At the time of the project's ideation, our choice fell on OpenAI's DALL-E as it was the easiest to use, had the softest learning curve, and included some early generative filling features that allowed for the editing of portions of the created images. We also adopted Midjourney, which was more powerful and accurate than DALL-E, to create higher-quality resolution images and to reflect on the potential alignment between sophisticated digital production and physically crafted objects. It is important to acknowledge that the unprecedented pace of AI technologies' evolution might make our tool choices appear questionable and obsolete when considered in light of the present state of the art. While DALL-E was a groundbreaking tool at the project's inception, even more advanced tools have since emerged that would probably better fit our research needs.

Finding designers was easy, as both authors of this paper are academics and practitioners within the product design field. Both have, in recent years, developed projects and courses around the integration of AI in product design processes and have worked in the past with artisans, being fully aware of the dynamics that occur throughout those exchanges.

Finally, the last addition to the group had to be the craft component—someone willing to engage in this conversation and experiment within this new framework. After careful consideration, which we will address below, we opted for a bronze casting shop based in Antigua, Guatemala. It is worth expanding on the motivations behind the selection of this partner artisan. Firstly, the type of craft we sought was one deeply embedded within a traditional legacy and subject to that preservation aspect, which in some ways delays the normal evolutionary process of material culture. This kind of craft is mostly present in the Global South, where many vernacular practices are still alive and in use. Our inquiry also encompasses the discourse around high-tech and low-tech, particularly the contrast between the perceived value of "advanced" technologies like AI and the actual relevance of what Edgerton (2011) defines as "technologies in use." These are tools and technologies that hold significance in specific contexts, regardless of whether they are classified as low or high tech.The complexity and well-known risks associated with multicultural research projects suggested to us that, to limit the chances of any unintentional misrepresentation, we needed to select an artisan belonging to one of the Principal Investigator's cultural contexts, either

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Italy or Guatemala. The latter responded better to our project's requirements, so we began our search for a partner around Antigua, Guatemala, where one of the Principal Investigators lived and worked extensively with the local community, with access to a rich concentration of traditional craft activities. After considering a few options, we decided to propose the project to Antigua en Bronce, a workshop specializing in creating bronze artifacts, particularly door knockers belonging to the colonial tradition of Antigua. The subject intrigued us, and the workshop had an online presence, uncommon for such local businesses, suggesting a certain openness to new technological environments.

Antigua en Bronce expressed immediate interest, showing friendly curiosity and willingness to participate. The head artisan, Mr. Dany Roberto Tinoco, and his collaborator, Carlos Enrique Cabrera, were integral to this project. Additionally, Mr. Tinoco's niece, Christa Marcela Dieguez, herself an artisan and heir to the family legacy of bronze casting, served as the main liaison for communication and technology management. The shop team's dynamic played a crucial role in the project's success. The younger niece of the master artisan/shop owner, also their social media manager, was instrumental as the mediator. She handled video calls and managed the DALL-E account, facilitating communication between the artisans and the design team. Her role was pivotal in bridging the gap between traditional artisans and modern technology, ensuring smooth collaboration and effective use of the provided tools.

A final note must be dedicated to the subject of our design, or rather the medium selected to explore the characteristics of this dialogue: the door knockers. Door knockers are the best-selling product of the Guatemalan artisans and allowed them to work on a subject they knew extremely well while experimenting with the new AI technologies. However, while the door knockers intrigued us for their colonial history and the possibility of building a hypertextual conversation around postcoloniality, the product type does not have specific relevance within this research context outside of residing within the selected artisan's skillset. Additionally, the knowledge and understanding of the Guatemalan context itself, well understood by the Guatemalan-born Principal Investigator, is not the focus of this investigation. The elements explored here are those functional to our main questions.

To conclude this section, a few notes are needed to better understand our research context. Guatemalan artisans, known for their culturally rich and intricate handmade products, especially in the areas of traditional indigenous textiles, weaving, pottery, and other traditional crafts, have faced significant challenges in the global market in recent decades. Globalization and the availability of industrialized products have put pressure on traditional products in their local market, where locals undervalue handmade items and often perceive them as inferior, or items that should be marketed to tourists or exported. Guatemalan artisans find themselves in a precarious position where their work is undervalued by their clients and by exporters and designers. This heavily skewed power dynamic often leads to the exploitation of artisans, who receive only a fraction of the price their work could ultimately fetch in international markets. It also keeps artisans an anonymous part of the production of their work, where the purchasing brand/exporter or designer is ultimately credited with the creation of the craft. In light of this present situation, part of our interest was to reflect on the potential reset of the existing dynamics under a new relationship between designers, artisans, and algorithms.

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Methodology

Once we had set the objectives, identified the context, and established the research partners, we crafted a methodological structure that would enable us to explore the potential of the algorithm-designer-artisan dialogue. Macroscopically, our process can be split into three major modules: learning, designing, and making. The learning module focused on acquiring the necessary information to access and use the technology; the design module involved the actual use of the technology within specific design challenges; the making module was about translating two-dimensional images into physical artifacts.

Learning

The learning module involved providing the artisans with access to the technology, teaching them how to use it, and inviting them to explore its opportunities and limits. The inability to travel to Guatemala forced us to conduct the workshops remotely, relying primarily on the contextual knowledge of one of the principal investigators, who is Guatemalan-born and has extensive experience working and living in Antigua. While virtual interaction limited our understanding of the physical context—such as the shop's actual dimensions and the dynamics between the shop's crew—it also mitigated any embedded biases that a preliminary visit might have introduced. Since we were dealing with digital tools, it was appropriate to adopt the modus operandi common to these technologies, such as faster content delivery through screen and file sharing.

A brief note on the Information Technologies (IT) adopted during the project: While we used Zoom for teaching sessions due to its broader array of features, we relied on WhatsApp for initial outreach, quick check-ins, and material sharing. WhatsApp is widely used in Central and South America and doesn't require any additional training. Most importantly, it is a common tool for communication among family and friends, making it more informal and helping to mitigate some of the power dynamics inherent in these kinds of investigations. The exclusive use of the Spanish language in all our communications also played an important role in this regard.

The learning process included three phases: tutorial, practice, and review. The tutorial consisted of a short workshop focused on introducing DALL-E's interface, basic text-to-image instructions, and a particular emphasis on the generative filling command, which allows for replacing parts of an image with new text-to-image input. This latter function, now common across many text-to-image platforms, was at the time only available on DALL-E, and despite its simplicity, represented one of the reasons for choosing OpenAI's product.

At this point, the artisans were given access to a dedicated DALL-E account with a pre-loaded amount of credits. They were asked to explore the tools, attempt to produce images relevant to their practice, and assess how the platform responded to their prompts. Having access to the shared account enabled us to monitor their progress and reflect on their creative attempts. An important factor to consider was the language used in the prompt editing: Spanish. The lack of inclusivity in machine learning models, especially in their earliest iterations, is well-documented (Reviriego, Merino Gomez 2022), and some of the specific

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Spanish terms used by the artisans were misread or not correctly identified by the algorithm. This led to initial frustration, which slowed their enthusiasm. For instance, the Spanish word "Aldaba" (door knocker), though recognized by the Royal Spanish Academy's dictionary, is of uncommon and localized use, resulting in unpredictable and unusable outputs. Eventually, the artisans found that using phrases like "Tocador de Puerta" (literal translation of door knocker) provided more targeted results.

After a couple of weeks of monitoring the DALL-E image archive, we met with the artisans for a second tutoring session. Together, we addressed the frustrations they encountered and helped them optimize their prompts to create images more aligned with their searches. Moreover, we noticed that the artisans tended to use the technology in an assertive manner, primarily writing prompts aimed at creating images that depicted something they already had a clear idea of, or that belonged to their existing visual vocabulary. In this session, it was crucial for us to encourage the artisans to consider the creative potential of DALL-E and to be inspired by new trajectories, rather than merely seeking an accurate visualization of something they already knew.

Design

After concluding the teaching and learning sessions, the research was ready to move into the design phase, during which the artisans were challenged to integrate Generative AI into their processes. To deeply understand how the new technologies could function within the traditional craft system and to reflect on the relationship between artisans, tools, and designers, we opted for a comparative analysis of three different scenarios that commonly occur in collaborations between artisans, designers, and their clients (Figure 2). The first scenario represents the pure expression of the artisan's will and curiosity after their initial exploration of text-to-image generation. The second scenario reflects the use of the AI tool to respond to a client's request. Finally, the third scenario involves the straightforward three-dimensional translation of a pre-given image created by the designers using AI.

Scenarios	1	2	3
Design Brief	Artisan	Client	Designer
Image Creation	Artisan	Artisan	Designer
Prototyping & Execution	Artisan	Artisan	Artisan
Hyper-text	Colonial	New Colonial	Post-Colonial

Figure 2. Note: Breakdown of different scenarios attempted for each of the three objects created, denoting a shift in responsibilities between client and artisan, as well as a shift in Hyper-text between past, present and future.

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Scenario 1: Artisan-Led Creation

In the first scenario, we commissioned the artisan to create a bronze door knocker, giving them complete freedom to decide the theme, subject, and form, with the only stipulation that their ideas be developed using DALL-E. This required the artisan to engage in an iterative process: inputting written prompts, evaluating the generated images, and refining the prompts to achieve a preferred outcome. Once the artisan was satisfied with one of the generated images, the concept was ready to be transformed into a physical artifact. In this scenario, the artisan drew directly from their knowledge and, although not explicitly instructed to do so, gravitated towards the stereotypical symbols and forms of traditional colonial style. Here, the dialogue occurred solely between the artisan and the AI tool.

Scenario 2: Client-Inspired Interpretation

In the second scenario, we aimed to replicate a common practice in artisan-client relationships, where the client communicates their desire for a product verbally, providing a general idea without specific details about the final outcome. The artisan is then responsible for interpreting the client's request and, through the lens of their own style, delivering the commissioned piece. We requested a bronze door knocker for a fast-food store in Antigua, a subject chosen to push the artisan away from tradition and encourage a deeper dialogue with AI on a new theme. As in the first scenario, the artisans used DALL-E to develop their ideas. They presented three options, from which the client (us) selected one to proceed to the production phase.

Scenario 3: Designer-Led Collaboration

In the third scenario, we focused on another common practice in the craft world: collaboration between artisans and designers, where the latter provides a clearer concept and more detailed instructions. In this case, the artisan's role is largely limited to the physical creation of the artifact, with little room for creative interpretation. For this scenario, where the artisans were not involved in using any AI tools, we opted for a more advanced text-to-image platform, Midjourney, to create a more sophisticated result. The artisan's role was to translate the two-dimensional image of the door knocker into a physical product. The design goal here was to create an image of a product that was complex, detailed, and unconstrained by practical production considerations. By exploring the translation from the high resolution of the AI-generated image to the lower resolution of a bronze artifact, we aimed to observe how the artisan responded and the choices they made during the design-for-production process.

Making

The last phase of the project focused on the production of the physical artifacts. This step aimed to highlight, throughout all of the three scenarios, how the artisan is the gatekeeper for translating two-dimensional images into three-dimensional outcomes, and to emphasize the dependence of digital representations on the artisan's hands to give a real body to their fascinating yet immaterial AI generated digital creations.

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The AI-generated images, following the three scenarios described above, were used by the artisans to create the three-dimensional forms that would ultimately be used to cast each bronze component. At this point, their process became completely "conventional," as the artisans are accustomed to receiving drawings, sketches, and photographs as references from their customers. The interpretation of these images into hand-sculpted 3D forms—a crucial step that demonstrates the artisans' spatial ability, skill, and knowledge of the casting process—is often undervalued and overlooked. The composition of these forms (Figure 3) varies depending on their size, shape, and complexity. A combination of wooden forms, clay, plaster, and more modern materials like automotive body filler are used to create the forms to be cast. Once the initial shape is satisfactory, these are hollowed out, shaped, and reduced (often from non-cosmetic surfaces) to minimize the weight and material utilization of the final bronze form.

Figure 3. Forms created by artisans in preparation for sand casting of bronze. These objects are a combination of wooden forms, plaster, clay, and automotive body filler. Photographs by Juan Noguera.

Some of the pieces must be split into several components to be molded satisfactorily. These pieces are welded together by the artisan after the bronze casting process is complete. The artisans use a sand-casting process that involves specially shaped mold boxes, first filled with a compressed mixture of molding sand, where the forms are carefully pressed. If the part requires a two-sided mold, a demolding agent is applied, a second mold box is assembled, and the second side of the mold is filled with sand and compressed by hand. The mold box can then be carefully split, and the original form removed, creating a cavity. Airways and gates are then pressed into the sand with a hollow cutting tool, creating a path for the molten bronze to follow during the casting process.

A traditional, coal-powered furnace is used to melt the bronze. This furnace is constructed of refractory bricks, built into the ground of the artisans' shop, a method that has been used by artisans in Guatemala for generations. After heating up a crucible and melting the bronze stock, the parts are cast into the sand molds and carefully removed. A labor-intensive process of hand finishing then begins. The artisans refine the shape of the objects, often adding textures and forms they deemed too fine to be reproduced by the sand-casting process. Multi-part objects are welded, and the objects are then filed, sanded, and buffed to their final finish. Any patina, paint, or other finish required by the customer is then applied.

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Notably, the artisans always consider the final use and application of the parts, as mounting features, assembly features, and hardware are integral to their design process. Many of these pieces are used daily (such as door knockers, bells, and railings), and they are designed to be functional and long-lasting.

Figure 4, Left. Dany Tinoco and Carlos Cabrera lift a crucible from the furnace to begin the casting process. (Figure 5, Right) Rough bronze casting versus finished and polished casting. Photo by Juan Noguera.

Hypertext Reading

The three door knockers create a narrative that reads like a hypertext, linking the colonial past, the colonial present, and a post-colonial future. Originating in ancient Greece and later brought to Guatemala by Spanish colonizers, door knockers serve as markers of stylistic transitions through different stages of colonization. These three scenarios also open windows to distinct conversations: the first directly recalls colonial times, the second emphasizes a new form of capitalistic colonization, and the third speculates on a post-colonial future where cultures reclaim their symbols. During the video call interactions between the researchers and the artisans, The artisans found these scenarios compelling, believing they effectively represent Antigua Guatemala, its heritage, and its complex present reality. This progression underscores the evolving relationship between traditional craftsmanship and modern technology, highlighting the importance of cultural preservation, adaptation, and self-determination amid changing external influences.

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The Three door knockers

(Figure 6) Photograph of bronze door knockers mounted for exhibition at a major U.S. based academic institution. Photograph by Nate Tangeman, used under permission.

In this section, we will discuss the final outcomes from this multi-voice dialogue. Our observations are not intended as universal guidelines for integrating AI with traditional craft or promoting AI use among artisans. Instead, as stated at the beginning of this paper, they are meant to reflect on a practice still in its embryonic stage, which may or may not evolve into a more established practice.

The Hummingbird Door Knocker - Scenario 1

Within this scenario, artisans were given creative freedom in the ideation and production of a door knocker of their choice, with the only requirement being to use DALL-E within their ideation process. The artisans' choice of a hummingbird highlights their connection to Antigua's colonial past and aligns with the type of products traditionally produced by the shop. While they could have worked outside the limits of a restrictive commissioned work and taken advantage of AI to get inspiration beyond their routine references, they solely gravitated toward designs they were familiar with. They looked for those stereotypical colonial motifs usually incorporated into their creations and that are known to be accepted and approved by their clients. Their approach demonstrated a tendency to use AI for direct representation rather than for exploratory collaboration. Moreover, we can observe an initial tendency to measure how much AI was able to replicate the artisans' mastery, partially to —

play around with the AI versus human paradigm and partially to test the AI's level of accuracy in following their instructions. As it was their first encounter with AI, their inexperience might have influenced this initial result. Notably, and this happened throughout all three scenarios, they ensured the door knocker was fully functional, paying attention to its mechanical and ergonomic elements, thus filling the functional gaps left out by the AI-generated images.

Hypertext

The hummingbird door knocker represents the colonizers of the past, specifically the Spanish colonization of Antigua. The hummingbird is used as a naturalistic symbol, like those commonly associated with Spanish colonialism. This piece reflects the artisans' traditional knowledge and their cultural heritage, often manifested in colonial symbols.

Figure 7. On the left, a selection from dozens of images generated with OpenAI's DALL-E text-to-image generator, prompted by the artisans. On the right, the selected image to be reproduced in bronze.

The Hamburger/Fast Food Door Knocker - Scenario 2

In this second scenario, the artisans were asked to create a door knocker for a fast-food store in Antigua. This scenario mimicked a typical artisan-client relationship, where the client communicated a general idea without specific details, and it pushed them to explore the creative potential of AI outside their references to tradition and heritage. Using DALL-E, the artisans explored various food-related designs, eventually choosing a door knocker shaped like a hand holding a hamburger. They applied their expertise to filter the AI-generated concepts based on practicality. The artisans were amused by the often absurd creations that

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AI generated in response to their prompts and, while they certainly could have reached a creative solution on their own, they benefited from the new abundance of creative stimuli.

The AI-generated image selected by the artisans to be turned into a physical product sparked an interesting reflection. Two components of the door knocker break substantially from the traditional designs. The first regards the movement of the knocking element, which has a horizontal swing rather than the traditional vertical one. While there is an undeniable advantage to using gravity to decrease the knocking effort, it is appreciable how priority has been given in this case to innovation and aesthetic newness. The second is about the element on which the swinging component knocks. This is usually integrated into the design or limited to a small circular shape under the knocking area; in this case, the ring, usually seen as the swinging element, becomes the hitting surface distributed around the central figure, distancing quite heavily from traditional canons. The artisans' interpretation of the generative AI images into a finished object of such unusual nature showcases their adaptability and the merging of past and present influences in their work.

Hypertext

The hamburger-shaped door knocker symbolizes the present-day colonization through globalization and tourism. It represents the fast-food culture and the impact of global brands on local traditions and economies, reflecting Antigua's current struggle to balance preservation and modernization.

Figure 8. Note: On the left, a selection from dozens of images generated with OpenAI's DALL-E text-to-image generator, prompted by the artisans. On the right, the selected image to be reproduced in bronze.

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Figure 9. Note: On the top two rows, a selection from dozens of images generated with OpenAI's DALL-E text-to-image generator, prompted by the researchers, as an initial exploration part of the group conversation. On the bottom left, a more complex image generation utilizing the Midjourney text-to-image generator, prompted by the researchers. On the bottom right, the final interpretation and bronze sculpture produced by the artisans, with a simplified language suitable for their technique and available tools.

The Maya futurist Mask Door Knocker - Scenario 3

This last scenario involved a collaborative approach where designers provided a clear and detailed concept to the artisans. The artisans were not involved in the AI design process but were only asked to translate the digital design into a physical product. The designers used Midjourney to generate the image, which served as the design brief.The door knocker the artisans were challenged with represented a futuristic interpretation of traditional Mayan motifs, full of decorative elements and intricate carved details. The difficulty of translating the complexity of the reference image into a physical product highlighted the distance between the digital and physical realms. The artisans' work appeared as a low-res version of the AI-generated proposal, distancing substantially from the expected outcome. Due to —

the limited budget available for this project, the artisans had to handle the mold-making process themselves instead of hiring a professional carver, a step they would have taken with more funding. This was also a factor that affected the final outcome. This process, however, is not dissimilar to the day-to-day business of the foundry, where customers will often bring a photograph as a reference for what they might want to see in a knocker, which is subject to the artisan's realistic interpretation. We can observe here how, when the artisan is integrally involved in the use of the technological tools, the results are more harmonious and satisfactory; on the contrary, if the artisan is abstracted from prompting and image selection, there is a chance that the outcomes will be of lower quality and not true to their skills and sensibility.

Hypertext

The Maya futurist mask door knocker represents a decolonized future, focusing on the reappropriation and inclusion of traditional symbols into everyday products and affirming the value of Guatemalan identity in a modern context.

Observations and Reflections

Integrating artificial intelligence into the traditional artisan workflow has revealed significant challenges and benefits. Observing the dialogue between the artisans, the AI tools, and the designers/clients, we aimed to observe the potential changes to the artisan's workflow, business practices, and creative process. These reflections are supported by direct feedback from the artisans and the reception of the finished bronze door knockers at international exhibitions.

From a workflow perspective, introducing AI tools such as OpenAI's DALL-E into the artisan's process certainly streamlined certain aspects, albeit with an initial training process facilitated by the shop owner's niece, who served as a digital mediator in our project. The ability for the team to rapidly generate ideas through AI reduced the time normally spent on concept generation, allowing the artisan to focus on the refinement of the idea and its execution. One artisan noted in their exit interview: "AI helped me realize that it is something that can aid in my day-to-day work, especially in generating ideas quickly and efficiently." After the ideas to be executed were chosen and refined, the artisan's process remained unchanged, with the carving, mold-making, and casting process retaining its traditional value.

Regarding the creative process, our initial assumption—that the accessibility of Artificial Intelligence would diminish the artisan's creativity—was dispelled as the tool became a vehicle for conversation and team ideation. The AI-generated images were somewhat unpredictable and unexpected, pushing the artisan to explore new design possibilities that otherwise may not have been considered. One artisan shared: "Initially, I thought AI was purely mathematical and not related to images or creativity, but working with it opened up new possibilities for design that I hadn't imagined." However, the artisans were also concerned about possible over-reliance on AI, potentially stifling original thought. One artisan said: "If people use AI too much, it might decrease creativity because they become dependent on it."

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It is too early to speculate on whether access to AI tools will be impactful for these specific artisans' businesses, or whether it will provide economic benefits or growth. Even though the younger niece of the shop owner was an effective digital mediator, the older generation is more reluctant to engage with technology. This experience, however, has been impactful for the younger artisan in the family. She noted: "I realized that it is something that can help me in my day-to-day work because I learned how to use it. I use it a lot for my copywriting in my other business. It is a tool that one can use like any other application."

The artisans' feedback, both during the process and in our final conversations, has been instrumental in helping us understand the implications of using AI in traditional crafts. Their experience highlighted both the benefits and challenges. They appreciated the efficiency and inspiration provided by the AI system but also expressed concerns about potential over-reliance and had initial frustrations with the AI's ability to understand them due to specific cultural and linguistic nuances. The artisans emphasized the learning curve involved: "We had to figure out how to optimize our prompts to get better results."
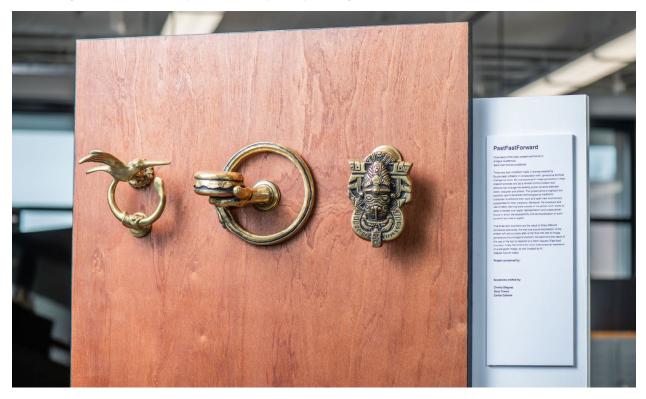

Figure 10. Note: Photograph of bronze door knockers mounted for exhibition at the Rochester Institute of Technology. Photograph by Nate Tangeman, used under permission.

The door knockers were showcased at various exhibitions and presentations, including showings in South America, the United States, and Italy. At every showing, they garnered significant attention and praise. Visitors were intrigued by the unexpected integration of AI-generated concepts with traditional crafting techniques. The positive reception underscored the potential for AI to add a contemporary edge to traditional crafts when the artisan has ownership over the process and result, ensuring no compromise to their cultural essence. —

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Figure 11. Photographs of bronze door knockers mounted for exhibition at the "Personal Structures" Exhibition, during the Venice Biennale. Organized by the European Cultural Centre.Photograph by Paolo Cardini.

Challenges and Limitations

The challenges and limitations of this research can be categorized under both socio-ethical and practical-technical aspects.

As with many research projects that involve collaboration with local communities and underrepresented groups—which, intentional or unintentional, contribute to the creation of the "other" (Sarukkai, 1997)—this work is not exempt from complex and delicate ethical considerations. The awareness that the researchers are external actors who choose to interact with a system to which they do not belong is vital to our approach, as is the awareness of the power dynamics that can undermine the relationship between the research stakeholders. One of the main ethical challenges has been the nature of the collaboration with the artisans. Transparency and clarity of intentions have been our priority, as well as building reciprocal interests in engaging with the project.

While the reflection on the relationship between traditional craft and new technologies was the focus of our interest, and we explored it through the work of the artisans, we made sure to contribute to their growth with training and exposure to the latest discussions in design and digital production.

Two additional factors are important to highlight here: recognition and remuneration. For the first, we ensured that the names of the artisans were always present in any publication of the work, granting them ownership of their work and contribution. Remuneration was also critical; while we considered them research partners and wanted to avoid a work-for-hire dynamic, we were fully aware of how valuable the artisans' time is and how vital a

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monetary reward is for them compared to any form of visibility or promotion of their work. For these reasons, aside from paying for the production of the three door knockers, we also compensated them for the time spent experimenting with AI and purchased the molds that are usually discarded.

Another critical point is the awareness that tools and technologies could themselves be instruments of colonization. Often, the introduction of new technology, developed within an external cultural context, could contribute to the westernization and global homogenization (Srinivasan, 2019) of methods and processes for those who adopt that technology. Our idea was that the inclusion of many voices in the technological debate at its early stages could contribute to the development of technology under more inclusive and equitable premises.

From a more practical perspective, the challenges lay in the responsiveness of the artisans, the time they could dedicate to the project, and their willingness to push the boundaries of tradition and modify their workflow. Acknowledging the privilege of long-term thinking and being conscious that everyday needs often jeopardize the ability to conceptualize and experiment, limited the artisans to basic engagement.

Another notable technical challenge faced by the artisans was the unusual request to reproduce an object from a single image, without the ability to obtain additional angles or other references—a limitation of the particular generative AI system used (OpenAI's DALL-E). One artisan noted: "The biggest challenge was making the molds because we only had one photo. To make molds, you need photos from various perspectives to do it well."

An additional element that represented both an opportunity and a limitation was how the interaction with the artisans had been structured. The youngest member of the crew was the one helping us develop this project and acting, as mentioned above, as the digital mediator with the rest of the artisans. The possibility to have, through her mediation, easier access to the artisans' reality was definitely a plus, and the idea that technology could help fill an intergenerational gap is highly compelling. However, we cannot guarantee that the commitment of the artisans was equal to that of the mediator; we have no certainty that the artisans who actually produced the pieces engaged sufficiently with the AI tools to suggest that they will resonate with them beyond the scope of this project.

Finally, some limitations of this investigation are due to the systemic constraints of the traditional craft context and market itself. Artisans are usually asked to reproduce accurately what is suggested by tradition; clients demand and pay for those specific characteristics, leaving little room for innovation. Artisans must conform to this model, and as a result, they are not as inclined to embrace change or propose bold alternatives that might not guarantee a secure income. This time and budgetary constraint was noted by one of the artisans, who stated: "If there were a larger budget, we could make better models. A professional carver could make better molds, although it would be more expensive."

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Conclusion

We can draw a few more final considerations from this work—one more specific to the artisans and the other to the technological discourse. The artisans, although busy with their everyday activities and commitments, demonstrated curiosity, interest in the technology, and willingness to take on a new challenge. They immediately agreed with great enthusiasm to participate in this research; they actively participated in our training sessions and responded positively to the tasks we set up for them. Traditional craftsmen are often accused of a lack of innovation, which is perceived as a denial of tradition (Poleć, Murawska, 2021). However, the craftsmen we worked with were very inventive. We can deduce and confirm that rather than lack of innovation, traditional artisans have a lack of access to training, financial resources, and new technologies (Yang et al., 2018). Moreover, despite steady growth in the export market (Agexport, 2022) for Guatemalan craft goods, this market is still limited, partly due to logistical challenges, such as poor government support for small businesses, and partly due to a lack of recognition and appreciation of the true value of their craft.

The creation of the door knockers, especially the Fast Food and the Maya Mask, exposed the artisans to new forms and meanings, opening a window to the possibility of expanding their design proposals. Unfortunately, the demand remains an issue: the traditional craft market seeks specific artifacts that, due to changes in habits and societal rituals, have become functionally obsolete, reducing them to mere souvenirs that preserve only the memory, not the tradition itself. It is financially safer for the artisans to give their audience what they want, securing their profits at the expense of their creative freedom and evolutionary push.

Another important insight is related to the craft demographics and the role of new technologies in its potential rebalance. Without wanting to generalize, in the specific case of the Guatemalan artisans, the people mostly involved in the metal shop were male, while the artisan who coordinated this project, mediating research needs and the other artisans' time, was a young woman. She manages and takes care of the business' social media page, which was essential for our initial outreach. She was also the one who directly managed the DALL-E account and ran the prompts for her colleagues. The involvement of new generations, due also to their enthusiasm for new technologies and familiarity with engaging with digital tools, was a very reassuring sign of the potential preservation and regeneration of traditional practices, the potential reevaluation of gender roles, and the rebalance of the inner dynamics of power.

The second consideration is the conversation around AI ethics, and specifically its relation to decolonizing practices. Our attempt to match what is considered "low-tech" with the forefront of "hi-tech" reflects the will to alter the picture of an innovation-centered global history that claims universality but is in reality based on a very few places (Edgerton, 2011). Having AI and craft standing side by side on the design table has been a way for us to reset the colonial technological hierarchy and grant the same dignity to both technologies.

However, the dialogue between these two technological contexts is compromised by how AI is developed and managed. Typically, the initial stages of developing a computer vision system involve gathering thousands or even millions of images from the internet. These images are then categorized and organized into various classifications, forming the basis of —

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how the system will interpret visual data. These extensive collections are known as training datasets and are often referred to by AI developers as the "ground truth." In this context, "truth" is less about an accurate or universally accepted reality and more about a collection of images sourced from a variety of online platforms and what's available in large quantities (Crawford, 2021). In our research context, if we were to train a model on a traditionally crafted artifact to either identify it or generate variations, we might encounter a lack of sufficient training data without fine-tuning (using a pre-trained model and adapting it to a specific subject). This lack of data becomes significant, as it not only presents challenges for ownership and appropriation but can also limit how AI interprets the world. In the case of underrepresented cultures, this could lead to stereotypes or misrepresentations. Inviting the Guatemalan artisans to engage with AI provided a unique opportunity for testing the possibility of mutual growth. Imagining a future in which AI will be built on the principles of inclusivity and transparency, artisans could, by generating and refining AI prompts and images, contribute to a richer digital representation of their culture. As AI technology evolves, having a broad spectrum of traditional artifacts digitized and properly tagged with identity marks could promote inclusivity and cultural representation, enhancing the possibility for AI's to be used for participating in a respectful multicultural conversation. This vision could support both technological advancement and cultural preservation.

Within a preferable scenario in which AI will start to be built on a deeper level of inclusivity and hear the many voices who could be impacted by the technology (Lewis et al., 2022), the Guatemalan artisans might represent proof that such dialogue is possible and very much needed.

Finally, the international dissemination of this project, including this paper, aims to raise awareness among the general public and academia about the importance of bridging the gap between the Global North and South, low-tech and high-tech, while understanding the implications and consequences of developing such powerful technologies as AI.

Looking forward, if this technology develops under fair and inclusive principles, the relationship between artisans and their clients or designers could be impacted by the use of AI tools. Traditionally, artisans have faced a frayed relationship with designers, often marked by problematic power dynamics. Clients, as well, typically demand precise reproductions of traditional designs, leaving little room for creative input from the artisans. AI tools, if accessed, understood, and used by all parties, could facilitate a more collaborative process and inclusive dialogue between artisans and their clients or designers. For instance, clients could use AI to generate initial design concepts and provide clearer, more detailed design specifications, reducing misunderstandings and ensuring the final product aligns with their vision, which artisans could then refine and personalize based on their material expertise and cultural knowledge. Conversely, artisans could initiate new design directions, building a more proactive relationship with design practitioners and incorporating that "newness" which is usually within the designer's domain.

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