

# NEMA

Preserving cultural heritage through  
cross-dialogue between traditional and digital  
ways of making.

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## ABSTRACT

'NEMA' explores how various digital techniques and ways of thinking can intersect with traditional methods of making culturally inspired art and design. In this study, the traditional methods being focused on are the use of clay and paint on surfaces to create cultural designs that hold the significance of traditional heritage, beliefs, power, and ancestral knowledge within them. The digital techniques and methods being researched and studied are the use of digitally fabricated approaches like 3D modeling, scanning, and digital printing. "The goal of this research-creation work is to combine both digital and traditional methods to create an immersive experience that Africans in the diaspora can identify with, while also encouraging a wider audience to engage with African cultural heritage."

This research seeks to find ways to effectively preserve cultural and traditional practices through ways of thinking through making. As Dr. John Henry Clark says, "**Take the best of what you are good at and use it to help your people.**" Through this work, I use my art to address certain negative notions about my Nigerian culture, opening discourse to bring about enlightening people and showcasing the richness of my cultural heritage, while also preserving it by creating an archival set of culturally inspired works through these methods.

Keywords: Ancestral Knowledge, Archival Works, AR/VR, Diaspora, Culture and Tradition, Lived Experiences, Indigenous Cultures, Africa, Marghi Ethnic Group, Nigeria, Heritage, Cultural Identity, 3D modeling, Cultural Preservation, Documentation, Art and Design.

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# CHAPTER 1

## INTRODUCTION

According to Floribert Endong, cultural preservation is, “***The act of using deliberate and well-designed methodologies, to maintain cultural heritage from the past for the benefit of the present and future generations***” (2019). The preservation of our culture is part of our heritage. Our ancestors and the people before us created and passed down their art, memories, way of living, and secrets to us. Some we hold onto physically, while others are passed from one generation to the other by word of mouth through stories and folklore which are gradually fading away. Similarly, those items that were still within reach of my people have gradually been destroyed or lost in time. A significant number of people, including Africans, relegate the African cultures and traditions to be something that is ancient and ‘bad’ almost as though it’s something that should be feared and eradicated, which has led to the culture's erosion and the need for further preservation efforts.

Africans have used various methods over the years as means of cultural identification. Growing up, I was made aware of certain practices like the tribal markings we had on our body, patterns and motifs we did incorporate into our fabric, houses and also our everyday items, names given to each person which served the purpose of identification among our people and a means of connection to our ancestors. We can also see this in the distinctive hair plaiting and styles that differentiated us from other cultures around Nigeria. One could easily identify where a person is from and to an extent know about their cultural background so long as they were familiar with these practices and methods used for cultural identity. These methods have served as a means of identification for a lot of people and have been like our very own cultural passport. In recent times, we still can identify things through their unique markings and elements that

have been embedded in them and trace their historical origin. Incorporating these techniques and methods into my artistic practice imbues it with the cultural identity of my community.

The word NEMA means to search, or seek in the Hausa Language, a native dialect common to the northern people of Nigeria. Africans have long been taken away from their home, have had their lands occupied by foreigners, art stolen and gradually had their identity taken away from them. Their cultural heritage is one that was not left behind or kept and preserved. One would imagine that it would have been a struggle to worry about persevering our artifacts and keeping our identity while battling with survival and slavery. Some Africans have been displaced and are now so far from home and have no knowledge of their cultural heritage. The new generation of African artists are becoming more enthusiastic about creating art that speaks to where they are from. It is my hope that those who still have a connection to their African roots can draw inspiration from their ancestors, be able to preserve the African culture, reclaim it in our voices and represent it to the world the way we want it to be portrayed. I am an African, a black woman from the Mamza Clan of the Marghi and Bura people of Borno State of Nigeria. Tracking my origin from stories told by my father, my ancestors were not originally from Borno state, as written in my papers. My ancestors possibly migrated from other parts of Africa and finally settled in the place I now call home. When searching for my cultural identity and who I am, it's hard not to acknowledge that I am part of the culture that all black Africans represent and not just people from my hometown. Although our cultural practices are unique to each tribe in Africa, we all have common practices and ancestral lineage.

My experience as a Nigerian living in Canada further showed me how my culture is not as accessible as I would hope, making me feel homesick and disconnected from the world around me. I would have to go to certain places or museums to have a sense of



belonging to my culture. I would like to explore disrupting the ideology that my cultural art, design and practices are a thing of the past, I believe they are of significance in the future. The preservation of African culture, tradition and the creation of African-inspired art and design is up to us, the present and future African artists and designers. Finding value in what indigenous people of Africa create and preserving culture through these methods by making them accessible in these spaces is part of what I hope to accomplish with this thesis.

In this study, I examine my Nigerian identity in the context of art and design, and how I am preserving my culture through these themes mentioned in page 14, which is aimed at opening a dialogue to demystify and provide an avenue where people, especially Africans in the diaspora, can have an immersive experience with the culture. This involves working through creating physical art and design to have a conversation with the materials, perform rituals and invoke ancestral knowledge in the works, before transferring and creating these culturally inspired works in the VR/AR space through 3D modeling and other digital approaches like 3D scanning.

## RESEARCH CONTEXT

I am an indigenous person from Dille, Borno State, Nigeria. I have a voice and carry with me the knowledge and identity of my people and ancestors. I draw inspiration from my culture and embed elements, stories and cultural practices that can be preserved in my works. Seeing how my work evolves with different materials and digital techniques is relevant to the work I am doing for my thesis.

In the present world, all kinds of new media, concepts, and devices have entered the domain of creative art and design, demonstrating a whole spectrum of new artistic practices. By contrast, in Africa's art and design arena, painting and sculpture continue to

dominate artistic endeavors; and avant-garde practices, though they do exist, have been few. 3D printing, AR, and VR technologies are fast taking over as a method of artist expression, representation is powerful and the lack of it will lead to misguided interpretations. As Lockwood David explains, VR serves as a great tool for educating people and has distinct advantages over other forms of digital exploration. For example, VR technologies give the user a hands-on experience and is a powerful visualization tool (16). But African-inspired designs are underrepresented in VR spaces. There is room for the indigenous people of Africa from different tribes to showcase and tell their stories. The power that lies within our cultural practices is powerful and is one to be reckoned with. We take part in ceremonies to connect with our ancestors in various forms like dancing, and invoking certain natural elements like plants, herbs, earth, water and flowers. Furthermore, we create masks, staff and sculptures to serve as a medium and point of connection between us and our ancestors when we partake in certain cultural activities. These practices have over the years led to the creation of astonishing works of art and artifacts that continue to be a great source of inspiration to generations of Africans and people around the world. In light of the benefits and significant impact that the digital space offers for cultural education, the representation and preservation of African culture through art and design in this domain is essential.

**My research and creation asks these questions:**

1. Can 3D modeling and simulation enhance future cultural archives, by passing down lived experiences and ancestral knowledge and making these more accessible within an immersive space? Can it translate my ancestral knowledge and influence how people in the diaspora perceive African culture in this digital age?

2. Do digital tools, mediums and materials influence the way people engage and perceive the interpretation of my cultural heritage when I design and make art?
3. Does traditional art lose certain attributes in terms of its impact, energy and message of cultural identity when incorporated into the digital space?

I explore these questions through a series of works through traditional and culturally inspired art and design, predominantly derived from the Marghi ethnic group. These archival works primarily focus on inspirations from Tribal Markings, Masks, Motifs and Patterns, with the purpose of preserving the cultural and traditional practices that they embody. Through these processes, I explore how my works and cultural heritage might evolve in the digital fields of interest. This study employs various materials and techniques, including paintings, sculptures made from clay, 3D scanning, 3D modeling and printing, as well as VR/AR exploration, in order to transfer the archival works into the VR space, to promote interactivity and offer a more immersive experience for the audience.

My hope is that through my work, Africans in the diaspora can get to learn more about and identify with their cultural heritage. I aim to facilitate a dialogue that cultivates a genuine interest in the cultural practices and traditions of the culture. Additionally, I aim to contribute towards the preservation of these practices by creating lasting imprints.

## CHAPTER 2

### FRAMING MY RESEARCH

In the course of my research, while trying to locate items, art, and designs that reflect my cultural heritage of the Marghi tribe, I encountered an inadequate and limited portrayal of the culture I was familiar with from residing in Borno State, Nigeria. I want to intentionally leave imprints of what I represent as a Black, Nigerian woman in design. The internet and technology have played a major role in cultural preservation as we see in the present world. We have artifacts, paintings, ceremonies, pictures, virtual exhibitions and knowledge being shared among people through 3D modeling and digital techniques. The creation of detailed digital models of these artifacts helps document important cultural heritage that can't easily be destroyed and simultaneously be widely spread around the world to future generations. The phrase *The internet never forgets* has been a familiar saying throughout my formative years, and my research has afforded me a deeper comprehension of this concept.

I grew up in different states in Nigeria which exposed me to a whole array of cultures. The displacement caused by the insurgency during my formative years led to my family's relocation and the destruction of my homeland, leaving me without a physical hometown or ancestral village to claim as my own. As a result, I realized how certain things, ceremonies, culture, fashion, art, architecture, and the like would be lost forever. In an effort to preserve and invoke nostalgic memories of my hometown, I often incorporate traditional and cultural elements in the designs I create. This involves the incorporation of motifs found on household items such as the calabash, as well as the designs present in my grandmother's traditional attire from our village. As I matured, my motivation for engaging in this activity has shifted towards cultivating a stronger connection to my cultural heritage, promoting a sense of inclusion, and alleviating feelings of displacement.

Through my work in design, I have found solace in the act of reclaiming what has been lost and providing others with an opportunity to experience my culture, independent of physically being present. I have always been intrigued with how one can use different elements and materials to create a design and artwork that encapsulate significant amounts of information that outlives the creator, and this spawned my interest in the research of cultural identity preservation using art and design in the digital space.

The future of tech design and art seems to be moving towards digital techniques, and interactive immersive 3D displays. I have watched several 3D animations like *Kubo and the Two Strings* - 2016 (Japanese themed, which used physical 3D models to create stop motion animation), *Coco* - 2017 (Mexican culture, inspired by the holiday; Day of the Dead), and *Over the Moon* - 2020 (Chinese myth), with stories and design rooted in a particular cultural heritage. These animations were made with a combination of different digital techniques and fabrication methods from laser cutting, to 3D physical models, scanning and digital modeling. All have a rich cultural identity and portrayed certain aspects of those cultures like their stories/folklore, music, patterns and motifs, fashion, art etc, and I was able to engage and learn about their culture just by viewing these animations. The impact of the various techniques in these movies to educate the audience about the cultural heritage of diverse peoples serves as a motivation for me to similarly depict and preserve my cultural heritage in the digital space.

I believe there is a wide spectrum of cultural preservation and expression in the 3D digital space that is yet to be explored. According to Verona & Dalian Adofo, African culture and spirituality hold a lot of knowledge and practices (since their existence) that science, new media, and some Religions claim to have just discovered or are discovering. There is an intersection between traditional, cultural practices and new technologies that are emerging. One example is epigenetics, which explores being able to switch on and off certain genes in one's DNA to activate a certain part of one's ancestral lineage. Modern

science believes this can be achieved using equipment and machines to facilitate the process. These are things that indigenous cultures and people have been aware of over centuries in the past, which they invoke using rituals and ceremonies (2016). There has been a deep connection with nature during rituals and performing certain practices to activate these ancestral DNA makers within us, passed on by our ancestors without taking away our power and agency. Africans have been practicing this and activating memories of past ancestors. Wiredu Kwasi also spoke about similar concepts in relation to how African traditional thought relates to Western thought (324). My artistic practice similarly incorporates traditional rituals as a means of invoking ancestral knowledge which I aim to materialize in my work. These practices are essential to our cultural heritage and should not be disregarded in the wake of technological advancement given the significant knowledge they embody, as demonstrated by these existing studies. This serves as a driving force behind my creative efforts toward preserving our cultural heritage within the digital space.

In addition, Verona & Dalian Adofo, spoke about African spirituality and how their findings contradict all the negating teachings that are known and focus on ancestral knowledge and readdressing the balance of the negativity that is out there. They address the lack of information in academia, one that is free from colonial and religious propaganda to create a space for an honest discourse to take place in understanding African spirituality. They also researched how people focused on the negative part of African spirituality when it came to telling stories and folklore, being curious, and finding the true power behind African spirituality and what good can be used from it. It can be seen as something not to be scared of but as a powerful thing. Goerge Washington Carver – a well-known inventor and a Botanics mentioned that he walked into nature at dawn and he would speak with the plants and nature and they would tell him their secrets. He did these rituals usually practiced by ancestors to communicate, he did this

even without knowing these rituals prior to when he practiced it and this can be seen as a good example of being able to activate ancestry knowledge from within (2016).

***“Take the best of what you are good at, and use it to help your people”,***

- Dr. John Henry Clark .

These works are visual representations of my culture and carry with them ancestral knowledge, lived experiences, connection, and creation of cultural/historical items, documentation, heritage, and identity which will serve as a means of preservation for as long as they exist. Nigerians and Africans at large who see this would be able to identify with the works and to an extent know the significance of the elements embedded in these works and will constantly serve as a means of documentation and preservation of the cultural heritage they embody. This can help to preserve and promote cultural heritage, reinforcing the sense of identity and community among those who share it.

My research on promoting inclusivity and demystifying cultural heritage and tradition has led to the point of intersecting lived experiences, and ancestral knowledge with physical materials in the digital space while exploring cultural preservation, documentation, cultural heritage, and identity, as the source of inspiration for my thinking through making (these themes are discussed further in Chapter 4). With this project, my goal is to produce culturally inspired designs and art pieces that invite audience interaction and contribute to the creation, and preservation of culture in the 3D digital space. By observing audience reactions and discourse surrounding these works, I further explore the impact of culturally-inspired digital media on cultural preservation and dissemination.

## APPROACH/METHODOLOGY

In order to make my culture more accessible in the 3D digital space, as well as dispel the notion that African culture is ancient and doesn't evolve, my work is deeply rooted in these steps:

- Creating items using clay and paintings, mainly to help me have a conversation with these materials and understand the processes and how my ancestors/people produced some of our cultural items.
- Creating a visual digital archive of 3D models of my representation of my culture, that embodies certain elements in relation to my cultural heritage.
- Having a middle ground and a cross dialogue between the physical handmade and the 3D fabricated objects.
- Creating an immersive experience in the AR and VR space while fostering cultural preservation and lived experiences/documentation with the possibilities of invoking memories and epigenetics of my ancestors.

For my research, I focus primarily on research creation as a methodology, which has taken my work further in the creation of cultural items with the significance of traditional elements and practices embedded in them. With this approach, my work recognizes the value of artistic practice as a form of research and allows for the integration of artistic processes, materials, and techniques in my research process. In addition, I will be using autoethnography to analyze and interpret my personal experiences and observations related to the cultural heritage and practices of my community. This entails reflecting on lived experiences and analyzing memories from home, channelling traditional and cultural knowledge into my art as a means of preserving it. As Ellis' et al explains, autoethnography is a qualitative research method



that involves a researcher reflecting on and writing about their personal experiences and insights related to a particular cultural phenomenon. It involves exploring one's own cultural identity and how that identity shapes their understanding of the world around them (2011). By employing the research creation approach, I can critically reflect on my interactions with my cultural heritage, the ancestral knowledge passed down through my family, and experiences within my community through my making. These methodologies facilitate a more comprehensive and nuanced comprehension of the cultural context in which my artwork is situated.

## CHAPTER 3

In exploring these methods and mediums, I will be studying and taking inspiration from these elements and how they influence our art and identity.

1. Tribal markings
2. Patterns and motifs
3. Masks and Sculpture

### TRIBAL MARKINGS

Tribal Markings are symbolic permanent markings done on the face and other parts of the body. What does it mean to have an identity, to belong to a tribe? Of what significance is it to identify with a place and be marked as part of a community? My study focuses on tribal markings, primarily in northern Nigeria, and their relevance in the context of cultural identity, artistry, social status, and spiritual purposes. In northern Nigeria, these markings involve the use of sharp objects, usually a blade to make a superficial cut in the skin depending on what the markings are for and it's followed by the insertion of charcoal or other herbal substance in the open cut. For example, Wilson-Fall Wendy explains in detail how these markings are done by the artist 'Mai-zane', and the primary tool used is a blade fixed on a metal used to make quick short strokes of cut into the skin. The 'mai-zane' would draw the pattern as requested and would rub lightly in the direction of blood flow and the cut that was made with the heel of his hand to lessen the pain and clear away the blood for better visibility. He would also throw cold water on the area at intervals and then mix black soot from the bottom of a cooking pot with a small amount of water to be applied on the fresh incisions made but this time against the direction of the cut until the incision can longer accept more soot. After all this is done,

the area is left for about five minutes before being gently washed with cold water, which concludes the tattooing process (2014).

I adopted similar techniques when incorporating tribal markings in my clay sculptures and 3D models, for instance, while creating my 3D models, I had to use the crease and clay tool, which acted as a blade to enable me to make incisions on my models that represent the tribal markings. With the clay sculptures, using the traditional techniques was more direct as I was able to make cuts into the surface of the clay with a small knife and used water to smoothen the area at intervals to prevent that area from hardening (see chapter 4, fig 13).

Some of the tribal markings involve having three strokes across the face, others have them longer than others, they can be cut deeper into the skin in certain tribes, some are wider and others can be just a single stroke across the face (Tremearne 165). I remember seeing people with three lines of tribal markings across the cheeks starting from the edge of the lips and gradually spreading out towards the ears. This is a pattern usually common to the Yoruba people in the Western part of Nigeria. The Fulani people have various markings used on different people of different classes and clans (Reed, 426). Urenna explained some of these markings and their meanings. For instance, the Igbos, in the Eastern part of Nigeria, have a specific marking used for spiritual purposes on a child they see as 'Evil' usually referred to as an Obanje. They mark them in some form of ceremony using herbal substances to keep them grounded and to avoid their untimely death and reincarnation. It is believed that the child has some evil spirits which makes them die at a particularly young age and be reborn again just to die at that same age to torment their parents (2018).

The Hausa tribal marks are commonly known as 'Zube' and 'Yan Baka', in Fulani they are called 'Kalangu'. Tribal markings done in the north include but are not limited to these:

**Medicinal tribal markings**, are made on parts of the body using certain herbal substances placed inside the incision to prevent or cure an illness. I have come across relatives of mine with three short vertical lines close to each other made on their shoulders and tummy areas, they had those markings done on them due to some illness they had even though they didn't state what exactly it was. It was like a taboo to go around letting people know what ailment you had, but rather acceptable to keep it a secret.

**Cultural Identification**, various types of tribal markings have been used as a form of identification for the Marghi and Bura ethnic groups. These are usually done on the face and help identify one person from the other. These types of markings became popular during the slave trade, inter-tribal conflicts and kidnapping, they serve as a way of finding and identifying people that were lost. One can trace the origin of someone's family or lineage through these tribal markings. Because of how unique these markings are, people could easily be identified by their clan, where they came from, their language and also who they are. This made them belong to a place and be able to find their home.

**Social Status and Class**, the royals and people of high class in the northern part of Nigeria have distinctive, decorative tribal marks that differentiated them from the other people in the community. These serve as a sign of class and prestige and these markings are restricted to only them. They are also given to the firstborns of a family, especially to those that are next in line to rule a community. These marks ensure that the right person takes their place when they come of age in a community. They are usually smaller and more stylized designs, usually done on the forehead. I recall when I was younger, there was a boy that had a distinctive

marking on his forehead, the marking he had was royal, which served as an identifier. He was the firstborn and heir to the throne, a soon-to-be king.

**Spiritual Purposes,** some specific tribal markings done during certain rituals are believed to ward away evil spirits and bring good luck to the bearer. These types of markings can be done in any part of the body for spiritual fortification. Some people are seen as 'Farin Gini' because they are generally liked by everyone and have great fortune wherever they go. It's believed that they have good spirits watching over them constantly and that they can invoke those good spirits to the bearer of these markings when done properly. Spirituality plays a major role in tribal markings in the north, these markings serve as a direct connection between the gods, plants, animals and the earth's energy.

**Ceremonies, Celebrations and Beautification,** these markings are made on the body as a way of beautifying it, usually done on the hands and feet. They are also used in certain ceremonies like rituals for Marghi/Bura brides when they are set to be wedded, or during the celebration of the birth of a child. They are very decorative and elaborate and a symbol of beauty and class. These markings are usually temporal, unlike the tribal markings that are permanently used for identification. We call these types of markings 'Henna or Lele', which is a paste made from the leaves of henna plants usually found and cultivated in farms around the north. This drawing lasts up to about 3 weeks and gradually fades until it is no longer visible. It is a popular practice in Nigeria and is now a fashion trend among the people. The origin of Henna in the North is not known for sure and although it was a trans-culture introduced to West Africa, Henna can be traced to Northern Nigeria as early as the period of the Roman Empire (Noam et al, 2016).

During ceremonies like weddings, the ritual of applying Lele to the body also serves as a way of bonding with relatives and friends.

Recently, Africans would use white paint to make these types of tribal markings to decorate their bodies and face using culturally inspired patterns. These paintings are mostly done for decorative purposes and artists use them as a means of connecting to their roots and ancestors to invoke certain power and energy. We can see this in Beyonce's music video 'Sorry' with the elaborate and decorative body art done by Laolu Senbanjo, a Nigerian-bred, Brooklyn-based performance and visual artist (Beyonce 0:09 - 0:40).

The preservation of tribal markings is important for cultural preservation as it helps maintain the continuity of cultural traditions and cultural knowledge from one generation to the other, and serves as a tangible expression of cultural heritage which my work is doing by having them embedded in the art I am making. This will ensure that the cultural traditions and customs are not forgotten.



Left to Right; Fig. 1 and fig 2. Traditional wooden masks with patterns and tribal markings depicted on the face of the sculptures, photographed at the "Art Tech District" - Discovery Museum, Wuse II, Abuja, Nigeria, 2021 - Image by the author.

## PATTERNS AND MOTIFS

Traditionally, patterns and motifs are used across different items, from textiles to household furniture, the body, objects, and architecture. They reflect the conversation between the artist, the material, and the object/body being imprinted on. They are used to mark and identify an object, used to tell stories, share memories, and transfer powers to objects for protection and to add to the beauty. The Marghi people of Borno State, Nigeria are known for their intricate motifs and patterns which have deep cultural and symbolic meanings reflecting their beliefs, values and history. The motifs and patterns of the Marghi ethnic group are commonly depicted through various mediums such as painting, etching on calabashes, henna application, and clay and wood carving. These patterns are also evident in their textiles through traditional dyeing techniques. The motifs usually drawn by the Marghi people are geometrical, they have abstract forms and figures and also have detailed elaborate floral patterns.

In Marghi architecture, the geometric patterns not only serve an aesthetic purpose but also convey narratives about their builders and the origins of the architectural style. Certain symbols are specific to certain tribes, like the 'Arewa' symbol common to the Hausa people of Nigeria. This symbol represents the north and gives identity to the object that bears it. My Great grandparents, grandparents and my parents grew up in Mubi, a town located in Adamawa state. I noticed how they had certain symbols that were part of the architecture that holds stories that my father will happily share if we cared to ask. These symbols also serve as a means of protection to ward away evil spirits; they were used as markers to indicate that a home is protected. Zaria city in Kaduna State has elaborate geometric patterns on their buildings that symbolizes the interconnection of the people, culture and traditions. It's hard to live in the North and not come across objects with interesting patterns on them. They embody intricate techniques and styles that create elaborate textures on their surfaces.

The calabash is one object widely used by the Marghi people. It carries several motifs and patterns, and serves as a great medium for artistic expressions. Growing up I would see how these calabashes are used by the Marhi people for different purposes. These calabashes are planted vines grown for their fruits and are harvested at different stages depending on the intended usage. They are used to store food, serve as a container and are popular with the Fulani tribe for carrying their famous 'Fura da Nunu'. They are used in fashion to make traditional regalia, and by mothers to shield their children. They serve as decorative objects around the home and the royal palace. The gourds are usually decorated using pyro-engraving, pressure engraving, carving (scraping), painting and dyeing (Berns, 30).

Calabashes are used for our traditional weddings as the bride, her sisters and friends would carry these on their head and wrapped around their arms in different sizes that are stacked together with some traditional fabric, onions placed inside and some cowries wrapped around them. They would dance with these calabashes in their traditional attire from the bride's parent's house and 'escort' the bride to her husband's house in the presence of the mother and other relatives. This ritual represents the bride's family and friends giving her to her husband. These calabashes they would use, had motifs and patterns on them that have been carved and painted with symbols that are meant to protect and bring about goodwill and blessings of childbearing to a bride's home.

Calabash can store, transmit and even help in cultural preservation. Over the years many aspects of culture had been preserved and promoted with the aid of Calabash. For instance, a well-carved or decorated Calabash can tell the history and place of its origin in addition to giving the thoughts of the people producing it, trading it and even giving some insights into their activities including their culture and history (Babagana, 2018).



Babagana also shows how this art of calabash cravings is interpreted by modern artists. Patterns and motifs are significant in cultural identity and preservation as they serve as a visual representation of cultural heritage that can be passed down to future generations. My works incorporate these patterns and motifs and the use of calabash as a cultural heritage symbol as seen in the 3D models. They also embody the traditional techniques used by my people by the means of my 3D calabash models. This plays a role in reinforcing cultural values, beliefs and customs in my work. (See chapter 4, fig. 17)



Fig. 3. HONA PRESSURE ENGRAVED GOURD BY RIFKATU, USHIBURA VILLAGE. 22.9cm. MCH, GIFT OF BARBARA RUBIN HUDSON. - Image used with Permission.



Fig.4. PIDLIMNDI WOMAN CARRYING PYRO-ENGRAVED BOWL WRAPPED WITH HOMESPUN CLOTH. MBAGU. - Image used with Permission.



Fig.5. DERA PYRO-ENGRAVED GOURD BY MARIAMU, KUBO VILLAGE. 23.5cm. MCH, GIFT OF BARBARA RUBIN HUDSON. - Image used with Permission

## MASKS AND SCULPTURES

These items represent rituals, spirits of nature, justice, and celebration of life. Some are seen as direct representations of gods and people believe they hold great power within them. Some of the masks serve as a face covering and at the same time are used as decorative sculptures that are hung on the wall and placed around the house, a palace or ceremonial buildings. The masks are typically made of wood and bronze, adorned with intricate carvings, cowrie shells, ivory, and other decorative elements, some are beaded and made with leather, and others are made with plant vines and leaves especially those used at festivals worn with traditional elaborate regalia. The masks are believed to have spiritual powers and are used to communicate with the spirits of the ancestors. The images in fig. 6 & 7 are replicas of the original, fig. 6 is believed to hold the powers of being able to see into the future when a person looks into the mirror which is now broken, fig. 7 is a mask made from beads used in ceremony by the Oba and it's believed to have spiritual powers. The people say that the mask is too heavy to be carried by just four people, but when worn by the Oba on his head, it becomes weightless and a part of his body. These items are from the Yoruba people of Nigeria and are displayed at the Art Tech District, Discovery Museum, Wuse II Abuja, Nigeria. Lloydetta explains; when masks are used for ritual purposes the person that wears it takes on the identity of the spirit the masks represent which are of their ancestors and becomes a medium that allows communication between the spirits/gods and the people. It also gives powers to the wearer through the rituals which usually involve carefully choreographed singing, music and dance performed by the people (2013).

Masks and sculptures of the Marghi people have the cultural identity of ancestors and the people embedded in them, this is seen through the tribal markings, symbols and elements used on them. They also hold in them the spirits of those that have lived on earth in the past. Regrettably, these items haven't been preserved in the past but have

rather been destroyed due to the influence of religion. The preservation of these items have been challenging particularly in the face of cultural assimilation and influence of Western culture. Through the incorporation and utilization of these culturally significant items as a source of inspiration, I aim to convey and impart essential cultural attributes, values, beliefs, and traditions inherent in them in my artwork. Incorporating these masks and rituals in my work as seen in the 3D model (fig. 17), in the form of inspiration, serve as a way for my work to carry the identity of my people and embed in it the cultural and traditional values of our ceremonial rituals.



Fig. 6. Traditional Mystical Mirror, photographed at the “Art Tech District” - Discovery Museum, Wuse II, Abuja, Nigeria, 2021 - Image by the author.



Fig. 7. Oba royal mask replica, photographed at the “Art Tech District” - Discovery Museum, Wuse II, Abuja, Nigeria, 2021 - Image by the author.

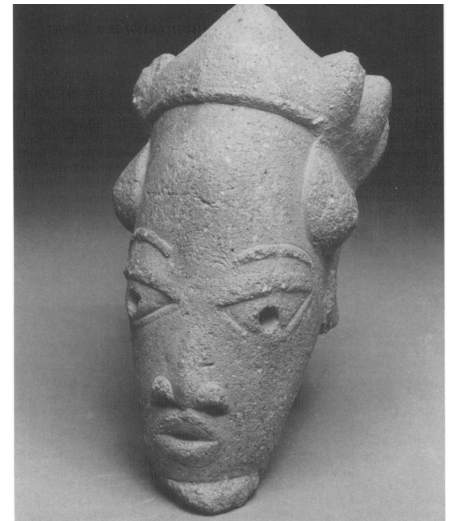


Fig. 8. Nok head from Jemaa, Nigeria, ca. 500 BC-AD 200. Ceramic; h. 19 cm. National Museum, Lagos. Courtesy of the Detroit Institute of Arts, photo by Dirk Bakker. - Image used with Permission

## CHAPTER 4

### CULTURAL PRESERVATION, DOCUMENTATION, HERITAGE, AND IDENTITY

My work is closely fascinated with how these themes and methods that have been mentioned earlier, store and carry with them the ancestral knowledge and identity of the past. Ways of documentation in the Northern part of Nigeria have been limited from my experience. The first series of exploration of my work includes paintings which focus on how tribal markings and motifs and patterns influence the objects they are imprinted on and how they convey the messages intended by the artist when they are being drawn out. These paintings carry patterns used by the northern people of Nigeria that tell stories of past ceremonies and rituals, they have patterns and marks and have the identity of the Marghi people. Paint as a medium serves as an extension of the hands to the canvas and has long been used by people to capture the cultural heritage, traditions and customs of a people while providing an important record of their history and identity. These patterns were inspired and invoked using the ancestral knowledge I have and also from works of my people done before. The painting has embedded elements of the northern culture which would be carried on along with this work wherever they go.

Fig. 9 shows a lady with a detailed design around her signifying culture and how it's usually centred around a woman. Paintings in the past have served as a great source of vital information about the identity of a place, people, objects, including beliefs, practices and heritage. Some of the cultural practices seen not just among the Marghi tribe but also with other tribes around Africa have a woman at a disadvantage and my work portrays culture surrounding and protecting the woman rather than harming her. Cultural practices like the lele empower and beautify a woman, which serves as an inspiration for the paintings. Fig. 10 & 11, have abstract depictions of patterns that are often found in a northern home, used as protection and a mark of identity. These types of

patterns and motifs can be seen in historical objects and paintings of the northern people and have been translated into this artwork with the purpose of interpreting my culture in my voice and also preserving it using this medium.



Fig. 9. Painting of a traditionally inspired lady bust of the Marghi people, 24 x 26 inches. Digitally painted and printed, by Author.



Left to Right; Fig. 10 & fig. 11. Digital abstract paintings of lady bust with motifs and traditional elements of the Marghi people, 24 x 36 inches, by Author

## LIVED EXPERIENCES

Holding on to memories I have had, living back home, it's in our culture to braid each other's hair and this for some of us is one of the major ways we get to bond and spend time with family and the community. This was sort of our quality time together. My natural hair is a major part of my identity as it comes with its own uniqueness and has some fundamental stories tied to it in black history. For one of my sculptures, in fig. 12, I had to braid her 'hair'. This brought back memories of me braiding my sisters' and mom's hair, while we talked and caught up with each other's lives, discussing important issues, and a way of just being in the same space with one another. With this piece, I embedded my lived experiences in it as part of the cultural heritage of my people. Those who know

and will get to learn about these elements as seen in the sculpture will recall the cultural values whenever they come across them. The nose piercing as seen in the sculpture is a part of the Northern culture that signifies when a woman is of age and as a sign of status and wealth for those who decorate their piercing with valuable materials. People in my community have these piercings which they use as a form of beautification, identity and a sign of their marriages. This practice has now become a fashion trend for the modern generation. These sculptures (fig. 13, 14, 15, & 16), have elements and tribal markings that hold within them memories of my relatives, ancestors and people I have come across while living in the northern part of Nigeria. Drawing on these lived experiences informs the narrative aspects of my sculptural work as well as the incorporation of specific motifs.



Fig. 12. Clay sculpture of a lady made with white hara ceramics, glazed and fired, 14 x11 inches, by Author

An interesting observation about this form of research is that memories and cultural knowledge were embedded within the paintings and sculptures. I used that as a significant source of inspiration and guide to creating. Cultural identity and heritage serve as a connection to our ancestral knowledge which can serve as a means of survival. For instance, the use of certain rituals and invoking 'powers/energies' that guide us on what herbs to use to heal ourselves, identify with our people, and document certain memories and history. Unlike other forms of cultural preservation like scanning and collecting of existing artifacts, my work explores the production of new art pieces that are inspired by traditional practices, cultural motifs, patterns, and designs, primarily focused on preserving the historical context of existing artifacts and cultural practices. This serves as a means of empowerment, and a source of reconnecting and engaging with my ancestral lineage by performing certain rituals and utilizing traditional techniques during the creative process.

The presence of nature, especially as seen with plants in Nigerian culture is prominent. Lele used by the Marghi people for healing and spiritual purposes are made from a plant, burning of incense common in the North to ward away evil spirits involves using natural elements like tree bark and herbs, tribal markings did mainly for the purpose of identity also requires using certain herbs inside the incisions made. Nature is believed to have such great power, some women would use a certain mixture of plants, flowers, roots and fruits to create some form of portion 'Kayan Mata' which they used to enchant themselves and control the opposite sex in order to gain favor, wealth and whatsoever they ask for. My work carries that representation of nature in our culture in the form of flowers, sticks, leaves and herbs, as seen below.





Left to bottom, Left to Right; Fig. 13, Fig. 14, Fig. 15 and Fig. 16. Clay sculptures with motifs, patterns, tribal markings and traditional elements embedded in them, made with hara white clay, glazed and fired, 15 x 11 inches, by Author.

## DIGITAL TECHNIQUES

For this work I focused on the use of several digital techniques; 3D modeling, 3D scanning, 3D printing and VR/AR explorations. These techniques are being used to create and make replicas of traditional African objects such as masks, sculptures and 3D models of architecture that embody significant cultural practices which help in preserving the cultural heritage that might otherwise be lost or damaged. They help provide a visual representation of the culture for future generations.

Transitioning my work from the physical to the digital space has led my exploration to make 3D-inspired models which can be used in VR (fig. 17). Similar to my work of making these traditionally inspired objects digitally and printing them, people are using 3D printing technology to revitalize traditional techniques, African heritage sites and artifacts that were once produced. To illustrate, The Zamani Project based in South Africa is seeking to immortalize historic spots in 3D, VR-ready models. The project's aim is to build a database of complex, lifelike 3-D models (Chris, 2018). These techniques help in reviving traditional African crafts that are getting lost, destroyed and forgotten. Moreso, this same technique can be used to conserve existing cultural heritage objects such as damaged sculptures, objects and masks by the use of 3D scanning which transfers the physical object to be accessible in 3D digital space and the use of 3D modeling to restore certain lost parts. As seen in an article on Trimech, they argued that not until recently, replicas of artifacts, statues, art and architecture were traditionally made using molds and casts which can potentially damage delicate objects and degrading material, as supposed to using 3D technology which captures object data via layers, including precise size and texture data without touching the original at all. They digitally recorded and were able to preserve history through the Artec Space Spider scanner of a bronze statuette of the 'Dragon and Phenix', which was completed in two scan intervals. This resulted in a high-quality 3D model of the artifact which can be

studied virtually by anyone and allows them to zoom in appreciation of the details of the ancient Chinese culture piece (2019).

***“I like to see how current African artists are refreshing the ancient craft”*** - Jeryce Dianingana.

The quote above, from the artist Jeryce, is a reflection of what my work using digital techniques represents. Exploring cultural preservation using digitally fabricated techniques for this research involves the scanning of the physically made objects, converting it into a 3D model using software (Metascan) and then editing it to be usable in Augmented and Virtual Reality. This provides for the work to be viewed virtually, making the viewer have an immersive experience with the objects. 3D modeling and scanning enabled artists to create and document African art forms of cultural heritage digitally. They serve as a great means of creating/reproducing these traditional objects which can serve as an archive stored digitally. The 3D models I made during my research have tribal markings as seen on the skin of the models, which are a representation of the tribal markings done by the Marghi people. The models alongside them are calabashes decorated with patterns and motifs like the northern people of Nigeria have in their culture and adorned with elements like jewelry and cattle horns peculiar to the northern tribe. These models can be used to create educational and interactive exhibits that raise awareness about the culture while promoting greater appreciation for cultural heritage and encouraging its preservation. 3D modeling and simulation can also play a role in shaping how people perceive culture in the digital age. For instance, people living in the diaspora who are far from their cultural roots can use virtual representations of cultural heritage to connect with their ancestral culture and history. The immersive experience created by 3D modeling and simulation can help to foster a deeper understanding and appreciation, which can have a positive impact on cultural preservation.

The AR/VR exploration for my research provides my work with a larger range of accessibility. Their use for cultural preservation has been a growing interest in Africa and offers unique opportunities to document, reproduce and promote cultural heritage as seen in the Zamani project mentioned earlier (page 33). It is a great means of reaching a larger audience digitally and providing them with an immersive experience. With the proper use of AR and VR, one design/model made can reach thousands around the world. They would be able to experience these models virtually anywhere simply with a device.

Virtual reality (VR) has quickly become a mainstay for exhibiting arts and cultural organizations. When looking at it as a concept, 'VR has the potential to simulate imaginative and existing physical environments along with their processes. The simulations can be tuned to a highest level of multisensorial realism in order to affect users' visual, auditory, tactile, vestibular, and even olfactory and gustatory senses'. The article further explains the uses of VR in cultural heritage and how it encourages cultural preservation (Sydney, 2022).

This notion is also evidenced by the work done by Iyobaland, where there is an exhibit of some replicas of historical artifacts and sculptures of the Benin people of Nigeria, that have been placed in the Virtual space available to be experienced in an immersive way. These exhibits also have a collection of artworks 'Illuminaire Art Gallery' from various African artists, all utilizing the VR experience (2022). These exhibits help to raise awareness about the cultural significance of different sites, objects and traditions which provide a deeper understanding of their meaning and importance.



Fig. 17. Rendered images of 3D modeled bust of a lady, with abstract patterns and motifs, face painting, tribal markings and surrounded with calabashes. Made with Blender. 2023, by Author.

## CHAPTER 5

### EXPLORATIONS/METHODS/MATERIALS

#### PAINTING

##### **Software used: Illustrator and Procreate**

A number of artists have opened up conversations about oppression and our history using paint as a medium. Painting in Africa goes beyond just making art on paper or canvas. It has been used as identity markers, for rituals and other spiritual/cultural purposes. I witnessed the cultural values attached to body painting and the significance of identity marking when I was in Mubi (a town in Adamawa State, Nigeria). Using the long flow of lines and geometrical shapes has been common in the north and used to convey what an artist thinks, which represents the connection to our people and ancestors and how our different cultures and identity interlink with one another in the preservation of ancestral knowledge. I found painting to be enlightening and a great way of being able to interpret patterns and motifs in my paintings and put down certain memories and traditional elements I have come across during my research which felt like a natural flow embedding them. The paintings signify the cultural designs and identity of the people of the North of Nigeria. They serve as a statement piece to what my culture reflects and an archive piece to the collection of my documentation of preserving culture. Using Illustrator and Procreate to create these digital paintings gave me the room and opportunity to paint as though I was doing it traditionally with the use of a brush and paint, especially because I made these paintings on an Ipad pro using an apple pencil which served as a great tool. This medium gave me more flexibility however as I was working with layers and could easily change colors and elements. These paintings were printed (transferred from digital to physical), and even though that was the intended outcome, these paintings still had their presence digitally. (See fig. 9, 10 & 11).

## CLAY SCULPTURE AND 3D MODELING

### Medium: Clay | Software used: Blender

My grandparents' house was made with clay, and they had quite a number of items that were clay, like pots, and jewelry. Clay was an essential material. This is a material that has been used and is still in use for artistic purposes, cultural, and traditional ceremonies. Clay holds memories and remembers each touch. It gets hardened when fired and at the same time becomes more fragile. Clay has healing properties and helps to detoxify, it's a natural material gotten from the earth. With all the significance of clay, it is an appropriate material that enabled me to convey my message and art.

These sculptures are a true representative of the Marghi people's cultural practices; tribal markings, body modification, motif and pattern usage and nature. They carry with them experiences lived, ancestral knowledge passed down to me and the identity of the northern tribe. The clay sculptures were made with the 'Hara white' clay, a base glaze of Tea dust and an underglaze of custom mixed colors to achieve the desired look for fig. 13, 14, 15 & 16. For the sculpture in fig. 12, I used a custom mixed glaze to achieve a dark look that represents my blackness. Working with clay was essential to my research as this material was used by my ancestor and its significance is deeply rooted when it comes to the cultural practices in Borno State. Similarly, the 3D models made (fig. 17), were an interpretation of the physical clay sculptures and having to make the clay sculptures with the cultural elements embedded in them made the transition of making the 3D digital models smooth. There was a flow and quite a number of similarities between making 3D sculptures digitally and using clay to sculpt. The tools and techniques in the software used (Blender), mimics the methods used in modeling clay, especially in terms of sculpting. For instance, there is a tool called 'clay strips', which is used to add more material to an object when sculpting digitally and it's the same method

used when sculpting clay and trying to achieve certain forms. Modeling digitally gave me more room to experiment, duplicate my models, change colors, add textures, and manipulate my models to a certain degree, adding different motifs and patterns and cultural elements.

### **3D SCANNING**

#### **Software used: Metascan**

Transferring my clay sculptures using this software to a 3D digital model was effective in placing the work in the AR space. I was able to transfer my real-life sculpture to 3D digital models and interact with them by doing a test run on how they would look in the AR and VR space. I took over 120 photos of the sculptures in order to get a detailed 3D rendition. The base of the sculptures could not be captured as this technique involves taking 360-view pictures of the object, which was a bit limitive in comparison to making the 3D digital model. This could however be fixed using various software like Blender. Scanning made me lose quite a number of details that were relevant to my sculptures in terms of depth and capturing some fine cultural details that were present in the clay sculptures. This process enabled me to make replicas of my sculptures with minimal handling, (see Appendix B & C)

### **3D PRINTING**

#### **Machine used: Formlabs Form 2 SLA printer (Black Resin)**

While working on my 3D digital model and thinking about 3D printing, I had to limit the complexity of my design due to the limitations of the machines which made me not incorporate as many cultural elements in the designs as I would have loved to. Some machines can print complex designs and this can also be achieved by printing multiple



parts of an object before putting it together to form a whole piece. Because this process didn't give me room to incorporate as many details, it made me think about losing the essence of making physical objects with our hands in comparison to having them done digitally. Printing digitally also comes with a variety of options for using different materials including wood and clay which I would love to explore in the future. The 3D print method I used involves an additive technique that the machine uses to gradually create the design that it has been programmed to print. It also uses support materials that can easily be cut off and filed for a finer finish. 3D printing also gives room for further manipulation of the printed object as it can be painted over, filed or glued. With the advancement of technology, using digital prints is becoming more popular with artists. We can see this with modern-day artists working with 3D printing to make African-inspired masks (Dianingana, 2021). This method of 3D printing enabled me to research physically producing digital work, (see Appendix E).

## **AR/VR EXPLORATION**

### **Software Used: Unity, Oculus Headset and Metascan**

Exploring the AR and VR space gave my work fluidity in terms of being able to add certain cultural elements to my work and also being able to scale my work from the size of a pea to over 7ft high. This served as a great tool for my work to be situated in a vast space/scene and enabled the viewer to go around the artwork and have a close view and an immersive experience. The AR installation was a medium I used in taking the physical sculptures made and putting them in the digital space which created an avenue for them to be viewed without having to be in the physical space with the physical object making it possible for it to be viewed around the world virtually. This in turn makes the work more accessible as it can be viewed using a mobile phone and the internet. Similarly to the VR for Unity, the 3D models were successfully placed virtually with the cultural elements

and identity embedded in each of the models which serve as documentation and give the viewer an immersive experience and encourage a deeper engagement with cultural heritage, fostering a more meaningful connection with it. This was achieved using the 3D models I designed on Blender, then importing them as assets into Unity for VR. The file I used on unity for VR involved me designing a scene and inputting certain commands in terms of light placement and camera angles for the viewers and also the interactivity with the sculptures present in the VR space. The Oculus headset (Meta Quest 2) serves as a great support tool that I was able to use to transfer the 'Virtual Display' of my work into the headset that could be viewed without a laptop so long as the headset had access to the file, (see Appendix D).

## CHAPTER 6

### CONCLUSION

“Nema” is fundamentally driven by the desire and hope to preserve cultural heritage and explore ways it can intersect with 3D modeling and simulation to create an immersive experience that people can react with, engage with, have discourse about the importance of cultural preservation and also get enlightened about certain cultural practices. This was done by incorporating key cultural elements into all the work produced. Part of this research’s main component is my interpretation of the Nigerian cultural heritage, specifically that of the Marghi people by going through the processes of working with traditional materials like our ancestors did and transitioning to digitally fabricated techniques and AR/VR explorations. This research shows ways in which the different mediums, materials and techniques used translated the culturally inspired art in each process.

This research enabled me to play with physical objects which were handcrafted (Clay sculptures) and put them in the digital space by 3D scanning. Likewise the other way around, by creating 3D models (using Blender and Nomad Sculpt) and transferring those models to be physical by 3D printing and also virtually during my AR and VR exploration. These 3D models were successfully placed in the virtual space which gave the work a 3D immersive experience by allowing the user to interact with the models more engagingly. The user is no longer simply viewing a static image or object but is able to move around and interact with the digital moving models in a way that feels more like having a conversation with the work. This I believe can lead to a deeper understanding and appreciation of the work being presented in a new way.

The immersive nature of the VR/AR experience is important because it can enhance the impact and message of the artwork, and provide a more accessible and

engaging way for people to connect with cultural heritage. By creating this, the viewer is more likely to be drawn into the work as there is more curiosity and they can become invested in its message, making it suitable for my exploration of cultural preservation. All the works produced are inspired by the cultural heritage of the Marghi people in Nigeria, which are accessible digitally and serve as a form of documentation and archive.

## RESULTS/CONTRIBUTIONS

Based on my observations, people who viewed my work could recount certain memories and cultures of their own, which validates the purpose of my research; to preserve certain cultural heritage through these techniques that can be accessible in the digital space. This research has also exposed me to a deeper understanding of my ancestral knowledge and given me clearer insights as to why we partake in certain rituals. AR/VR enabled my 3D models and clay sculptures to be viewed as life-size models or as miniatures, it created an avenue for the 3D models to be experienced in an immersive way with a close-up look at the tribal markings, motifs, patterns and masks inspired designs. My work was able to be viewed virtually without having the physical object present. All things considered, there was a cross-intersection between the cultural practices studied, and the artworks produced physically with 3D modeling and simulation which gave room for an immersive installation.

This installation utilized 3D modeling and simulation to augment the cultural archival series, facilitating the transmission of lived experiences and ancestral knowledge through an immersive digital space. Consequently, this approach aided in preserving cultural practices and art by digitally representing them. Notably, this provided a medium for people to engage with and learn about cultural heritage. By leveraging these techniques and digital exploration, individuals of African descent in the diaspora, separated from their traditional roots, could discern and appreciate the positive cultural

heritage represented in the digital space, fostering a deeper understanding and appreciation of cultural heritage.

The digital tools, medium and materials I used to execute the digital installation significantly influenced the way people engaged and perceived the interpretation of cultural heritage. In the context of the physical clay sculptures and the digital virtual installation, sensory engagement and virtual immersion are distinct aspects of the audience's interaction. The physical sculpture invites touch and engages the senses, while the digital installation, accessed through Oculus headset and Unity software, evokes curiosity as people engaged with it based on wanting to have a feeling of being fully transferred into a different space virtually and be part of a new stimulated world, this however, wasn't an experience everyone was eager to have. Using digital technology provided new perspectives and fresh interpretations of my cultural heritage and made it more accessible and appealing to a wider audience.

During the digital creation of the 3D models, the absence of certain attributes became apparent, for example, the traditional technique of creating tribal markings using a sharp instrument to make direct incisions on the surface/artwork was not possible digitally, (although using the tools provided in the software created similar effects) unlike during the making of the clay sculptures which provided a traditional method of creating such markings. Additionally, sensory experiences such as the texture and smell of the materials were not adequately captured when utilizing 3D digital models or digital explorations. The translation of cultural and traditional heritage to the digital space is not without its challenges, as the digital representation of traditional art may not fully capture the cultural context and energy. Nevertheless, it is noteworthy that certain attributes of cultural heritage can be augmented through the use of digital tools. My work, for example, leverages these tools to create an immersive experience that enables viewers to engage with traditional art in novel ways while also ensuring its preservation

and accessibility to future generations in the digital domain which can't be destroyed easily.

The process of producing and creating these archival works has been a rewarding experience. It has challenged me as an artist and researcher and allowed me to explore new avenues of creativity and expression of my cultural heritage. Submitting these works to the OCAD University Repository, will serve as an opportunity to contribute to the academic community and create a lasting impact. By preserving and sharing my art, I hope to inspire and educate future generations and contribute to the ongoing dialogue surrounding cultural preservation, identity, creation, and history.

I have come to understand the power of art as a means of communicating historical and cultural narratives and the role it plays in shaping our understanding. My work will continue to carry with them the cultural heritage of my people and will serve as a means of preservation wherever they go/end up being seen.

In essence, I aim to continue creating cultural works inspired by traditional art and design, with the objective of documenting and preserving cultural heritage. Perhaps, this study could potentially serve as a framework for other individuals interested in using this approach to preserve their own cultural heritage and have an intersection with 3D modeling and simulation, to create an immersive experience that integrates the concepts of cultural preservation and modern technology.

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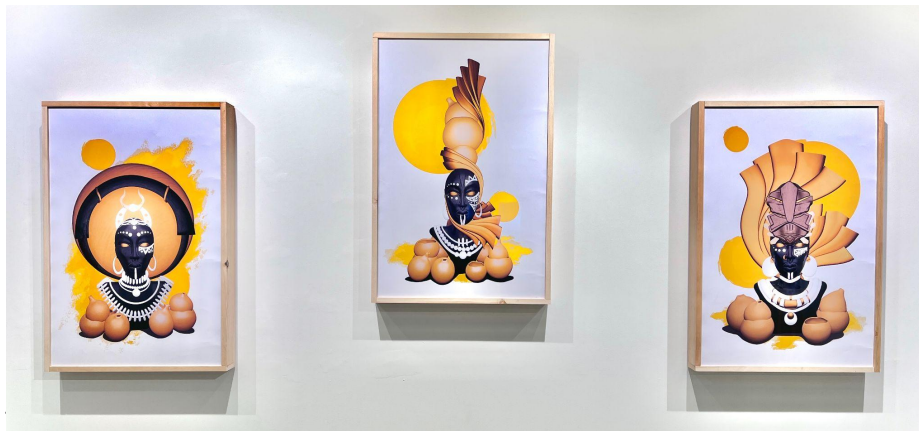
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## APPENDIX A

Images from Thesis Exhibition at Ignite Gallery.

Additional images and videos can be seen on [asabemamza.com](http://asabemamza.com)

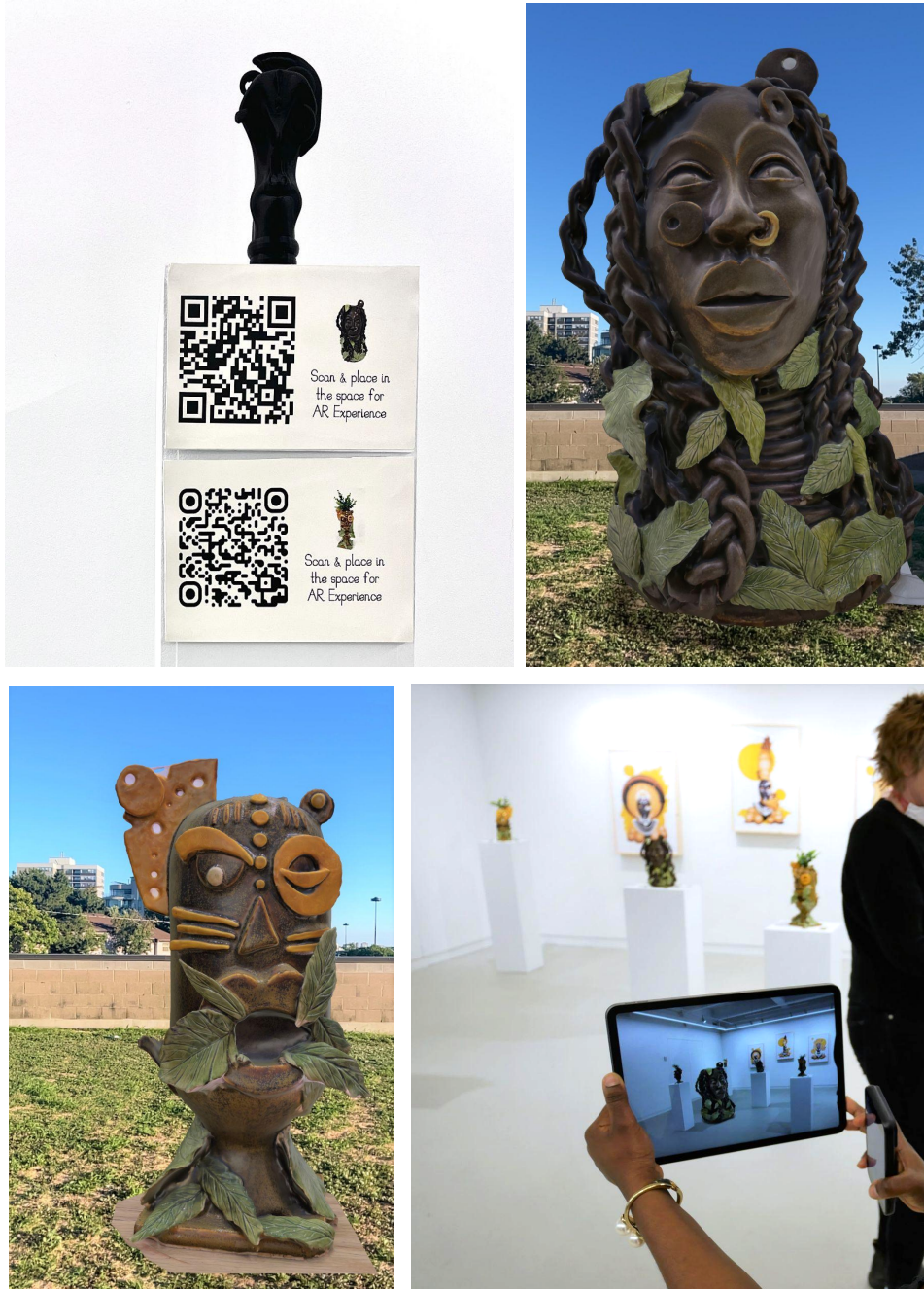
Series of images with clay sculptures and digital paintings displayed in the exhibition space, showcasing the physical making of my work, April, 2023.



## APPENDIX B

### Images from Thesis Exhibition at Ignite Gallery.

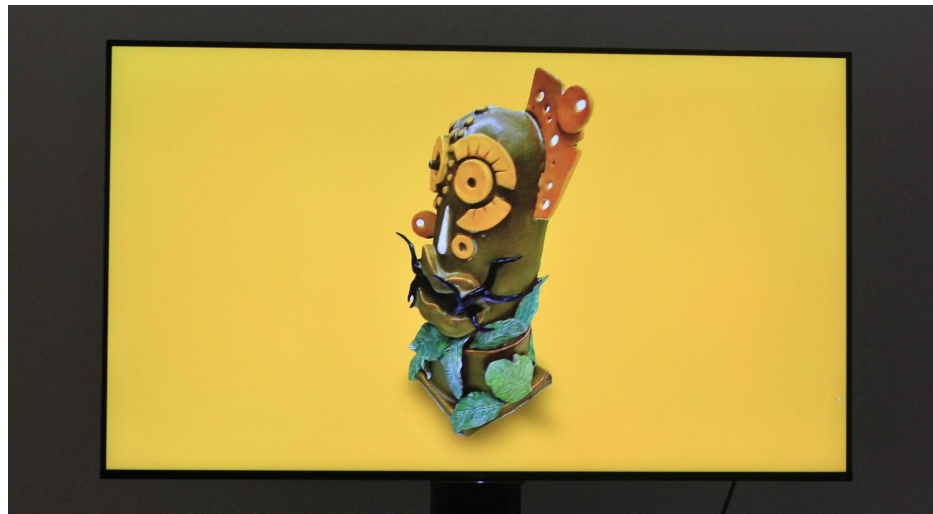
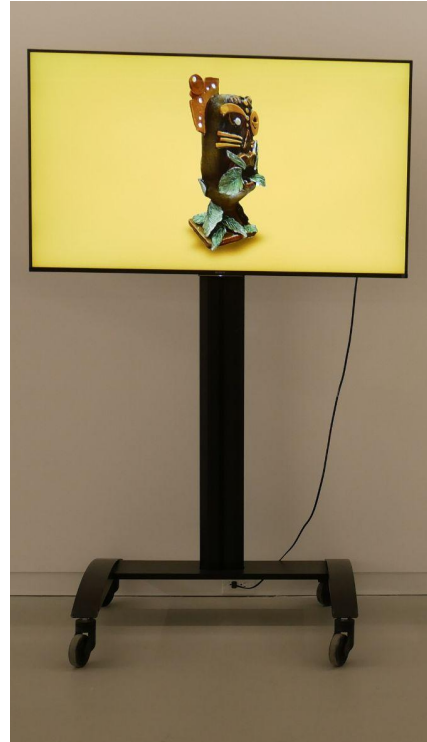
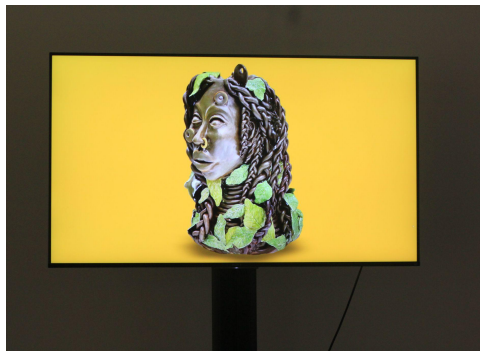
Series of images showing the AR exploration made from the 3D scans, this was archived using a GLB file with a QR Code generated for file sharing and AR viewing, April 2023.



## APPENDIX C

### Images from Thesis Exhibition at Ignite Gallery.

Series of images showing 3D scans, made into a video that rotates each 3D scan to show a 360 view of the clay sculptures, April 2023.



## APPENDIX D

### Images from Thesis Exhibition at Ignite Gallery.

Series of images showing the VR exploration which is viewed using the oculus headset linked to a laptop, the three 3D digital models were placed in Unity which was used for the exploration, April 2023.



## APPENDIX E

Images from Thesis Exhibition at Ignite Gallery.

3D printing of digital model.

