

Afro-Techno-History

by

Albert S. Hodo



Afro-Techno-History

by

Albert S. Hodo

This thesis challenges prevailing global technology design frameworks, predominantly rooted in Western standards, arguing for a more inclusive approach that reflects diverse cultural experiences. The study proposes a novel paradigm in which technology is designed contextually, incorporating local cultural ideologies. Focusing on colonized and marginalized communities in Africa, particularly in Ghana, the research explores the integration of cultural heritage in smart home devices. The framework, inspired by Adinkra symbols, seeks to bridge the gap between technology, cultural ideologies, and the developmental state of countries historically influenced by colonizers. The study advocates for a deeper understanding and incorporation of cultural nuances beyond linguistic translation in cross-cultural design.

Abstract

Technology design frameworks and practices used around the world are mostly based on the western standard of design and this is not representative of the global experiences. In the case of non-western groups that had other culturally significant design movements, it is important to go beyond built-in translation services on devices. There is the need for technologies designed in certain communities to have their users' culture and background reflected such that it has a home authentic feel especially in colonized countries and marginalized communities in Africa. This is mainly because such frameworks were adopted by the "colonizers" and there is no organic link between the technologies used, cultural ideologies and the developmental state of such countries. This thesis explores a new paradigm or framework for designing technologies in which devices are designed contextually, with local cultural ideologies. Designing for different cultures go beyond translating copy or text into other languages but actually appreciating, acknowledging and adopting cultural undertones that exist in images, symbols etc. (Cross Cultural Design, 2023) These themes are explored with the Ghanaian community as a case study where sample smart home devices are designed to express the cultural heritage through form, shape and physical interaction with inspirations from the Adinkra symbols of Ghana and more. These are designs based on a proposed framework that includes cultural heritage and references in designing for the West African communities. One important limitation is that local materiality was not explored in this project.

Afro-Techno-History

by

Albert S. Hodo

A thesis submitted in partial satisfaction
of the requirements for the degree of

Master of Design
at the
University of California, Berkeley

Fall, 2023

Faculty Director Signature and Date

Associate Director Signature and Date



Acknowledgement

I would like to show my appreciation to everyone who supported me in this research. I honestly could not have done it without your help, I am so grateful. To my professors Eric Paulos, Yoon Bahk, Hugh Dubberly, Chris Myers, Kyle Steinfeld and GSI Hila Mor, Thank you for you guidance.

To my friends and family for their unwavering support, and feedback, thank you. Special thanks go out to Ellie Hoshizaki, John Brechbill, Kad-miel Martin Odum and Rahul Srinivas.

Finally, to the UC Berkeley MDes community, thank you for providing an encouraging and supportive environment throughout my academic journey here.



an hour glass shaped drum of Ghana used to communicate ceremonial messages.

Introduction

Technology based on HCD

Human-centered design, an approach oriented towards problem-solving through a human-centered lens with rapid prototyping and critical thinking has had a huge impact on consumer goods, businesses and industries (Park & McKilligan, 2018) all over the globe. It has manifested in different methodologies with slightly different but similar approaches to designing consumer products such as Design Thinking, Human-Computer Interaction, and others (Culén & Følstad, 2014; Park & McKilligan, 2018). These frameworks and systems are designed to solve consumer needs by looking at problems of users, pain points and user experiences expressed as personas (Mao et al., 2005). This has been an efficient way in creating solutions to the needs and problems of people using technology. Even though this is a people's first approach, it does not fully involve the cultural experiences of people. The designs are also based on assumptions that users come from Westernized, Educated, Industrialized, Rich and Developed cultures(Akpem, Senongo, 2020; Cross Cultural Design, 2023). This has been recognized internationally and adopted all over the world with organizations such as the International Organization of Standardization (ISO) recognizing such approaches in its standardization documents. This inherently is not bad but HCD fails to recognize the cultures and backgrounds of different people from different cultures especially when the products/solutions are deployed in other regions. This creates a monotony of technology designs where all technologies look the same, and act the same.

In the context of African colonization

According to Ocheni and Nwankwo, in their research, In the case of Africa, it is a general perception that colonial influence and western design standards have contributed to the development and industrialization of the continent (Ocheni & Nwankwo, 2012) but a deeper analysis of this case shows that it is the other way round where colonization of African countries and adoption of Western education along with its design practices hindered the growth of localized technological practices and education(Ocheni & Nwankwo, 2012).

This is a bit counterintuitive at first glance since the user-centered design is based on research to understand users in their context and the problems they face, sometimes even

imploring ethnographic research and multiple rounds of iterations and market tests(Park & McKilligan, 2018) . This approach does not factor in the cultural practices and traditions of the community or users being designed for. This is because the designs of the physical solutions are based on western principles whereas most artifacts created in this region have some cultural components to it. This is very important and particular in the African context since cultural needs of the people differ in terms of their local traditions, practices and how the different societies work (Ambole, 2020; Sikhuphela et al., 2018) and does not get reflected in the designs. If our design practices does not leave room for us to create products that are culturally responsive and acknowledge multicultural experiences, then we inherently fail to meet user needs.(Cross Cultural Design, 2023)

A more inclusive approach to understanding users for consumer products would be a design paradigm that includes the cultural influence of the community in the finished products. This approach is more decentralized and it leads to the designs of products that are more intimate in our living spaces, have cultural influence and become part of the society, it also serves as an avenue for colonized and marginalized communities to explore their cultures. This method prevents a one-size-fits-all-all approach and creates design approaches that provide products that are more relatable to users.

Role of technology in culture

Technology in its sense has the attribute of highlighting societal values, culture, norms and even societal biases. (Arowolo, 2010; Jegede, 1993; Sibani, 2018) and in the case of African colonized countries, there are virtually little to no instances where technology expresses the cultures of the people (Arowolo, 2010; Ocheni & Nwankwo, 2012).This can be attributed to the conditioned dependency on foreign products the era of colonization created and how it has been amplified by the Western educational institutions created in Africa . This has led to design projects that do not belong or have a direct link with the culture (Akena, 2012). In an instance where technology is created and used based on cultural heritage, it does not only solve the needs of users but delivers cultural expectation, enhances user experiences and increases the cultural pride of the people.(Akena, 2012; Henries, 1977).

What is done in this project

The homogeneity and one-size-fits-all approach to the design of consumer goods leaves a case for exploring the decentralization of design and how design can be different in each context and community. This thesis is a deep dive into cross-cultural design and explores a new paradigm or framework for designing technologies in which devices are designed contextually, with local cultural ideologies. These themes are explored with the Ghanaian community as a case study where several smart home devices are designed to express the cultural heritage through form, shape and physical interaction. Each device lives in a distinct context of the home; the living room, bedroom and hallway and has its practical function. One important limitation is that local materiality was not explored in this paper.

In this project, a 5 stage approach is used in exploring this concept. First, in-depth research is done to understand elements of cultural heritage in Ghana, with a focus on local

philosophies and practices recognized nationwide. Secondly, contextual enquiries and interviews are conducted with participants to understand appropriate contexts to design IoT technologies that embody and express the culture. Third, low-fidelity prototypes and interactions are made in response to the needs based on the first stage ensuring that they fit in the contexts of the participants. Fourth, a framework is developed to match technologies and consumer products to the cultural traditions and heritage of the community being designed for practical actions within the community. Finally, high-fidelity prototypes are designed and fabricated to showcase and express how designs can be made based on specific communities using a variety of techniques.

A limitation of this project is that it doesn't factor in local material explorations which is very important in decentralizing design. This decision was made because the research is not being done in Ghana and would only be effective if done there. Another reason was to balance the tradeoffs between time and quality of the research. The impact of this work is to challenge existing design approaches in different communities as well as provide an avenue for people in colonized and underrepresented communities to appreciate their cultural heritage and increase cultural pride.

A limitation of this project is that it doesn't factor in local material explorations which is very important in decentralizing design. This decision was made because the research is not being done in Ghana and would only be effective if done there. Another reason was to balance the tradeoffs between time and quality of the research. The impact of this work is to challenge existing design approaches in different communities as well as provide an avenue for people in colonized and underrepresented communities to appreciate their cultural heritage and increase cultural pride.



13th century Artifact from West Africa with unique patterns with hidden meanings
(the Metropolitan Museum of Art, n.d.)

Prior Art

Afrofuturism

In the case of designing for Africa and the Diaspora, a lot of inclusive design research has been conducted. One major one among the African diaspora is Afrofuturism which provides a sense of reclaiming self-identities among the African diaspora with lost history and identities (Winchester, 2018). It is defined by Mark Dery, as “a literary and cultural aesthetic that uses the tools and tropes of science fiction, as well as references to African and non-Western mythology, as a means to confront and analyze the present-day issues faced by people of colour” (Dery, 1994). It provides a way of contextualizing and reimagining the future of people in the African diaspora in the context of science fiction, African history and technology. (Winchester, 2018). This movement lasted a couple of years and gained a new wave and perspective known as Afrofuturism 2.0.

The new wave has matured into a system of challenging Eurocentric perspectives on African and black history, not only by telling their own stories but also by critiquing narratives of the presumption of Western authority as sole interpreters of black history and futures (Anderson, 2016). Dr Lonny Brooks is a forecaster and Afrofuturist who imagines alternative futures from a Black Diaspora perspective while thinking about long-term signals that influence the next 10-100 years in his work.(Brooks, 2020). He has written books such as the Black Speculative Arts movement, which uses black storytelling approaches to challenge the colonial mindset and explore different possible futures. (Brooks, 2020)

A case for designing technology for Africa

There is evident research that suggests designing technologies and consumer goods for different communities using the same frameworks from Western methods at best, would be biased and at worst, racist.(Adamu, 2019; Ali, 2016; Ambole, 2020; Sadi Adamu, 2021). This makes it such that the experiences of marginalized communities are not easily represented or understood(Sadi Adamu, 2021). Another phenomenon that occurs is the clash between the standard design principles and the traditional and cultural ways of producing knowledge when designing for different indigenous communities(Sadi Adamu, 2021).

There has been a lot of work done to cater for this. Researchers interested in interactive technologies in Africa have explored alternative perspectives for design such as Ubuntu, Afrocentrism, indigenization, etc. (Awori et al., 2015; Kapuire et al., 2015; Winschiers-Theophilus & Bidwell, 2013). This has led to different ways of exploring how indigenous and local knowledge and culture can be integrated into the Human Computer Interaction (HCI) frameworks and practices(Sadi Adamu, 2021).

In the past few years, one major obstacle designers and researchers have encountered is that, when they try to infuse indigenous knowledge with mainstream design principles, it becomes more complex. (Adamu, 2019) This is because western design principles favors specific patterns which are influenced by the Bauhaus movements in Germany in the 1930s and this inherently conflicts with other culturally significant design movements in different groups outside of Europe(Cross Cultural Design, 2023). It must be noted that the pursuit of design for local African communities is not a post-colonial endeavour to contradict Western design standards as it might seem political to some(Sadi Adamu, 2021).

Human-Computer Interaction for Development

Human-Computer Interaction for Development (HCI4D) is a sub-branch of the ICTD (Information & Communication Technologies for Development) agenda. An emerging branch of HCI that focuses on designing for underrepresented and indigenous communities(Wyche, 2022). British Philosopher, Peter Winch has done much work in exploring the challenges of understanding other communities, and their unique perspectives as well as social structures(Sadi Adamu, 2021; Winch, 1964)His work is exactly in line with HCI4D from the African perspective. It provides a way to acknowledge and present the multiple experiences in the global design context. This is important since it considers the diverse languages traditions and cultures of different communities in countries in Africa(- Sadi Adamu, 2021).

There have been case studies to examine the efficiency of Western technologies designed without cultural context adopted in Africa, for instance (Sikhuphela et al., 2018) . The authors in this paper conduct research using the Automated teller machine (ATM) in South Africa and explore how different age groups from different communities interact with it. The main insight they got was how culture could influence the interfaces instead of the mainstream WIMP since older generations would easily use ATMs (Sikhuphela et al., 2018).

Another notable project done in the year 2020 was to promote and explore a broader design perspective for the African continent. In Amboles research done in 2020, they explored the disparities between Western design conventions and pre-colonial African design(Ambole, 2020). They also explored exemplary designs from the continent to promote and articulate some attributes of African design to strengthen identities that can influence relevant design solutions for African societies. Some examples are the Agbogbloshie Market Platform in Ghana designed with 1500 people with 750 grassroots makers who deal in scrapyard recycling with participatory design, Mariam Kamara's architectural firm in Niger who use local materials to design spaces based on local context as well as Ravi Naidoo's Design Indaba of South Africa who coordinates and hosts the biggest design conference to promote social designs in Africa.(Ambole, 2020)

Areas of opportunity -technology and culture

If we are to design and develop technologies that reflect the globalization and differences in cultures and experiences of the world, then we must develop and design different products that reflect the cultural experiences and expectations of different groups. This is especially needed in the African continent due to the stunted industrialization and growth caused by colonialism. Most of the research done in the past does not do a deep dive into the creating examples or coming up with a formalized framework to make this concepts tangible.

All the projects and research mentioned above explore the importance of designing for the African and African diaspora communities. This is also evident from designs born out of Afrofuturism through research done for Afrocentrism, it is also explored especially in the case of the ease of usage of ATM research done in South Africa.

However, there is little to no work done in the exploration of designing with HCI from a bottom-up approach from an underrepresented indigenous group while exploring the integration of elements of their cultural heritage and societal dynamics. This certainly provides an opportunity to explore new design frameworks, undiscovered materials and practices that can inspire new technological interactions and systems.



A contemporay home designed by a Ghanaian designer with an African theme. (Atelier, 2020)

Motivation

Why this? Why now?

This project sits in an important sphere of decolonization of the African continent. Since African countries gained independence after colonization, they have not been able to return to the authenticity of their existence due to the change in the trajectory colonization brought. There were hidden consequences of colonization that were not known at the time. Some examples are disrupting the ingenious rich cultural processes and industrialization that would have matured. Western standards of problem-solving, iron smelting and other craftsmanship were imposed on these indigenous cultures and most of these practices either have been lost or the few that survived were seen as techniques that had to be preserved as part of their histories hence halting any chance of creativity and inventions. This has stalled the perspective of creation from an African lens.

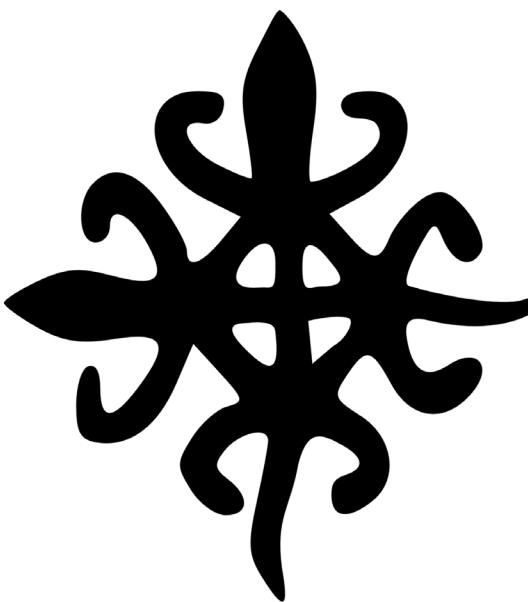
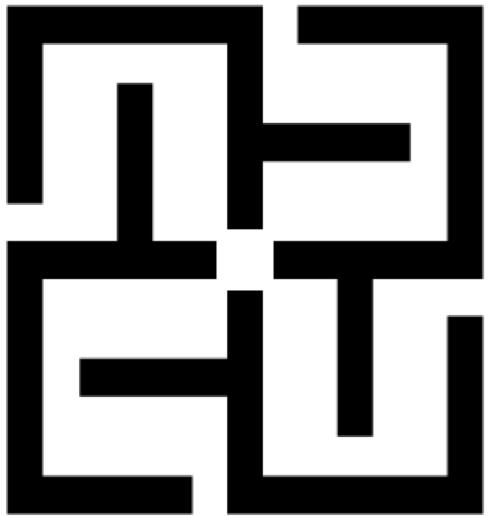
Another reason is the high rates of cultural dilution during colonial times and the continuation thereof. For such cultures that were being thought to believe that they were inferior and savage,(Ocheni & Nwankwo, 2012) most cultures didn't stand a chance of thriving against the Western standards that had been portrayed as better for many years in such colonies. Most of the talented people from such places strive to reach higher heights and create Western innovative technologies which were seen as prestigious(Kingsley Atter Fletcher, n.d.). For someone from an African colony to reach the highest standards in the institutions of their colonizers was the goal of many. This led to brain drain which is still prevalent today.

There is also the issue of the importation of Western products which leaves no chance for industrialization. This is partly due to the colonizers importing everything from the West which became a thing every indigenous person wanted. It became the new culture and still happens today to the point where Africa exports mostly raw materials only and imports everything from rice to toothpicks which is absurd.(Amin, 1972).

There is also no direct link between education, culture and practices in most parts of the continent. This is evident in the way most technologies and products designed for the West do not work in different African contexts.(Ocheni & Nwankwo, 2012)Places such

as the African Leadership University (ALU) in Mauritius are making changes by creating new curriculums that aim to fit the needs of the continent.

I am a proud Ghanaian and African and as a designer and engineer, I am obligated to use my skills to understand what closed doors there have been in design and engineering and how that can impact the way we as Africans view our cultures and practices.



The 4 main Adinkra symbols I used in my research ie. Sankofa, UAC Nkanea, Denkyem-funefu and Dwennimmen (Kwabena, 2020).

Method / Approach

In this project, a multi-step approach was taken in designing the technologies and framework. Following lots of iterations as well as testing design ideas and how they connect to the framework. It consisted of several iterations in the testing of design ideas and how well they connect to the framework. The process was nonlinear due to the several changes in concepts as failed testing required a step back to look at what could be improved and progress from there to design a framework that is appropriate to the goals of the project. In this research, different cultural references were used such as the adinkra vocabulary, cultural metaphors from Ghana, and design patterns & undertones from a library of pre-colonial west African artifacts.

These were used as the entry point to cultural heritage since its encapsulates various parts of the cultural heritage of the different groups in Ghana, Mali and neighboring countries, because it has historical cultural references to various pre-colonial groups in the western part of Africa.

Understanding of scope and general contextual research

Building a framework for designing technologies for a specific place and indigenous group that captures the culture and becomes part of the heritage without fully speculating is a challenging project. This project in no way solves that problem but proposes a hypothesis of what that might be. Lots of archival research had to be done to understand pre-colonial West African artefacts and designs. The Yale Museum has a collection of pre-colonial artifacts and that was a good frame of reference for me. I was able to capture most of the artefacts and study their shape, form and peculiar features to familiarize myself with some design styles of the indigenous people. Most of the artefacts were from Ghana, Nigeria, Mali and Cote D'Ivoire. These used in conjunction with symbols, practices and cultural experiences of western parts of Africa provides a series of cross-cultural design references that were used.

Field research and process designing

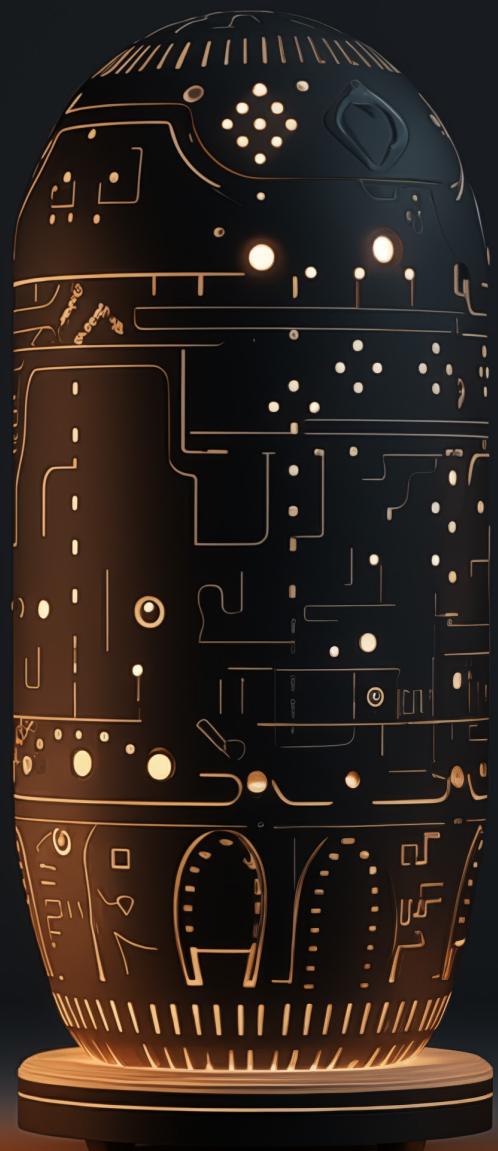
The next phase of the research was visualizing and designing two artefacts while I tried to explore how the pre-colonial region would have solved such problems. I decided to explore one problem that is local and contextual to the past but also explored how such design practices would be used to solve a general problem that is contextual in the 21st century. This is where I incorporated aspects of local cultural design and reasoning in the choice of interactions, overall form and aesthetics of the artefacts. There was a lot of analysis and experimentation on how obvious the cultural influence is on the artefacts as opposed to abstracting it where meanings have to be derived from interacting with the artefacts but inspired by the references.

Journaling and documentation of the process for the framework

The third phase consisted mostly of documentation and recording of project processes. Design tools such as card-sorting was used to simplify and categorize the processes. Initially, it started as exploring the intersection of contextual research and solution ideation and how I could factor in the indigenous culture and heritage. This is then developed more towards the final stages of my project into a combination of the scientific method and a contextual design framework that I called Afrotechnohistory.

Fabrication

The final phase even though this was done parallel to the other steps in a circular iterative manner was designing and fabricating the new artefacts for the 2 problems I decided to tackle. This is explained in detail in the Evaluation of framework below. This was interesting because it was a way of building the framework but at the same time, it represents what kinds of designs the framework helps you achieve. I used various fabrication techniques in the process, ranging from 3d printing of parts to laser cutting of wood and using foam core. I also leveraged the Esp 32 microcontroller and some sensors and actuators to animate the artefacts and explore the look and feel of the artefacts if they were being used.

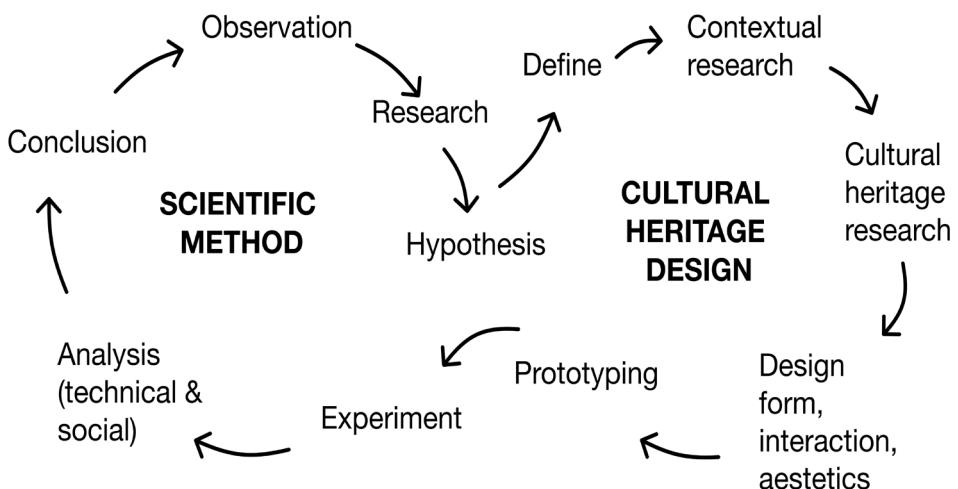


A rendering of Olu the storytelling lamp.

Final Design

Evaluation of Framework

Afrotechnohistory is a science that studies the history, cultural heritage, social norms and designs of pre-colonial African regions to make predictions and visualize their solutions to 21st-century African problems to influence design and engineering practices of the continent.



The figure above shows the proposed framework to be used.

The proposed framework above came out of the analysis of my iterative processes of designing the artifacts. It must be tested with further experiments to explore its robustness in creating technological artifacts that expands on cultural heritage.

It is grounded in the scientific method to prevent speculative designs and focus more on what could have been assuming colonialism did not take place as we know it today. It works hand in hand with a contextual design framework that factors in the culture of the people. This is connected through the experimentation stage of the scientific method and after the designs are made, the tests and analysis are done such that the designs do not only solve the problems at hand but embody the culture and become part of the cultural heritage. This was tested in two ways to ensure authenticity. First, it was tested by finding linkages between the cultural references used and the design decisions. The second test was done when a few people from the said community interact with the artefact and if they can easily make connections between the interactions, visual designs and their culture, it passes the test.

One difficult part of designing with afrotechnohistory is that the aesthetics, shape and form cannot be the exact shape and form of cultural references and symbols used in the culture. They have to be influenced and not an exact copy. This is to prevent cultural appropriation and promote cultural appreciation. This is done to encourage designers to understand the cultural significance and meanings behind design patterns, appreciating and adopting cultural design undertones in the references.

Another point to note is that specifically for the West African case worked on, there are hidden stories and proverbs in most designs. It is a cultural norm that wisdom appears in less obvious ways therefore, being able to incorporate hidden messages or moral lessons in the designs are appreciated more by the group and have a stronger connection to the culture since it fits in with the traditional artefacts.

During efforts at gathering data on cultural heritage, it was found helpful to categorize them through the UNICEF categories of cultural heritage. Since some may be lost, it is easier to document them and find the ones that are linked with more categories. That provides a stronger connection with the culture of the people. In this case, an example used was the Adinkra which may seem like just symbols but with contextual understanding, it is a vocabulary, it has hidden stories used to teach culture, it represents parables, it embodies several categories of cultural heritage and is used across different countries in the region.

Olu -The wise old lamp

In researching Ghanaian and neighbouring cultures, one aspect of oral traditions was the practice of passing down knowledge and culture through storytelling and folklore in gatherings from the old to the young. For instance, in most parts of Ghana, they would have a person who is referred to as the Omankrado (the town padlock) or the Afetor who knows the traditions of the ethnic group by heart and it's their job to pass them down. He also is consulted by the Chiefs and leaders of the kingdom over customs and specific details of rites that are performed. It is culture that such a person would also come to a public

place where young people are and they would sing about their stories, and their past and perform various dances and games. After which they would quietly sit around him as he passed on invaluable pieces of knowledge often done through parables and proverbs. This was one of the practices I decided to research more on since such things do not happen often anymore.

It lives on in some rural areas but is not the same as before. In Ghana, after colonialism, it lived on through a television broadcast of a version of that where many young people all over the country watched and learned about stories of Kwaku Anansi, a great spider in folklore originating from the Akan people and popular among West Africa, the Caribbean and the southern parts of the US due to slavery. The creation of this artifact serves as a reclamation of African identity and allows people to learn more and appreciate their cultures.

I explored how the indigenous people would have attempted to adopt/solve the problem of people not gathering anymore for such occasions and find a way to preserve the essence and knowledge of this practice. This is how I came up with Olu-the wise old lamp. It is an interactive household device that represents or serves as a symbol of the wisdom of the Omankrado. It lights up when 2 or more people come close to it. When pieces of chips on top of it are moved in a particular pattern, it triggers the device to share such tales as the Omankrado did.

My process

The form and shape.

For the design part of the framework, I explored how the region preserved practices and rituals at the time and this was mostly through human-like artefacts with distinct features that were sacred. They served as a way to prevent bad omens, provide goodwill, healing etc. Using the adinkra, the symbols Sankofa, and UAC Nkanea influenced the choice of artifact and how it works.

The Adinkra is a set of cultural symbols used in West Africa, popularly among the Asante people of Ghana but has its origins from Côte D'Ivoire. It's mostly used as patterns on cloths and each symbol has a different meaning and is interpreted differently based on its usage. The different themes relate to parts of history, beliefs and philosophy of the Asante people(Kwabena, 2020). They sometimes depict events, human behaviour, attitudes etc when used in different settings. For instance, we have the aban (castle/fortress), ohene tuo(kings gun), UAC Nkanea (lights; represents the benz, television etc), kook dua(cocoa tree) and many more. These and many symbols represent specific historical events and technological advancements influenced by both internal and external factors.(Kwabena, 2020)

Interaction

When multiple individuals approach it, the device lights up, symbolizing the sense of community and Ubuntu in the region. This ritual reflects the community's gatherings, reminiscent of the fire and lanterns used in such events. The illumination embodies not only cultural traditions but also technological progress, echoing the promise of UAC Nkanea, where "Nkanea" translates to light in English. It signifies a respect for both the traditional ways and the potential of the future.

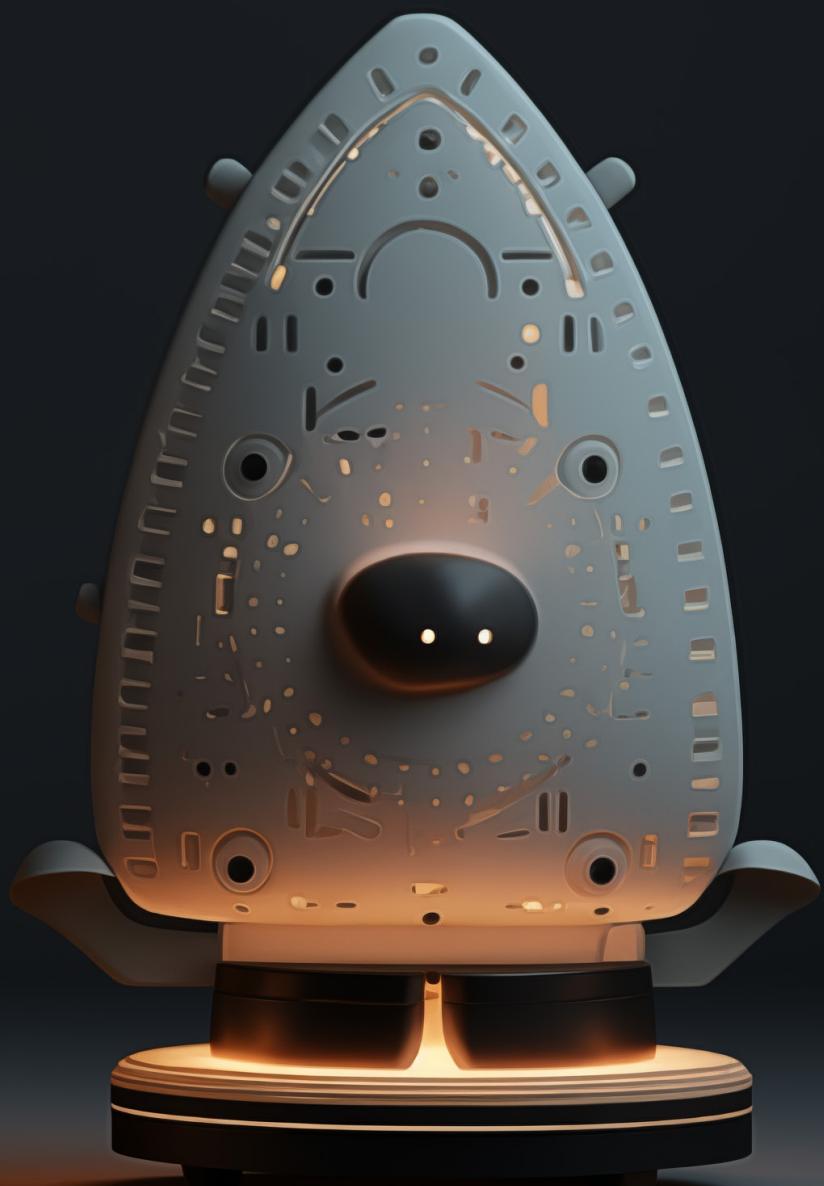
The device communicates, mainly through updated recordings, when you strategically move the chips, aligning with local beliefs. These events often feature dances and communal games, fostering harmony among community members. The chip section's pattern draws inspiration from the UAC Nkanea symbol, representing diverse rituals and games across the region, showcasing how technology enhances cultural practices. Choosing recordings over a smart AI system aligns with the Sankofa message, emphasizing the untapped lessons from history that shape the future. It also gives families the option of recording family member's messages through folklore and pass them down as heirlooms. Geometric patterns on the device reflect the rich design language of the region, representing its diverse culture. The design is rooted in cultural heritage and informed by contextual research.

Following the scientific method, the next step involves testing and analysis. The framework proposes two tests: one assessing the linkage between cultural references and the design, and the other, a social test where individuals from the region interact with the device. If they identify connections with their culture without prior information, the design passes the test. Conducting tests in both ways safeguards against potential misrepresentations resulting from biases or assumptions of the designers based on the chosen cultural references.

Aba - The Sleeping Angel

Aba is another interactive smart device concept that also lives in the context of the bedroom in a Ghanaian home. It has a flipped sleep schedule and needs to be put to sleep in the morning and woken up at night. It is a concept that helps young people get out of bed in the morning.

It is a thought exercise about how the pre-colonial region would have solved a common problem of today where many young people have poor sleep schedules and cannot rely on alarms to get out of bed. Inspired by the Nsa ko ns aba Adinra which represents "a reciprocated lending hand" and the interactions informed by contextual gestures. This was done in a similar manner as Olu. These were done in a rapid prototyping setting and mainly designed for an exhibition of Afrotechnohistory.



A closeup rendering of Aba -the sleeping angel that helps young people with forming a morning routine

Discussion

Exploration & Non-implementation.

During the literature review and research conducted, the papers cited in the above sections explored the inorganic relationship between technology and African cultures. Also, it looks at how Western technologies do not fit well into such cultures and how colonialism stunted the growth and exploration of design and innovative practices in West African cultures. However there have been little to no implementations of a deep cross-cultural designs in technologies for African societies.

Excitement in technologies with cultural references

When conducting interviews with people in Ghana, many of them especially the older generations were more excited about the prospect of designing technologies with cultural heritage as a key factor. Some key insights obtained from the interviews was about how older cultural artefact in indigenous communities had designs with hidden meanings that only a select few knew and had to pass down from generation to generation and these were patterns that could be interpreted as inscriptions to solve a specific kind of problem in society, for instance what to do when the leader of a household/ Chief of a kingdom commits a crime against their people.

Relationship between science and design

In this research in order not to only speculate on future designs pre-colonial West African regions would have done, a series of steps were followed, where a hypothesis was created, which was then tested and experimented to find out why a design decision taken was either meaningful or not in the context of designing the devices. After several iterations, documentation and trying to categorize the steps, a pattern was noticed with the approach used which was consistent with the scientific method and design thinking method. This was how the framework was discovered and developed into Afrotechnohistory since it showed the potential of being a particular field of study. It also shows a unique relationship science can have with design and how one influences the outcomes of the other. This was certainly an interesting observation in this project.

Relationship Between Afrotechnohistory And Afrofuturism.

Afrotechnohistory shares a connection with afrofuturism, and while more research is needed to fully understand Afrotechnohistory as a framework and field of study, it's intriguing to examine its similarities and differences with afrofuturism as a concept.

- Both Afrotechnohistory and Afrofuturism challenge the prevailing Euro-centric standards in design, aiming to question and disrupt the status quo that often marginalizes or ignores non-Western perspectives.

- Both concepts explore and incorporate Afrocentric ideas in design. They seek to infuse cultural, historical, and social elements rooted in African and African diaspora experiences into the design process.

Here are a few differences between them:

-Target Groups: Afrofuturism primarily focuses on African diaspora communities, which includes people of African descent living outside the African continent. It often engages with the experiences and visions of those in the diaspora, addressing issues of identity, culture, and empowerment. Afrotechnohistory specifically targets West African communities, concentrating on the historical context and contemporary challenges faced by these communities. It emphasizes the importance of understanding the pre-colonial past to inform present-day design solutions.

-Temporal Orientation: Afrofuturism takes a more futuristic approach, envisioning innovative and speculative technological solutions for the future. It often explores themes of science fiction, space, and technology to reimagine the possibilities for African and African diaspora communities. Afrotechnohistory focuses on researching the past of pre-colonial communities, emphasizing historical perspectives to inform present and future design solutions. It draws on traditional knowledge and practices as a foundation for addressing contemporary challenges.

In essence, while both Afrotechnohistory and Afrofuturism share a commitment to challenging dominant design narratives and infusing Afrocentric perspectives, their distinct focuses on target groups and temporal orientations set them apart. Afrofuturism leans towards speculative future scenarios, while Afrotechnohistory grounds itself in historical exploration to guide present and future design endeavors, particularly within the context of West African communities.

Challenges

Afrotechnohistory has certainly not been tested thoroughly due to the scope of this paper as well as its constraints. A more specific way of using cultural references and heritage has to be explored. Further research has to be done on how designs generated are tested in the analysis stage of the scientific method. The framework has to be tested on a wide range of problem areas to test and develop its usability, depth and rigidity.



A second rendering of an alternative Olu, based on ceremonial artifacts.

Future Work and Conclusion

This project is a focused case study aiming to introduce and develop the concept of Afrotechnohistory. While this initial exploration provides a foundation, there is a need for further research to delve deeper into the term. One crucial area for investigation involves the integration of local materials in design within the specific contexts of the region, a facet not thoroughly covered in this research. Additional studies are essential to refine the testing and analysis stage of the scientific method, preventing the “outsider” effect in design where cultural heritage may be misunderstood by designers unfamiliar with local communities.

To broaden the scope of the framework, it is necessary to explore various use cases and design problems, understanding its capacities and robustness. Considering the historical impact of colonization on technological exploration in Africa, this thesis raises questions about the innovative designs, processes, and material discoveries that might have been lost. While speculation is inevitable, this research proposes a new field of study in Human-Computer Interaction (HCI) that combines science and design. It aims to investigate pre-colonial histories of West African regions, offering a fresh approach to 21st-century technological challenges in the area.

Further research must be done to come up with a robust toolkit for other designers who would want to use this technique, perhaps for other cultures as well.

The research explores the practice of passing down culture through folklore and community engagement. It employs local practices and adinkra symbols, common in the western part of the region, as sources of cultural reference due to their encompassing representation of cultural heritage elements.

This work holds the potential to showcase how technology can be tailored to specific communities, becoming an integral part of cultural heritage. Importantly, it can contribute to fostering cultural pride among younger generations in colonized communities often classified as “third world countries.” Furthermore, it may inspire the exploration of Afrotechnohistory in designing technologies for West African communities, facilitating the preservation and exploration of their cultural practices and innovations.

Bibliography

- Adamu, M. (2019). Designing and Evaluating Learning Technology: An African Dilemma and Approach: Proceedings of the 11th International Conference on Computer Supported Education, 184–191. <https://doi.org/10.5220/0007744901840191>
- Akena, F. A. (2012). Critical Analysis of the Production of Western Knowledge and Its Implications for Indigenous Knowledge and Decolonization. *Journal of Black Studies*, 43(6), 599–619.
- Akpem, Senongo. (2020). Cross-Cultural Design. A Book Apart. <https://www.oreilly.com/library/view/cross-cultural-design/9781098124045/>
- Ali, S. M. (2016). A brief introduction to decolonial computing. *XRDS: Crossroads, The ACM Magazine for Students*, 22(4), 16–21. <https://doi.org/10.1145/2930886>
- Ambole, A. (2020). Rethinking Design Making and Design Thinking in Africa. *Design and Culture*, 12(3), 331–350. <https://doi.org/10.1080/17547075.2020.1788257>
- Amin, S. (1972). Underdevelopment and Dependence in Black Africa: Historical Origin. *Journal of Peace Research*, 9(2), 105–120.
- Anderson, R. (2016). AFROFUTURISM 2.0 & THE BLACK SPECULATIVE ARTS MOVEMENT: Notes on a Manifesto. *Obsidian*, 42(1/2), 228–236.
- Atelier. (2020, July 14). A bright and airy contemporary designer home in Ghana. Atelier 55 - the Curator of Contemporary African Design. <https://www.atelier55design.com/a-bright-and-airy-contemporary-designer-home-in-ghana/>
- Arowolo, D. (2010). The effects of western civilisation and culture on Africa. *Afro Asian Journal of Social Sciences*, 1.
- Awori, K., Vetere, F., & Smith, W. (2015). Transnationalism, Indigenous Knowledge

and Technology: Insights from the Kenyan Diaspora. Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems, 3759–3768. <https://doi.org/10.1145/2702123.2702488>

Brooks, L. J. A. (Director). (2020, July 7). When is Wakanda: Imagining Afrofutures—The Long Now. <https://longnow.org/seminars/02020/jul/07/when-wakanda-imagining-afrofutures/>

Cross Cultural Design: What Is It & Why Does It Matter? (2023, January 4). Big Human. <https://www.bighuman.com/blog/guide-to-cross-cultural-design>

Culén, A. L., & Følstad, A. (2014). Innovation in HCI: What can we learn from design thinking? Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational, 849–852. <https://doi.org/10.1145/2639189.2654845>

Dery, M. (Ed.). (1994). Flame Wars: The Discourse of Cyberculture. Duke University Press.

Edo artist | Plaque: Warrior and Attendants | Edo | The Metropolitan Museum of Art. (n.d.). The Metropolitan Museum of Art. <https://www.metmuseum.org/art/collection/search/316393>

Facebook. (n.d.). <https://www.facebook.com/blackstarofafrica/posts/fontomfromfontom-from-is-an-akan-type-of-hourglass-shaped-drum-mostly-used-by-an-776190416322687/>

Henries, A. D. B. (1977). Black African Cultural Identity. *Présence Africaine*, 101/102, 119–128.

Jegede, O. J. (1993). African Cultural Perspectives and the Teaching of Science. <https://eric.ed.gov/?id=ED365526>

Kapuire, G. K., Cabrero, D. G., Stanley, C., & Winschiers-Theophilus, H. (2015). Framing Technology Design in Ubuntu: Two Locales in Pastoral Namibia. Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction, 212–216. <https://doi.org/10.1145/2838739.2838788>

Kingsley Atterh Fletcher. (n.d.). Perceptions of Contemporary Effects of Colonialism Among Educational Professionals in Ghana. <https://doi.org/10.7275/68ZJ-CZ25>

Kwabena. (2020, September 15). Adinkra Symbols & Meanings. Adinkra Symbols & Meanings. <https://www.adinkrasymbols.org/>

Laput, G., & Harrison, C. (2019). Sensing Fine-Grained Hand Activity with Smartwatches. Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems, 1–13. <https://doi.org/10.1145/3290605.3300568>

Mao, J.-Y., Vredenburg, K., Smith, P. W., & Carey, T. (2005). The state of user-centered design practice. *Communications of the ACM*, 48(3), 105–109. <https://doi.org/10.1145/1076731.1076732>

[org/10.1145/1047671.1047677](https://doi.org/10.1145/1047671.1047677)

Ocheni, S., & Nwankwo, Basil. C. (2012). Analysis of Colonialism and Its Impact in Africa Ocheni and Nwankwo CSCanada 2012—ISSN - Studocu. Cross-Cultural Communication, Vol. 8, 46–54. <https://doi.org/10.3968/j.ccc.1923670020120803.118>

Park, H., & McKilligan, S. (2018). A Systematic Literature Review for Human-Computer Interaction and Design Thinking Process Integration. In A. Marcus & W. Wang (Eds.), Design, User Experience, and Usability: Theory and Practice (pp. 725–740). Springer International Publishing. https://doi.org/10.1007/978-3-319-91797-9_50

Sadi Adamu, M. (2021). Rethinking Technology Design and Deployment in Africa: Lessons from an African Standpoint. 3rd African Human-Computer Interaction Conference: Inclusiveness and Empowerment, 75–83. <https://doi.org/10.1145/3448696.3448704>
Sibani, C. M. (2018). Impact of Western culture on traditional African society: Problems and prospects. UNIZIK Journal of Religion and Human Relations, 10(1), Article 1. <https://doi.org/10.4314/jrhr.v10i1>

Sikhuphela, A., Gawuza, N., Maka, S., & Jere, N. R. (2018). Designing technologies for Africa: Does culture matter? Proceedings of the Second African Conference for Human Computer Interaction: Thriving Communities, 1–2. <https://doi.org/10.1145/3283458.3283504>

Winch, P. (1964). Understanding a Primitive Society. American Philosophical Quarterly, 1(4), 307–324.

Winchester, W. W. (2018). Afrofuturism, inclusion, and the design imagination. Interactions, 25(2), 41–45. <https://doi.org/10.1145/3182655>

Winschiers-Theophilus, H., & Bidwell, N. J. (2013). Toward an Afro-Centric Indigenous HCI Paradigm. International Journal of Human–Computer Interaction, 29(4), 243–255. <https://doi.org/10.1080/10447318.2013.765763>

Wyche, S. (2022). Reimagining the Mobile Phone: Investigating Speculative Approaches to Design in Human-Computer Interaction for Development (HCI4D). Proceedings of the ACM on Human-Computer Interaction, 6(CSCW2), 535:1-535:27. <https://doi.org/10.1145/3555648>

