Peace: Projecting Dual-Identities on Interactive Furniture

Sara Nabil[1,2]
[1]Open Lab, Newcastle University, UK
[2]Creative Interactions Lab,
Carleton University, Ottawa, ON, Canada
sara.nabil@carleton.ca

Richard MacLeod
Fouadisms Limited
Birtley, England, UK
richy@richardmacleod.co.uk

ABSTRACT

The world is promoting inclusion and diversity more than ever before. Many people have dual-identities that they alternate between and may often blend. In our design research we explore everyday objects and the role of technology to accommodate people's needs and personalities. Can furniture change its shape to reflect our dual-identities? Can our interior spaces reveal their hidden aesthetics when interacting with us? We designed a set of matching interactive furniture to unfold these narratives. Our Peace Table and Peace Painting change colour with proximity to reflect the dual identity of Western-Muslims. This pictorial describes our design concept and process with the aim of encouraging the HCI community to design for experiential artwork. Such interactivity can enrich and add new dimensions to the quality of living experience by merging technology into home decor in calm, ubiquitous and non-intrusive ways.

Authors Keywords

Interactive furniture; dual-identity; shape-changing interfaces; colour-change; Calm Technology; ubiquitous; Human-Building Interaction.

INTRODUCTION

Beyond emissive displays and motor-actuation, physical interaction with the surrounding environment can enhance people's experiences, support their engagement and their well-being in a variety of ways. Architectural and interior design will soon be interweaved with HCI to build the next generation of ubiquitous environments [1, 8]. In this paper, we aim to explore how can technology support people with dual identities through interactive artwork.

Previous work has looked into developing interactive everyday objects for domestic environments. For example, some have prototyped interactive furniture [8, 11, 3], artwork [13] and decorative elements [12, 9]. Still, such design intervensions are quite limited and most technical uptakes give little attention towards the artistic values and style of their designs. This inherently limits the potential towards supporting people seamlessly in their everyday life, reflecting their values and expressing their identities.

Art and the Western-Muslim Identity

People use decorative art to express their identity, whether in fashion, product design or interior design. In the Islamic heritage, calligraphy has evolved into the most prominent form of art. As the Islamic empire grew over massive territories of the ancient world, people adopting the faith developed mixed culture, art and fashion. Almost every Islamic nation has its own calligraphic script and even some cities developed their own calligraphy style [7]. Only 9 scripts out of hundreds of Arabic calligraphy scripts survived the test of time and popularity and became classic [6]. Two of these nine classic scripts are named after two nations: Al-Farsi (The Persian) and Al-Maghribi (The Moroccan). However, the attempts to merge the Arabic and Latin scripts to express the Islamic-Western identity and reflect its sociocultural aspects is still in the nascent stages [2].

Integration and Assimilation

People with dual-identities often suffer to integrate properly. When it comes to cultural identities, sometimes -even after three generations on- their origin is still the Homeland. But it is important to understand why not integrate? For many, the key factor is often fear. It is not the fear of integration that worries people of dual-identities, but rather assimilation. Generally, this is a cause root to many ill-integration syndromes.

One way to integrate but not to assimilate is to use fashion to express own identity in a distinctive style and in harmony with other identities. For example, in Victorian England, some inner-class conflicts were reflected in the re-design of garments and home decoration to reflect the identity of people [5].

INSPIRATIONS

This project was inspired by prior work in interactive furniture and calm appearance-changing artwork to explore people's living practices around everyday objects. However, our approach was not to develop new technology or use expensive fabrication methods, but to utilize low-cost materials and accessible making and crafting DIY techniques.

INTERACTIVE TABLE

The History Table-cloth [3] that changes illuminating patterns with pressure sensors inspired us to make an interactive table that responds to people's physical interaction but in low-cost materials. Thus, we hacked an IKEA LACK side table (oak effect, 55x55 cm) into an interactive table that features dual-identity artwork engraved using a laser-cutter and at the same time changes colour with proximity, then fades off slowly over time.

INTERACTIVE PAINTING

Inspired by the Anabiosis [13] painting that changes its colour in response to touch and Transience [14] Japanese calligraphy that uses chromogenism to show dynamic aesthetics, our design concept was to create a wall painting that responds in the same way but with a deeper significance. Therefore, we hacked an IKEA RIBBA Frame (white, 50x50 cm) into an interactive wall painting that features dual-identity artwork (matching the interactive table) hand-painted in layers that change colour slowly to reveal hidden calligraphy messages.

Fig. 1 History Tablecloth [3], ©Interaction Research Studio

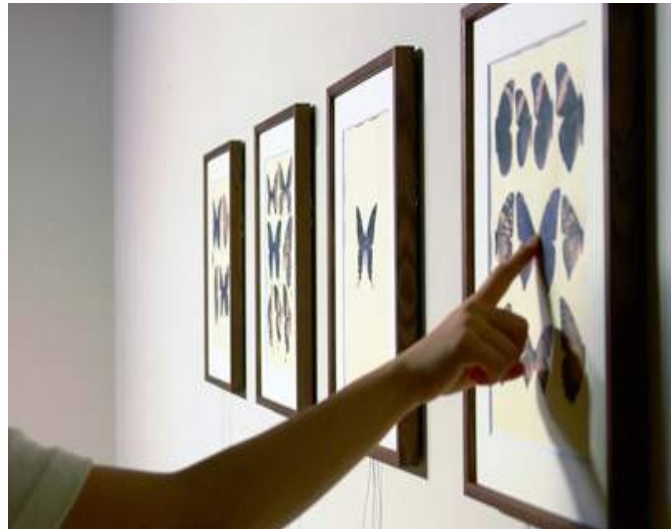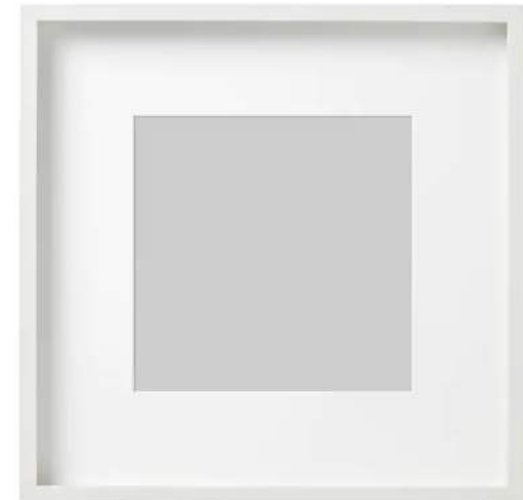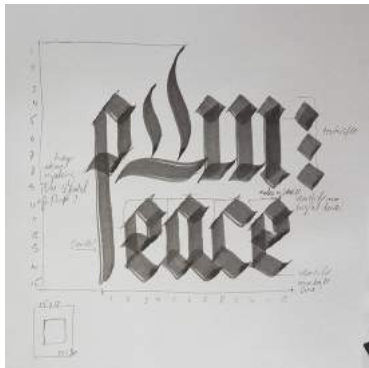Fig. 2 IKEA LACK side table [4], ©IKEA

Fig. 3 Anabiosis [13]

Fig. 4 IKEA RIBBA Frame [4], ©IKEA

Salam
(Arabic for Peace)

Playing with the Script

To achieve our design concept of bridging the gap between the Western and Muslim identities in our artwork, we wanted the writing script to be unified. While English can be written in a cursive way where letters are intertwined, Arabic calligraphy rely on such features where letters can not be separated in common text. In addition, Arabic is written from right to left, may include shapes (clarifying the accents and adding decoration) and does not have capital letters or abbreviations.

Therefore, to blend both together, we developed a new script with the characteristics of the Blackletter/Gothic (English) and the Kufi (Arabic) script [2].

This new script blends both the English and the Arabic alphabet into one new script/font. The key was maintaining the same form and readability of the alphabet of both English and Arabic text so they can be both perceived in unison and not two entirely separate entities. Still, there is still some uniqueness to few characters in each alphabet which did not transfer over. We took that as a good indication for integration but not assimilation.

Creating this unified script for both English and Arabic letters governed by the same rules of height, width, depth, ascenders and descenders was another metaphor that, in Western countries, all citizens are equal under the law.

Technique

We blended both the word "Peace" and "سلام" (Salam: Arabic for Peace) through a technique of using a back-light screen to play with layers. This helps seeing through and painting details exactly were desired.

Paper

The choice of paper needed to be thin to allow heat transmission but equally heavy enough and opaque to carry the weight of paint and hide electronics behind it.
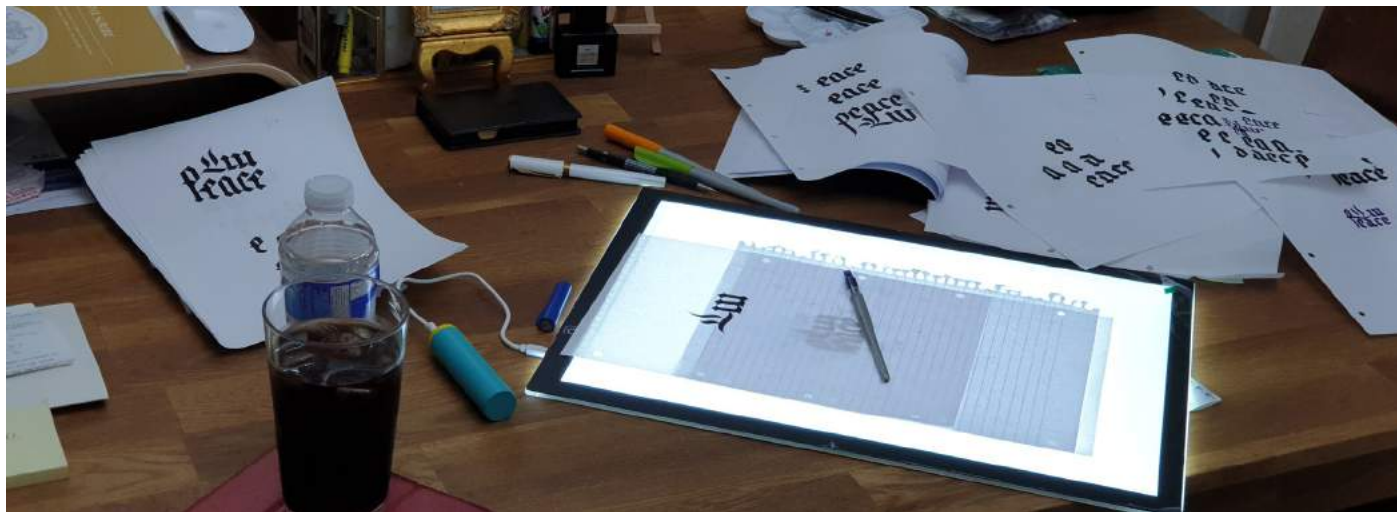
Colour

Playing with the composition and consistency helps figure out how to achieve the desired effect from thermochromic pigments. We mixed both thermochromic blue powder pigment (31 °C) with thermochromic screen-printing paint (47 °C) to get a rich burgundy purple.

Aiming for a deeper purpose than just colour-change, we started with a base layer in Arabic Gold ink to emphasize 'words of gold' or written wisdom. This ink also gives different shades when viewed from angles reflecting the multi-faceted nature of dual-identities. Then, the top layer of the thermochromic mixed paint was added with the appearing artwork.

Brush

Despite of the accompanying binder that typically dilutes the paint, we managed to apply the dry brush painting effect. We ensured the composition stays thick and used a dry brush to create lines and strokes within each letter to highlight their motion rather than having solid blocks of colour.
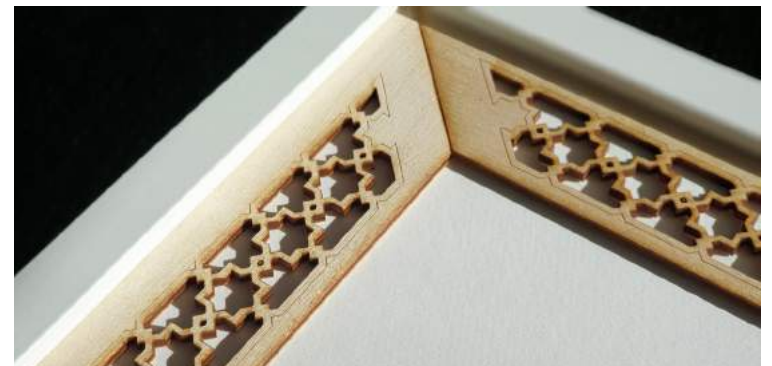
The Message

The artwork in this painting is unlike common paintings. The blend of the word Peace in both Arabic and English, painted in a single script is meant to reflect the harmony of both co-located communities: Muslims and non-Muslims. We placed the English at the bottom and the Arabic on the top to indicate the healthy environment provided by the Western world to all citizens regardless of their identities.
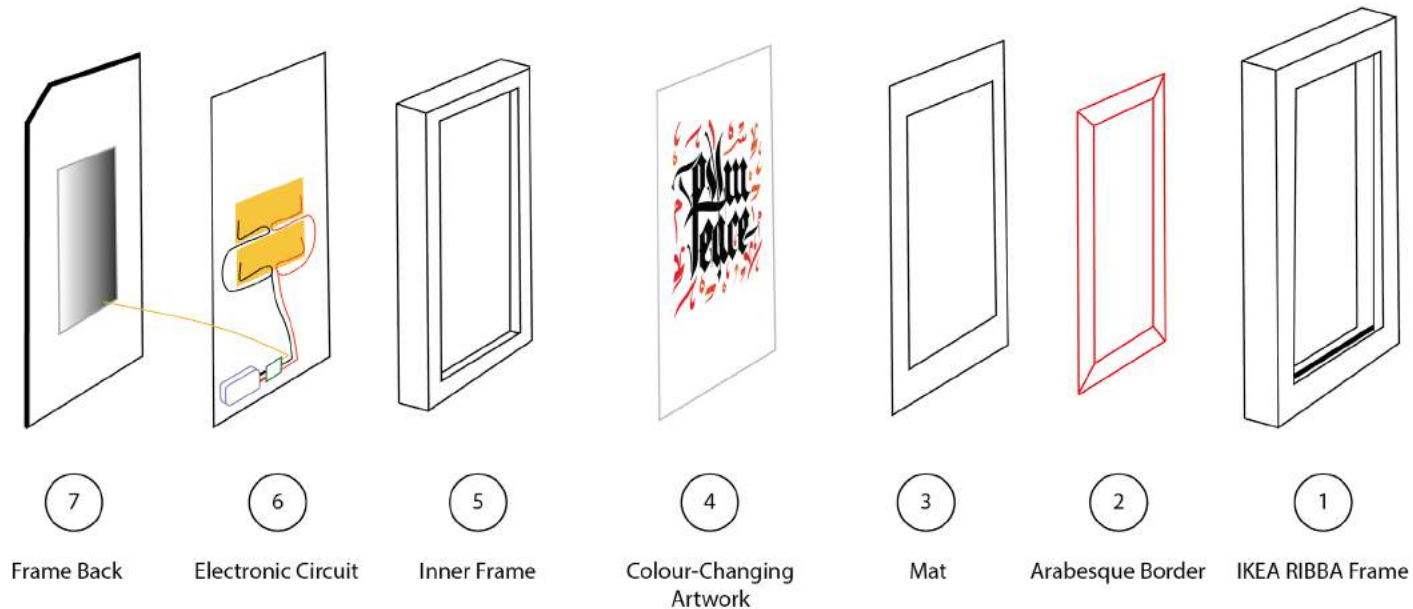
The Hidden Message

Our aim for the design of the two words is to reflect an integration between the characters of both sides together without assimilation. The words Peace/Salam (in Arabic) disappear when exposed to high temperature to read a message underneath.

In the Arabic side a quote of Mohammad the prophet of Islam say "لا تغضب، لا تغضب، لا تغضب" i.e. "Don't be angry, don't be angry, don't be angry". The English side message say "Keep Cool & Think Big".

DESIGN AND IMPLEMENTATION

| 7	6	5	4	3	2	1
Frame Back	Electronic Circuit	Inner Frame	Colour-Changing Artwork	Mat	Arabesque Border	IKEA RIBBA Frame

Making of the Peace Painting

The Peace painting is designed in layers as shown:

1. IKEA RIBBA Frame (white, 55x55 cm) as a neutral modern look that holds the painting layer together.

2. A laser-cut arabesque border (plywood, 50x50 cm) giving the picture frame an Arabic style and a customized character.

3. Mounting board (white cardboard mat) with wide aperture emphasizing the painting and the artwork.

Layer 1
(Arabic Gold ink)
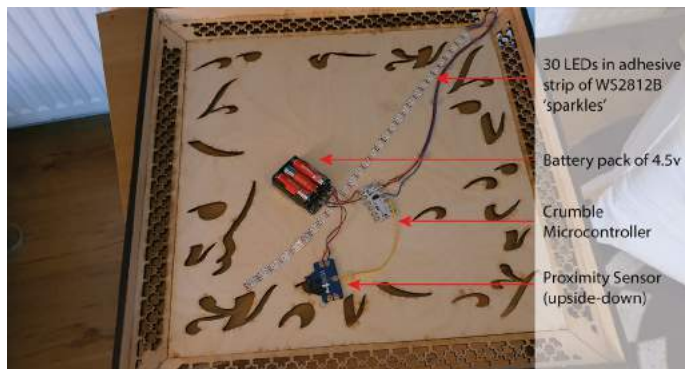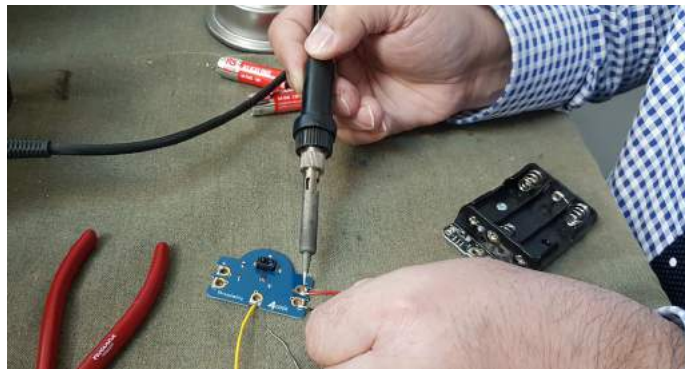
Layer 2
(Thermochromic Paint)
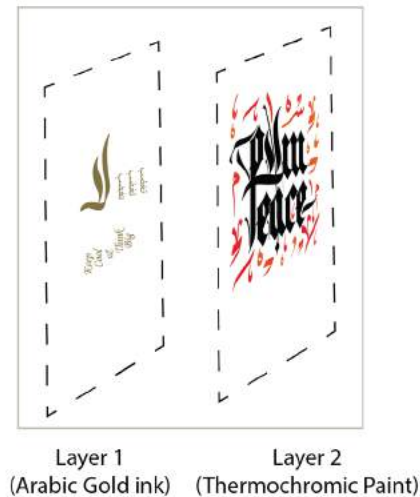
4. Colour-changing artwork using Arabic Gold ink (Layer 1) and thermochromic paint (Layer 2) on cartridge drawing paper (160 gsm).

5. An inner frame that gives thickness providing room for the battery and electronic components to be entirely inside the picture frame with no external parts.

6. Bottom Layer carrying the electronic circuit including an Arduino microcontroller with 2 MOSFET-enabled 5V heating pads that are powered by an 11.1V LiPo battery.

7. Frame back holding all the layers together with flat nails and fitting a capacitive sensing layer of aluminium foil connected to 1 MΩ resistor on the microcontroller.
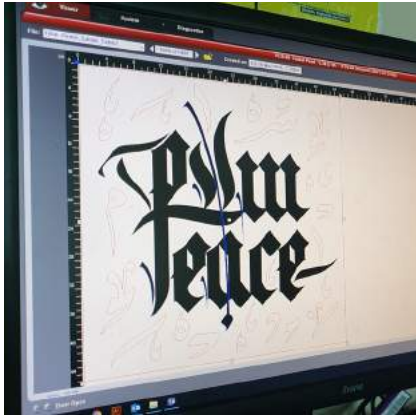
Making of the Peace Table

The Peace table is a hack of the IKEA LACK side table. We digitalized the Peace script design and engraved it on the tabletop plywood using laser-cutting to match the Peace painting. An arabesque border was also laser-cut and glued around to enrich the style. A battery-powered proximity sensor was added inside to respond to people by gradually changing the colour of a WS2812B 'sparkle' strip using a CRUMBLE microcontroller.

The customization of the IKEA LACK table design in this sense transforms the plain top face into an interactive dual-identity piece that support self-reflection as the proximity-sensing colour-change fades away slowly. It also enriches the decorative style of home spaces with DIY tech-making and fabrication methods at minimum cost. We programmed the light to increase and decrease gradually with proximity.

The design of the Peace painting is replicated on the Peace table. They are both interactive to the space occupants and the surrounding environment. The table responds to proximity while placing or removing objects on top of it. The painting responds to both capacitive sensing when touched and ambient temperature of the room triggering the thermochromic paint.
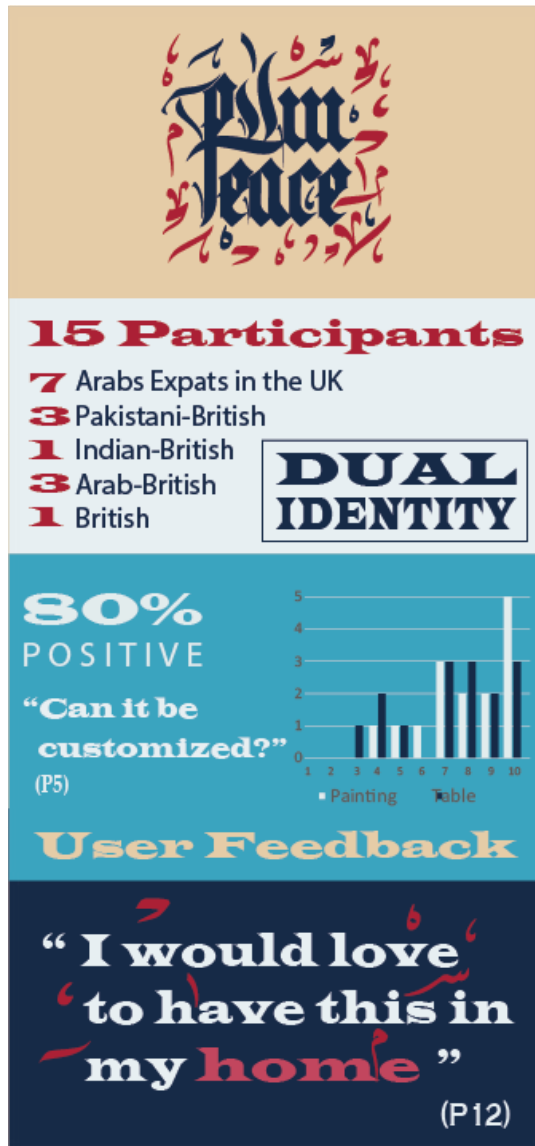
EXPERIENTIAL OUTCOMES

Blending technology with calligraphy was our metaphor for blending the Western advancement with the Islamic heritage. The interaction between them represents the harmony of cultures while the blend of the English and Arabic scripts reflect the integration of the dual-identity. As decoration and interior styles are common ways of expressing identity, values and pride, it was meaningful to use interior decorative elements as a vehicle to this context. The degradation of colour reflected the change that happens to people with dual-identity. Our pieces were programmed to change colour with physical interaction (touch or proximity), with time (autonomously) or slowly with the surrounding environment (with temperature). This reflects how identities change whether deliberately or implicitly (generated from the desire to blend in), or slowly over time. The painted text reveals hidden messages underneath as one identity fades (or morphs) over time, generation after another.

We set the painting and the table in the living room of one household where the owner (British-Muslim) invited 15 participants of family and friends over in three groups for dinner. The host demonstrated the interactive pieces to the first group who were impressed and presented the two pieces to the other groups (while he attended the kitchen) almost like a found treasure. The two pieces were the conversation material during dinner where they discussed how products can be customized in similar ways to reflect their dual-identity challenges in their own homes.

Participants reflected back on this design concept as an uncommon way to convey a message of exercising self-restrain while thinking of the bigger picture. They were appreciative of how the prophetic narration was quoted and how it was adopted to be part of the word Salam and how the Arabic words merged into the English ones smoothly. On a Likert scale, 80% of user feedback was positive and some expressed great admiration and took many pictures and selfies with both pieces in different angles as they interacted and changed colour. Many participants asked if they can have such pieces in their homes, if they can buy them or make themselves. Customization also constituted a significant part of their conversation asking "*Does it come in different sizes, colours, shapes, designs?*" (P10) in addition to practical concerns such as: "*Will you have a glass top on the table?*" (P3) or "*Can you roll it out for other furniture providers?*" (P7). In this sense, people are already considering the benefits and limitations of living with such interactive furniture on daily basis and in the long-term.

CONCLUSION

We described the design concept and the design process of two matching interactive domestic objects, aiming at exploring how technology can reflect dual-identities. We designed these pieces of home decor to explore the individual and collective reflective potentials of seamless technology that can be part of our living spaces. Instead of reinventing the wheel, we resorted to hacking affordable and accessible DIY furniture, materials and fabrication methods.

In a pilot study, we invited 15 people who self-identify as Western-Muslim to observe their experience with our interactive table and wall painting and unpack the hidden metaphors of dual-scripts and colour-change-identity-change scenarios. These alternative metaphors and design concept are part and parcel of compositions that seek to critically interrogate and expand our visions of diversity and inclusion beyond gender and ethnicity.

The experiential outcome we created to reveal and communicate the hidden layers of dual-identities is unique and novel in HCI. The gradual transformation of interactive furniture can reflect who we are and how we change, intentionally or subconsciously. But how can we give interfaces such deeper values and meanings?

As a pictorial, this type of research is better conveyed to HCI researchers, galvanising the community to visually demonstrate not just the design decisions, but also the used tools, materials, settings and techniques of prototyping, crafting and making.

In our future research, we aim to run long term studies of such pieces in people's homes and explore how it might change their living experience or self-reflection over time. We believe this work opens a great research agenda for interaction design to address deeper experiential aspects of our lives and in our home spaces.

ACKNOWLEDGEMENT

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