

Art Digital Jewellery as Atmospheres: An autobiographical RtD exploration into IoT for poetic contexts

KOULIDOU, Nantia <<http://orcid.org/0000-0001-5029-6848>>, P. CARVALHO, Luís <<http://orcid.org/0000-0003-4985-0121>> and PETRELLI, Daniela <<http://orcid.org/0000-0003-4103-3565>>

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Art Digital Jewellery as Atmospheres: An Autobiographical RtD Exploration into IoT for Poetic Contexts

Nantia Koulidou
Sheffield Hallam University
Art & Design
Sheffield, UK
n.koulidou@shu.ac.uk

Luís P. Carvalho
Northumbria University
Computer and Information Sciences
Newcastle, UK
luis.a.carvalho@northumbria.ac.uk

Daniela Petrelli
Politecnico di Milano
Department of Design
Milan, IT
daniela.petrelli@polimi.it

ABSTRACT

In a process of Research-through-Design two art digital jewellery pieces were created on the same bespoke IoT device that connects a person with the sea: a hand-held piece (SeaVessel) and a necklace (Thalassa). Drawing on the notion of atmosphere, the design development (2020-21) and the first author's lived experience with the pieces (2021-2022) are illustrated and narrated. We share insights into how the pieces augmented intimacy with a significant place and offer a space for self-reflection for the first author to explore their connection with the sea and ultimately the self. We offer insights gained from working with IoT, live data and online servers in such a poetic context. We contribute to experiential approaches to designing reflective and curious ways of interacting with digital technology with the notion of atmosphere as a concept for aesthetics for interaction design and an understanding of data as poetic data.

Authors Keywords

art digital jewellery; IoT; atmospheres; autobiographical design; poetic data; live data; slow technology; intimacy; ambiguity

CSS Concepts

- Human-centered computing-interaction design-Interaction design theory, concepts and paradigms

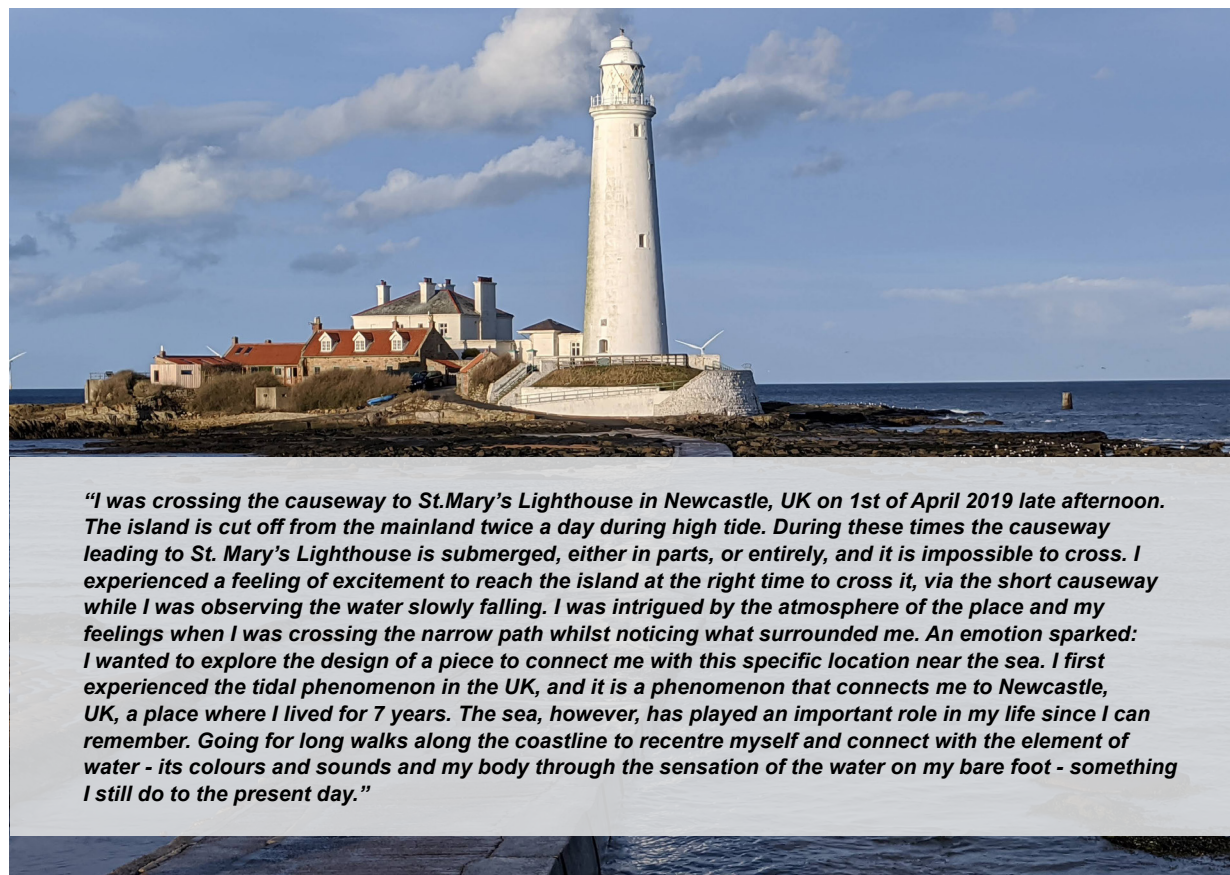
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"I was crossing the causeway to St.Mary's Lighthouse in Newcastle, UK on 1st of April 2019 late afternoon. The island is cut off from the mainland twice a day during high tide. During these times the causeway leading to St. Mary's Lighthouse is submerged, either in parts, or entirely, and it is impossible to cross. I experienced a feeling of excitement to reach the island at the right time to cross it, via the short causeway while I was observing the water slowly falling. I was intrigued by the atmosphere of the place and my feelings when I was crossing the narrow path whilst noticing what surrounded me. An emotion sparked: I wanted to explore the design of a piece to connect me with this specific location near the sea. I first experienced the tidal phenomenon in the UK, and it is a phenomenon that connects me to Newcastle, UK, a place where I lived for 7 years. The sea, however, has played an important role in my life since I can remember. Going for long walks along the coastline to recentre myself and connect with the element of water - its colours and sounds and my body through the sensation of the water on my bare foot - something I still do to the present day."

Fig.1: First author's reflections that capture the significance of the experience and the importance of the sea in her life. The picture shows the St.Mary's lighthouse in North Sea, Newcastle, UK



Fig. 2: (from left to right) The images capture the experience of the first author crossing the causeway to St.Mary's lighthouse during low tide on the 1st of April in 2019 late afternoon. The last image shows the times and dates that visitors can safely cross the causeway to visit the light house.

INTRODUCTION

Recent studies in design and HCI research highlight limitations in the ways we think of digital devices and their impact on ourselves, our bodily behaviours, and practices, missing out on designing for much richer experiences with digital data [15,18,21,31,34,42]. Our work responds to this growing call for alternative approaches to technology that offer more reflective, playful, and personal interactions with digital objects. We build upon our previous work on art digital jewellery [25] that we define as wearable or handheld digital artefacts which are highly personal in terms of their form, their materials, their narratives, and their interactivity. Thus, the combination of contemporary jewellery practices with electronics and computing offers ways of designing with digital data that appreciate the more relational aspects of well-being and sense of self [ibid].

TideConnection is an autobiographical concept that connects a person with the sea, and ultimately the self. The piece retrieves from an online server the tidal times for a specific location and maps the data into colour transitions shown by an RGB LED. The design developed into two physical artefacts: a handheld SeaVessel (see Fig.4) and the digital necklace Thalassa (see Fig.5), which means 'sea' in Greek. The first author then recorded her lived experience of interacting and wearing the pair for a year. We chose to present this work as a pictorial to detail the design and development phase, the experiential qualities of the pieces and their particular materialities.

As a theoretical framework we draw on the concept of atmospheres [2,33,39,43] as framing for the design of digital artefacts that can materialise the interactions between people and places in highly personal and meaningful ways. Before unpacking the concept of atmospheres, we briefly present the authors and their contributions. The first author has a background in architecture and jewellery, and the second authors in computer science and software engineering. The first author and second author collaborated in the design development of TideConnection. The third author supported the reflection on the pieces and contributed to the overall narrative of the paper.

ATMOSPHERES: A THEORETICAL AND PRACTICAL FRAMING FOR DESIGN

"I enter a building, see a room, and – in the fraction of a second – have this feeling about it. What on earth is it that moves me? The atmosphere of the place." Peter Zumthor, 2006 (p.12)

Atmosphere can be encountered in everyday language as ambience, sense of place, or the feel, the mood of a room and can be perceived through our emotional sensibilities [43]. Everything in our surroundings creates the mood, the things themselves, people, the air, noises, sounds, colours, material presence, textures, and forms [ibid]. The coastline and the sea have a certain atmosphere that has given the first author a sense of home all her life. Growing up in Greece, surrounded by the Mediterranean Sea, she has always found comfort near the sea. Coming from the warm

and calm Mediterranean Sea, which has small tides, to the UK, she got fascinated by the strong tides of the North Sea (see Fig. 2). In the UK tides move in and out of the seashore 0.8 - 4.8 meters rising up and down the height of 2m within a few hours. The tide transitions, from high to low and back every 6 hours, transform the landscape. The first author's personal reflections in Fig.1 capture the significance of her experience crossing the causeway to St. Mary's lighthouse. The emotions triggered a design exploration of how certain atmospheric qualities of the experience and the place could be translated into a poetic object.

To better understand the embodied sensations and emotive experience the first author felt in the context, we drew on the notion of atmosphere in philosophy [2,33,35,39] and design [1,24,43]. Drawing on Heidegger (as cited in Pallasmaa [33]) "an atmosphere is an experience of the in-betweenness of subject and object in which the emotive and sensory experience are central" (p.232). Bohme [2] and Schmitz [35] also discussed how atmospheres are experienced in bodily presence in relation to people, things, or spaces and Pallasmaa [33] described that "as we enter a space, the space enters us, and [this] experience is essentially an exchange and fusion of the object and the subject" (p.232). From these perspectives, we conclude that atmospheres are neither objective - an attribute of a space or a set of qualities possessed by things, nor subjective - an emotion solely experienced by a person. Rather it is an experience influenced by one's mood and the qualities of the space one inhabits.

To move from a theoretical standing to a practical framing, we draw on the field of design. Apart from Kinch [24] who considered the atmospheric qualities of a hospital room, including the sounds and the height of the bed, when designing an interactive toy to ease the hospitalisation of children, interaction design has not used atmosphere as material for design. However, atmosphere as a concept for aesthetics has been discussed in practice by architects (to name a few [1,33,39,43]). More specifically, we draw inspiration from the work of the acclaimed architect Peter Zumthor. In his book 'Atmospheres', Zumthor [43] proposed a set of design sensibilities which shed new light on understanding how the properties of a building relate to its beauty and its aesthetic qualities. The sensibilities are Material Compatibility, Tension between Interior and Exterior, Levels of Intimacy, Surrounding Objects, Between Composure and Seduction (Fig.3). We take these design sensibilities as a starting point to reflect on our design process. We do not see them as guidelines, rather as inspiration in the context of RtD. In our work, the notion of atmospheres has the potential to expand design in two ways: 1) by understanding the richness of our bodily experience and by paying attention to our feelings in the moment, we can bring sensitivities to our design process and 2) by using the notion of atmosphere as a concept for the aesthetics of interactive objects in poetic contexts.

In the next sections, we offer a reflective account of how we used these sensibilities to frame our design work. Before that detailed discussion, we present the methodology and the final pieces.

METHODOLOGY

Research through Design (RtD) with a craft ethos

By its nature, this work is explorative and experimental. A Research-through-Design (RtD) approach allowed us to stay open to mistakes and misunderstandings as potential qualities for innovation and for developing new perspectives [8,11,36]. This generative way of working builds upon the expressive possibilities of materials in the design of bespoke digital objects through a symbiotic

<Material Compatibility>

Materials have different aesthetic, expressive and performative qualities. The material composition gives rise to a unique experience for a person. This design sensibility gave us a framework to see the value in all our material explorations. How materials feel in the hand and how the narratives that accompanies them can add depth to the design.

<Tension Between Exterior and Interior>

For architecture, it is how a building balances between the interior space and the exterior environment. Within our work we used the sensitivity to explore how the form and interaction can be interior or exterior to a person.

<Levels of Intimacy>

For architecture, it is about proximity and distance, for us it is about layers of personal meaning induced in form, function and interaction and the intimacy between the piece, the body and the self.

<Surrounding Objects>

By paying attention to the interaction with the environment and other objects we reveal intriguing interactions between our design and other objects or the surroundings.

<Between Composure and Seduction>

For architecture this sensibility has to do with the way architecture involves a sense of freedom of movement, a mood that has more to do with seducing people than with directing them. For us, it is a lens to explore digital interactions that has less to do with directing people on a certain function and more with allowing them to explore meaningful connections and relationships.

Fig.3: The design sensibilities as used in this research. These were inspired by the notion of atmospheres in architecture [43].

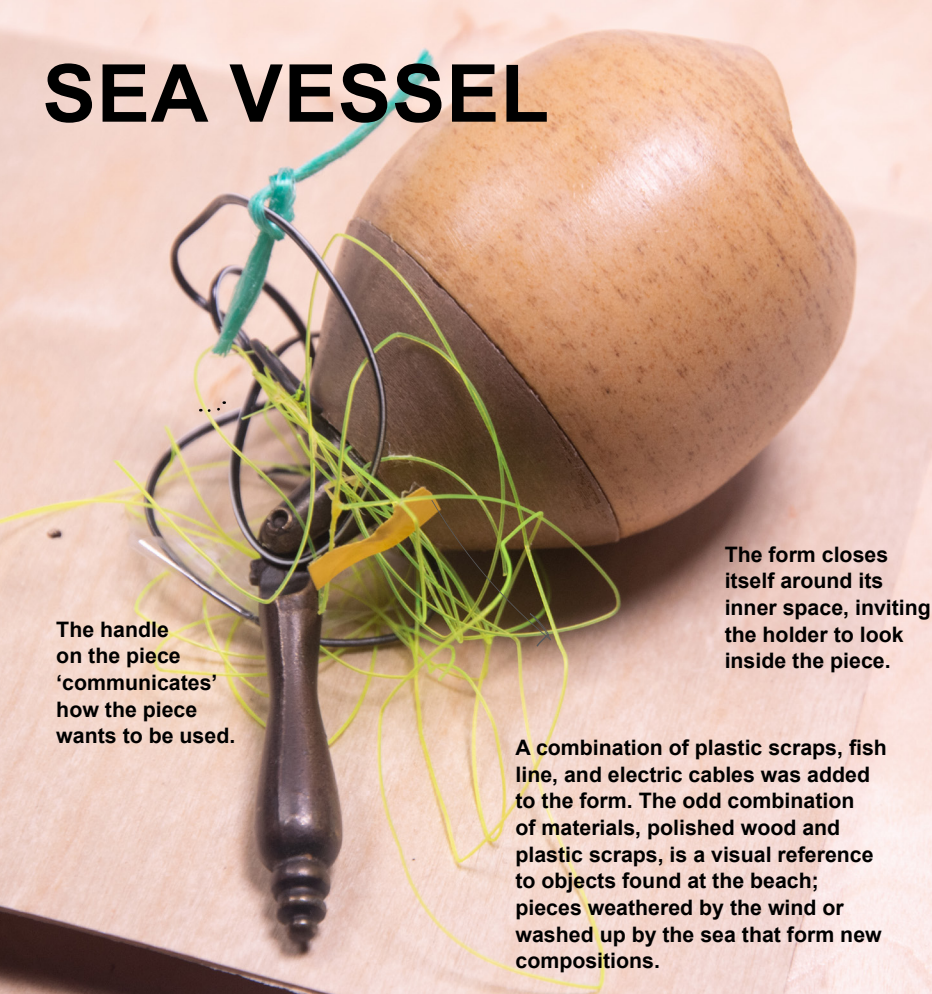
relationship between our disciplines, namely computing, design, architecture and jewellery making. A craft ethos with RtD brings the process of manual making to the fore strengthening the relationship between the practitioner and their materials creating an entangled bond [22,30]. In this sense, craft acknowledges the dynamic relationship between materials as a way of dealing with the complex, the messy and the uncertain [19,20]. We use Giaccardi and Karana's [16] definition of materials that goes beyond what an artefact is made of (metal, found objects, leather, sensors and microcontrollers), to include the properties, embodiments, and arrangements through which they can be experienced and performed.

Autobiographical Design

TideConnection is an autobiographical design. First-person approaches are becoming a valuable addition to the more traditional research approaches partly because of their shift towards human values to better understand the role of devices and systems in our lives and adjust them to a required outcome [7,23] and the desire to experience them [13,27]. Several autobiographical research studies have been published in recent years, including long-term usage of devices that connect people over distance [4,12], record of personal accounts and data collection on the use or absence of devices [10,27], embodied experiences that can inform design [5,20,28,40], or the exploration of how new interactive systems could open new ways of connecting people in bereavement [41].

This research started with a genuine interest and curiosity to explore how the first author could connect with a specific location and explore if and how a digital device could open new ways for meaningful connections between people and places, mediated by IoT devices and services. Therefore, our work aligns with first-person approaches in design research and HCI with a detailed account of the design development (12 months) and use of TideConnection (12 months). We acknowledge, however, that taking a first-person perspective in research comes with challenges [6,29]. However, an in-depth reflection on the methodological challenges of autobiographical design is outside of the scope of this pictorial.

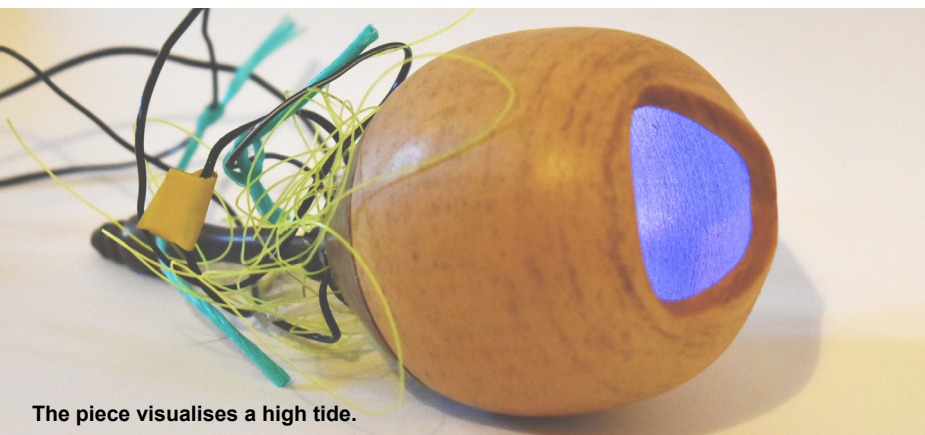
SEA VESSEL



The handle on the piece 'communicates' how the piece wants to be used.

The form closes itself around its inner space, inviting the holder to look inside the piece.

A combination of plastic scraps, fish line, and electric cables was added to the form. The odd combination of materials, polished wood and plastic scraps, is a visual reference to objects found at the beach; pieces weathered by the wind or washed up by the sea that form new compositions.



The piece visualises a high tide.

Fig.4: TideConnection (SeaVessel). SeaVessel is a hand-held art digital jewellery piece. It measures 10mm x 55mm made from 3D printed wood, found objects, electronics. The piece glows and projects light that represents the tide range from a specific location in the North Sea.

THALASSA

The tin was bought in the Tynemouth flea-market in Newcastle, UK in early 2015 and the fishline was found on a beach in Greece in Summer 2019

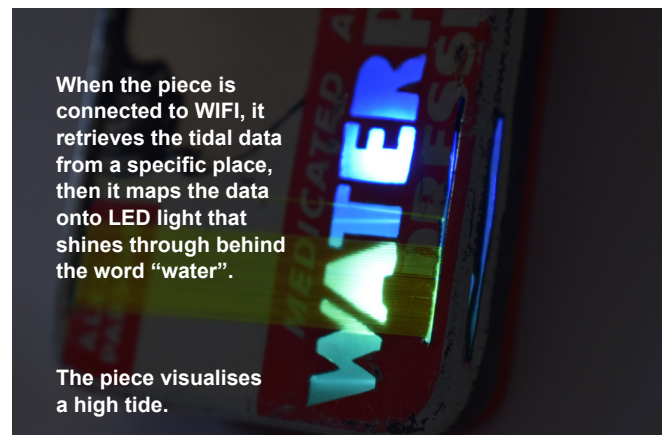
The fishing line was used for its link to the sea and its translucent quality to diffract light.

The tin had interesting graphical details that could be removed (the face and the word "water" have been sawed), whereas other elements have been framed to give them more relevance within the piece (the word "wounds" has a round metal frame).



The chain is made out of iron binding wire and the tube that connects to the chain with the piece is made out of steel. All pieces are connected using laser-welding.

The face was replaced by a polished metal surface to act as a mirror to oneself.



When the piece is connected to WIFI, it retrieves the tidal data from a specific place, then it maps the data onto LED light that shines through behind the word "water".

The piece visualises a high tide.



The piece is extended to encase the electronic component. Leather was chosen because it feels pleasant to the touch.

Fig. 5: TideConnection (Thalassa). Thalassa is an art digital jewellery piece worn as a necklace. It measures 80mm x 50mm x 25mm made from found tin, steel, fish line, leather and electronics. The piece displays the tide range from a specific location in the North Sea.

DESIGN DEVELOPMENT

In April 2020, the first author relocated to Sheffield (UK), a city in a landlocked county two-hour drive away from the sea. Designing the TideConnection (Fig. 4,5) was a way to explore her feelings for the place she left at a time, the Covid lockdown, when she was living alone in a new city and the human interaction was limited within the household. She shared her experience at St. Mary's lighthouse with the second author: she imagined an emotive and intimate piece that connected her to the sea, the one of her childhood, far

away in Greece, and the one of her adulthood in Newcastle, UK. They started to explore how certain imagined qualities of the concept could be translated into a digital artifact (Fig.6-1a-d): the experience of the cold water and the sand (Fig.6-2a,b); the tide changing the landscape; the objects found on the beach (Fig.6-5b, Fig.6-6a,d). They sought digital technology, IoT devices and online real-time data services, to create a direct and live connection with St. Mary's lighthouse. Tidal live data (provided by flooding prevention

service) symbolises a strong connection to the place as it embodies the dynamic transitions and captures the current state of the sea. The tide transitions from high to low to high was translated into RGB colours (Fig.6-8, next page). Pragmatically, light is easy to implement, is robust and has a low energy consumption making it possible to create an intimate piece on a small scale. Symbolically, the light in the piece reproduces the St. Mary's lighthouse providing direction for a safe journey.

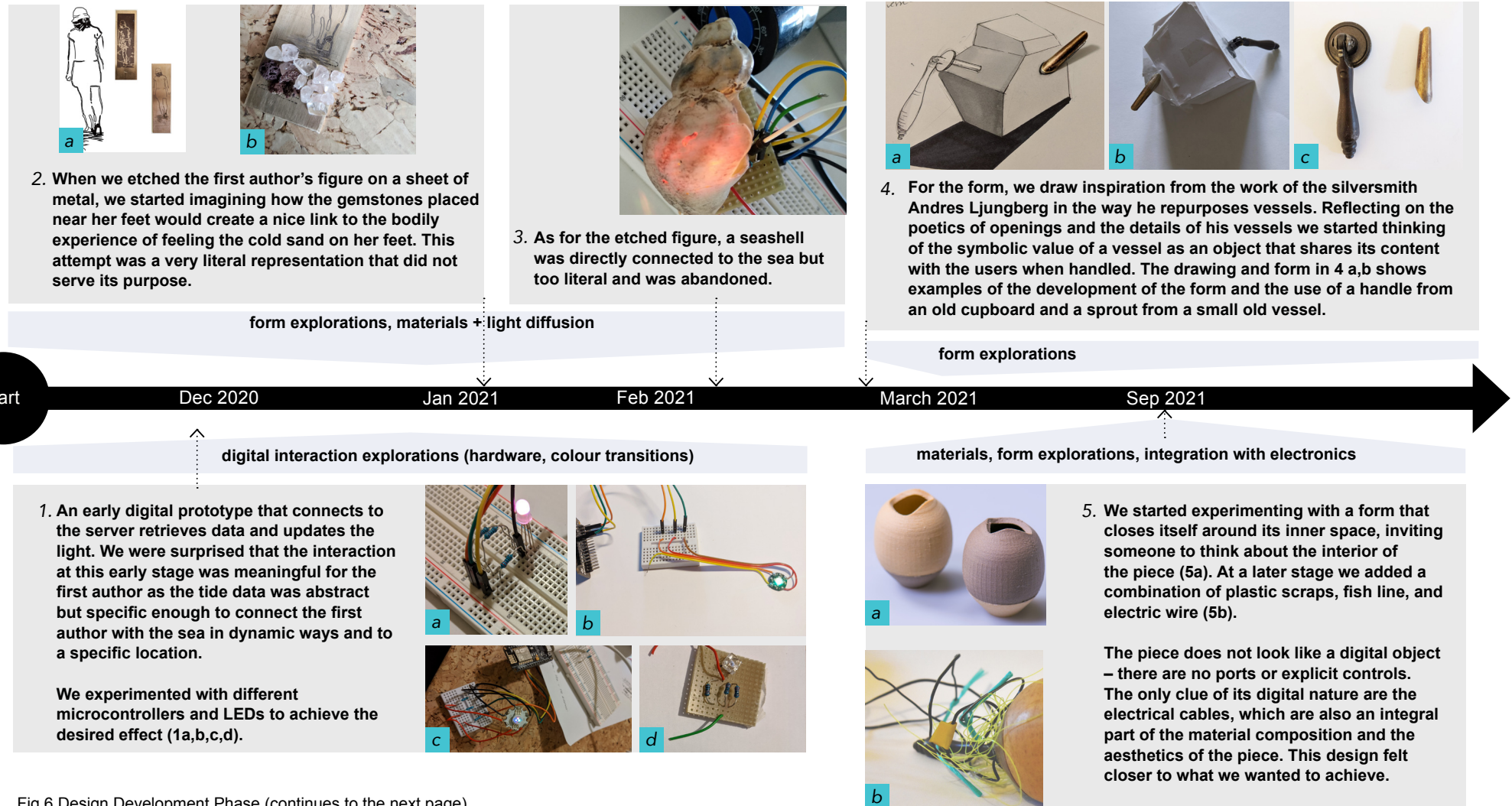


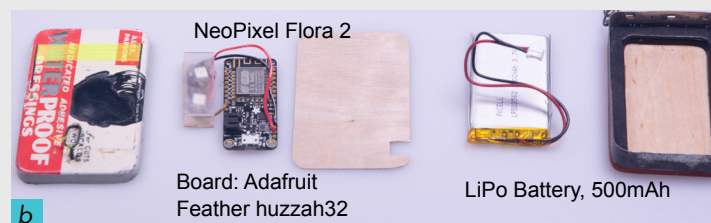
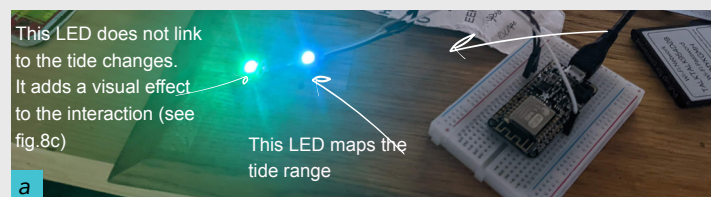
Fig.6 Design Development Phase (continues to the next page)

6. Whilst exploring the interaction with the SeaVessel, an old tin found at a flea market took us to a different conceptual path. The first author has a collection of found objects and sometimes they become part of the narrative. As for all found objects, serendipity is the trigger, but later those found objects become “imagined frontiers”. The tin then became a perfect point for further form exploration. The tin captured our attention for its visual narratives and its potential for the research. The first author started piercing the face depicted with the intention to replace it with a polished piece of steel. A polished metal acts as a mirror. The interaction of seeing herself in the piece whilst viewing the light was interesting to explore. Building on this idea, we started looking at ways that the light could be visible through the mirror. Only when the word “waterproof” drew our attention and we started exploring the visual effect of the light shining through the word “water”, we had the final form.



materials, form explorations, integration with electronics

8. As the design progressed, we changed the colours from blue (high tide) (0,0,255) to green (no tide) (0,255,0) to white (low tide) (0,0,0), which gave us a clearer transition between colours (3a). 3c shows the colour transitions as experienced by looking at the Thalassa piece between high and low tide. This design was an exploration on how to create an additional visual effect and allowed us to see light as a material with both visual and performative qualities. Through experimentation we reached the point in which the light mapped the tide range in a way that offered in itself a pleasurable interaction alongside its meaningful connection to the tidal range. 3b shows the final assembly of the piece with the embedded components. The final prototype uses the Adafruit HUZZAH32 – ESP32 Feather, NeoPixel Flora2 Leds and a Li-Po rechargeable battery 1200mA. TideConnection uses a WIFI to communicate with the server and obtain new tidal data. The system can discover new WIFI networks and connect to a desired network using its unique username and password.



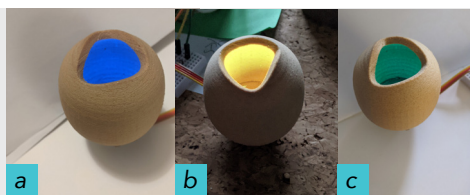
Sep 2021

Oct 2021

Dec 2021

end of design development

finalising hardware and digital interactions



7. When we selected blue (0,0,255) to represent the highest tide, yellow (255,255,0) for no tide and green (0,255,0) for the lowest tide, we experienced that as the tide changes, the colours blended into different hues of green (blue + yellow = green and yellow + green = a lighter shade of green). As the tide changes ever so slightly over time, the subtle changes of colour made it difficult to interpret its meaning.



LIVED EXPERIENCE

The second phase lasted 12 months, from June 2021 - June 2022. By then the first author had relocated to Sheffield. To live with the TideConnection was then particularly meaningful, slightly poignant: she was far from the sea, living alone in a new city, during the covid lockdown when, in the UK, one's household was the only people one could interact with. During this 12 months period the first author interacted with both art digital jewellery pieces: SeaVessel and Thalassa; she kept a diary to both check the correct functioning of the piece and as a way to record her feelings and thoughts related to the two pieces.

Collecting data on autobiographical design required careful consideration of when and how to observe and document the experience of self over time [5,26]. Following other researchers in HCI and first-person perspectives [ibid.], we integrated journaling and sketching into our design process to gain insight into the lived experience.

Our documentation process included both written and visual records of reflective observation. There were no specific prompts to engage with the pieces, nor was there a set timeframe for interacting with each piece. The first author would interact with TideConnection when she felt it was appropriate and then wrote in her reflective diary to document each interaction, she had with TideConnection (SeaVessel and Thalassa). Over time, data was collected in various forms, such as photographs and written journal entries detailing the date, time, and duration of the interaction. Visual entries, including sketches made in response to the lived experience with the pieces, were also included. By the end, 20 pages in the journal recorded a total of 50 interactions with both pieces.

REINTERPRETING ATMOSPHERES FOR DESIGN

This section revisits the sensitivities proposed in architecture (Fig.3) as key elements to create an atmosphere [2,33,43] and reinterprets them for the purpose of designing emotional interactive experiences. The first sensitivity, 'material compatibility', refers to the design phase, the others to the lived experience of the subject with the object to which the emotive and sensory experience are central. The experiential

sensitivities act as an analytical framework to help the first author reflect on key aspects of her lived experience therefore this part is a first-person narrative.

Material Compatibility

This sensibility sits in the design and development phase and gave us a way to see the value in all our material explorations. How materials feel in the hand and how the narratives that accompany them can add depth to the design. We experimented with different materials to imagine how a physical artifact would embody aspects of the place. Depending on what material we have chosen, we drew upon different aesthetic qualities. By using objects found by the first author at the location (Fig.4 and Fig.5), we re-created a sense of presence with elements of the atmospheric energy of the place. In this first phase of the research, the objects themselves and their visual language inspired the design. We also explored the intensity and quality of the coloured light and the link between live tidal data and the smooth transitions between hues of colours. This was an experientially rich space for designing meaningful interactions.

Use: Exterior interaction

The SeaVessel had its place in the house, at my desk; often I would leave it on for the whole day. SeaVessel allowed me to witness the full colour transitions on a tidal cycle when the piece was connected to the data over the course of a day (high to low tide and back to high). The subtle but noticeable colour transitions over 10-12 hours allowed me to experience the rhythm of the piece and its relationship with time. My experience with the piece when it was on continuously was subtle: SeaVessel stayed in the background as a companion piece and acted as a gentle reminder that the sea is constantly changing.



Tension Between Interior and Exterior

In architecture, this sensibility refers to the inside and outside of a building and the relationship between public and private. In this design context, for us, it relates to the person and the object in multiple ways. Indeed, the two pieces of TideConnection implement two alternative ways of framing the person-object interaction: SeaVessel is an interaction exterior to you, the piece performs all the time, and you observe it, whereas Thalassa is interior to you as the piece performs only when you want to connect with it and the associated meanings. The forms of the two pieces also implement the interior-exterior dichotomy: SeaVessel has a form that is enclosed (interior) whereas Thalassa has a form that is performative (exterior). In essence, we find a tension between the interior and exterior interaction in both their use and form expression: SeaVessel is an exterior interaction in terms of its use but interior in its form (Fig.7), while Thalassa is an interior interaction in its use with an exterior form (Fig.8). In Fig. 7 and Fig. 8, we unpack each point.

Form: Interior interaction

SeaVessel fits in the palm and the light shines through an enclosed space, offering a rather secluded interaction. I find myself looking inside the piece to see the light. Depending on how it was placed on the desk, sometimes I could barely see the light unless I was actively engaged by changing its position or holding it in my hand (Fig 7).

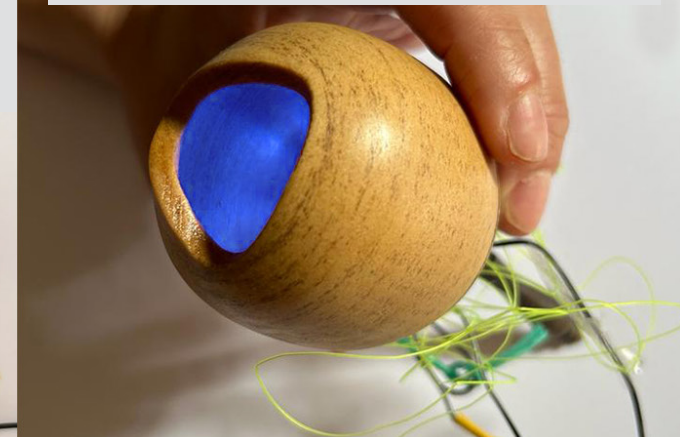
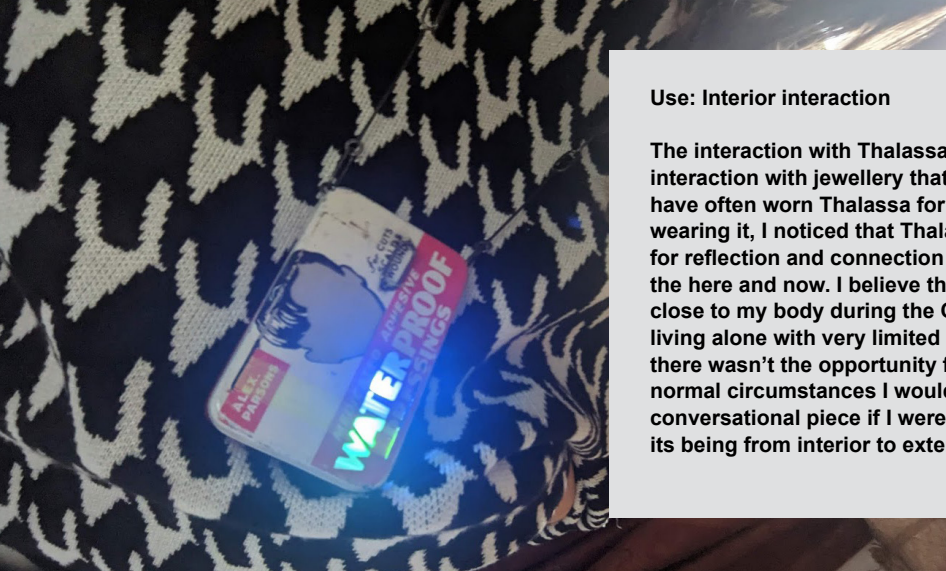
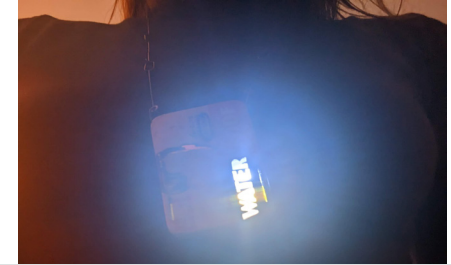


Fig 7: Looking inside the SeaVessel to see the light (left) low tide (right) high tide.



Use: Interior interaction

The interaction with Thalassa was similar to the familiar interaction with jewellery that we put on special occasions. I have often worn Thalassa for a few hours at a time. When I was wearing it, I noticed that Thalassa became more of an object for reflection and connection with myself and my feelings in the here and now. I believe this was due to Thalassa being close to my body during the Covid lockdown when I was living alone with very limited contact with others. In lockdown there wasn't the opportunity for others to ask me about it: in normal circumstances I would expect Thalassa to become a conversational piece if I were wearing it in public thus shifting its being from interior to exterior.



Form: Exterior Interaction

Thalassa offered an open interaction, rather than an enclosed one. The light was more performative and the piece asked for attention (Fig.8). The additional LED light amplified its performativity and I got to a point when looking at the changes on the LED light became a voyage of personal discovery rather than a straight and unfiltered interpretation of the tide range.

Fig.8 (left and right) Wearing Thalassa in different occasions.

Levels of Intimacy

The sensibility Layers of Intimacy in architecture is about proximity and distance. Within IoT design, for us, it is about layers of personal meaning induced in form, function and interaction and the intimacy between the piece and the self.

When I was interacting with the pieces, I always found myself excited to explore the state of the sea in the moment of the interaction. However, I was surprised that even though the data was retrieved from a significant place on the seashore, interacting with TideConnection did not make me connect with the place per se, rather with the sea as an idea and its dynamic state more broadly. My relationship with the sea and its dynamic state was more prominent when I interacted with Thalassa. The deliberate action to wear the piece offered

a more intimate interaction between myself, the piece, and the sea and as a result new opportunities for meaningful connections were created. Wearing the piece and taking it with me, it was like taking the sea with me. The moment of interaction with the piece (when I put it on around my neck) was a strong connection with the sea. Whilst I was wearing the piece, I noticed myself often holding it, asking myself "Where is the sea level now?".

TideConnection made me think about the meaning the sea has in my life. The piece allowed me to bring the focus back to myself through a mental image which I materialised in a series of drawings. The drawings were captured in my diary and two different examples are shown in Fig.9, that captures

how the sea changes and my connection with its dynamic state, and in Fig.10 a,b,c,d (next page) that expresses the specificity of the place: the sea is always the same, what is on the seashore is different.

These drawings were done over 12 months following the same process (Fig.10). When drawing, I found myself in a reflective and mindful space which I highly valued. Through drawing, I unlocked an active way of connecting with the sea. TideConnection gave me the opportunity to imagine the movements of the water and its effect on my body while walking barefoot on the beach. The piece acted as a trigger from the outside environment, stimulating my senses adding an additional layer of intimacy to the interaction.

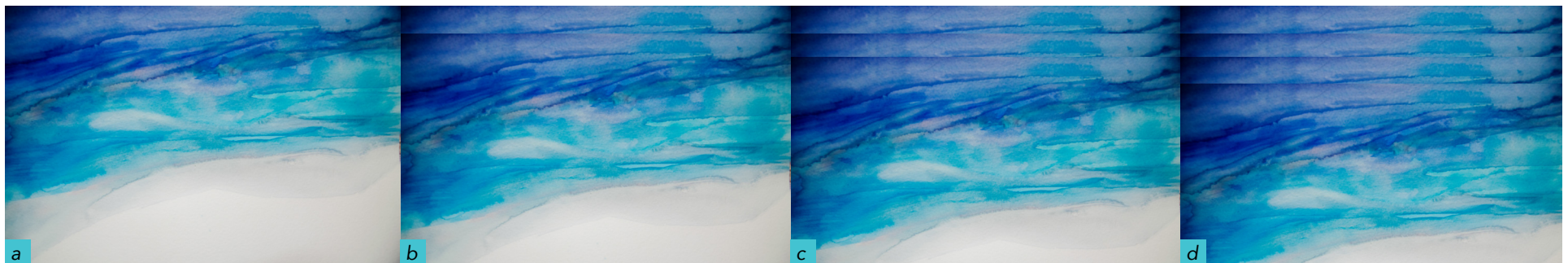
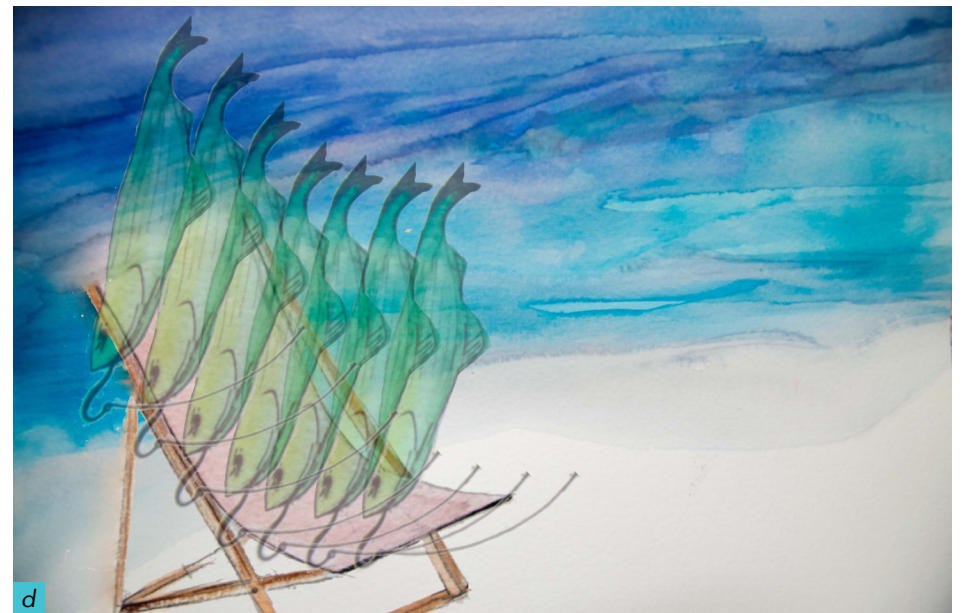
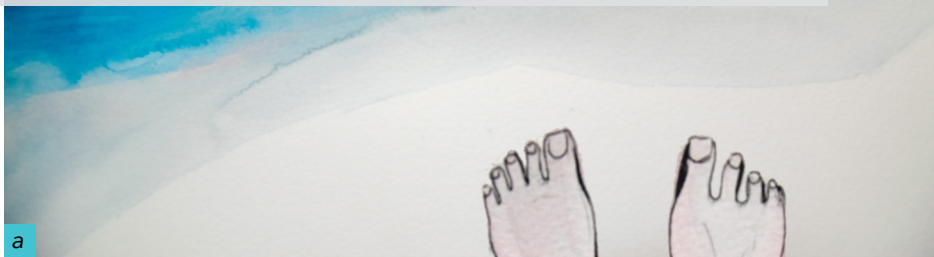


Fig.9 a) Drawing the sea using watercolours on an A4 paper on 20th of May 2021. b,c,d) A series of images I have created on the day overlapping the drawing of the sea and moving it forwards 1cm on each drawing. These images are digitally manipulated using Photoshop. My intention was to capture the changes of the sea and connect with its dynamic state.

Fig.10. These series of drawings show myself a) walking on the seashore and feeling sand and water, or b,c,d) being a diver to explore the seabeds.

These explorations started always with the same drawing of the sea (Fig.9a) and in different occasions, I have added characters, objects, or body parts (my feet for example Fig.10a) to the initial drawing.

The drawings of the individual items were made using watercolours on transparent paper and the composition was put together digitally using Adobe Photoshop.



Surrounding Objects

The sensibility in architecture brings the attention to the surrounding objects and buildings. Buildings do not exist in isolation. Within this work, I brought my attention to the surroundings on a few occasions when, for example, SeaVessel was left on all night by mistake, I noticed the beautiful reflections on the ceiling in the dark room in the middle of the night (Fig 11a). I stayed in the room for a while looking at the light and its expressions. The reflections resemble the northern light in a dark sky. On a different occasion, interacting with Thalassa, once again accidentally, the piece was covered under my blouse or behind my scarf (Fig. 11b,c). In that moment, through the reflection of light on my clothes I felt that I was connected to the sea and the water in a very sensorial way, in metaphorical terms “I was wearing the water”. These reflections highlight the significance of the surroundings and other objects in exploring interactions that can augment the intimacy between myself, the piece and its meaningful connections associated with the interaction.

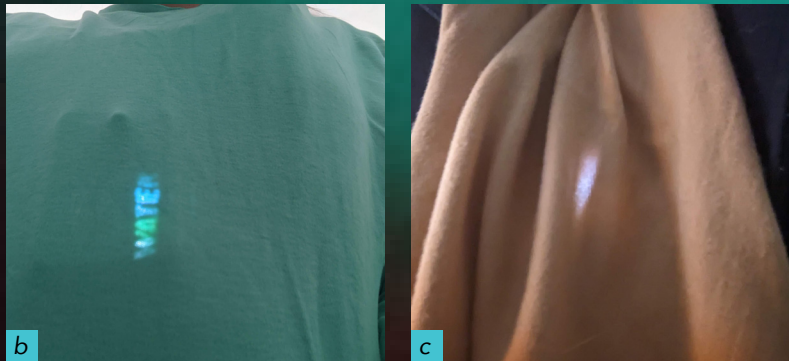


Fig.11: a) SeaVessel's reflection of the light on the ceiling in my room at night. b,c) Thalassa interacts with my clothes, covered under my blouse or behind my scarf

Between Composure and Seduction

For architecture, this sensibility has to do with the way the built environment involves a sense of freedom of movement, a mood that had less to do with seducing people than with directing them. Zumthor [43] gives the example of hospital corridors as spaces that are directing people and suggests that there is another way of experiencing spaces: “as a gentler art of seduction, of getting people to let go, to saunter” (p. 42). In interaction design we interpret this sensibility in the way we explored interactions with digital data that has less to do with directing people towards on a certain function and more with allowing them to explore meaningful connections and relationships with people and places and ultimately the self. Thibaud [39] refers to how the “pervasive quality” of a particular situation “gets inside us” (p.209) and orients us towards particular actions and expressions. TideConnection ‘got inside me’ allowing me to explore interactions that have less to do with the height of the tide and more to do with being seduced into the experience of the sea.

FINAL REFLECTIONS

In this research, starting from the same concept, the relationship between the first author and the sea, we developed two poetic artifacts with different aesthetic qualities and interactions, and we reflected on how these qualities emerged from an initial inspiration to form a pair of pieces in a dialogue with materials and meanings. The data about the tide level at different times in a specific meaningful place were transformed into a poetic representation of the sea and embedded it into an object that evoked a sense of place. Ultimately, TideConnection created the right atmosphere for intimacy with the self and the values that are important to the first author. In this final section, we summarise the types of connections the first author created with the piece, with the sea through the piece, with the self through the sea.

Connecting with the piece

In the research, we embraced the opportunities and challenges that TideConnection offered. The tidal range data was abstracted into colour transitions but situated to link to a specific location. The meaning of the changing light was clear to us, nevertheless we were surprised to see how a simple bare LED was enough to spur rich personal reflections since the early stages of the design process. However, in developing the interaction, we found that choosing the colours was important for the first author to interpret the meaning. By the end of the intense design development phase, the first author had built a relationship with TideConnection: at a glance, she could interpret the meaning of the coloured light and its link to the tide level. Spending time to understand the piece was important in developing this connection.

The live data created a strong link between the sea and the first author. The evocativeness of the piece is also due to the quality of the light, its colour and gradual yet continuous changes in a quiet way. We argue that other media would not work in the same way (for example, vibration or sound). There is a “material” quality in the light that made it malleable: its visual quality added depth to our explorations of materials. Our simultaneous exploration of physical materials and the electronics and the interaction increased the evocativeness of the final pieces as they all work in synergy with each other.

Connecting with the sea

The connection with the sea changed depending on the aesthetic and interactive qualities of the pieces. SeaVessel was used for longer periods of time, a full day, whereas Thalassa was worn for short periods each time, a few hours. We saw that when TideConnection was on continuously (SeaVessel), it mostly stayed in the background as a companion piece and acted as a gentle reminder that the sea is constantly changing. Whereas, when the piece (Thalassa) was on the body the connection with the sea was more prominent at the moment of putting it on and starting the interaction. Thalassa acted as stimuli to connect with the sea and its current state. We saw that the wearable digital jewellery piece offered an additional layer of intimacy because of its closeness with the body which was highly valued by the first author. Therefore, this is a new example of art digital jewellery that expands existing work in the field [25] though the use of public and live data.

Connecting with the self

TideConnection offered layers of intimacy in relation to the body and the self. Sea Vessel fits within the palm nicely and its form invites to hold it. This relationship with the body was amplified with Thalassa due to wearability. This intimate relationship of Thalassa with her body invited the first author to bring the attention to her feelings and thoughts in the here and now. The interaction with TideConnection unlocked another layer of intimacy with the place through the embodied practice of drawing. Through the act of drawing, the piece prompted the first author to cultivate her embodied and emotional sensibilities, such as when walking on the seashore and feeling sand and water, or by imagining to be a diver to explore the seabed. For the first author the piece was instrumental in developing the awareness of the meaning the sea has in her life and ultimately to better knowing herself. Cain[3] describes drawing as an embodied practice that makes visible our emergent thinking processes: “it is the evolution of the practitioner rather than the evolution of the drawing” (ibid p.17). In this way, through drawing, the first author explored her sense of self in relation to the drawn images. Phenomenological data collection methods like these have been receiving increased

attention within the interaction design and HCI community. For instance, Mah et al. [28] adopted a first-person research approach, which involved documenting the practice of a daily compassion cultivation technique using stream-of-consciousness writing and body maps after each session. Similarly, in Cochrane et al.’s work [5], the Inside-Out Probe Workbook data collection method incorporated journaling and sketching activities to help the design researcher probe the lived experience of emotionally challenging daily activities, thereby informing the design process. In our study, we underscore the significance of drawing as a self-reflective method to attain a deeper understanding of the inquiry.

ATMOSPHERES AS A NOVEL FRAMING FOR AESTHETICS FOR INTERACTION DESIGN

Our work contributes to a broader effort within the design research community to explore concepts and framings to enable people to interact with digital objects and personal data in more reflective ways leading to personal experiences that are unique and subjective. While appreciating existing approaches of designing for experiences with interactive objects [15,18,31], as design researchers we stayed open to new ways of thinking and making. In this design exploration we investigated the concept of atmosphere as a theoretical framing to understand the design process as well as the emotional, bodily, and sensorial experience with an IoT device designed as a poetic representation of an intimate connection to a place. Some aspects of the atmosphere (design sensibilities) brought our attention to different materials, their expressive qualities, and their performativity; others sensibilities pushed us to focus on the form and its affordance; others to consider the piece’s interactive qualities and their impact. As such we see the concept of atmosphere as a foundation for designing rich interactions with digital technology with the focus on meaningful situations that could include, besides a place as in our research, meaningful past events or people.

In the rest of this section, we share the challenges we faced in working with IoT devices, online services and public data and the opportunities we saw in working with public data for intimate personal connections in poetic ways. We position

our findings within existing work in interaction design and design research.

Designing with Live Data and Online Services

The first author felt both anticipation and worry about the piece working correctly when she interacted with TideConnection; over time she trusted the piece and its functionality. It is interesting to think about trust in the context of IoT technologies and online data. TideConnection is dependent on external factors with regard to where and how it gets the data feed. The piece is connected to an online server that, in turn, receives data from sensors that measure the sea level. The server side is a black box to us as we have no control over the data harvesting and serving.

Within the design research community, there is a concern about the notion of control of the whole design process when using live data and an articulated infrastructure to access it. A response to this challenge is the acknowledgement of the limitations of working with IoT, online services and public data as part of the design [26,38,41]. Accepting the fate of IoT is key and designers should take this into account in their practice. The tide service has been changed or the connection between the piece and the database has been lost so TideConnection does not receive live data anymore, yet it still works, shining the data from when it was last used. Others have looked at what happens when IoT fails us [26]. How our relationship with digital objects may change after their functional use has radically altered is an interesting thing to consider. We may wonder if we will try to repair TideConnection or leave it as is and keep it as a memento of a meaningful connection with a place during a challenging period of our lives (2020-2022).

Poetic Data: Slowness, Intimacy and Ambiguity

Personal digital data has been discussed in a speculative RTD project on documenting a wedding through the quantified self [9], and selected files from a personal archive have been revisited to create meaningful relationships with one’s own digital trail [32] or deceased loved ones [41]. Here, we work with external public data (tidal data) and transform it into a poetic expression for a meaningful interaction between a person and a place. Publicly available data, specifically

environmental data such as air quality [17] or weather data [15], can be used to create a more personal understanding of climate change. Although this meaningful use of public live data can raise critical awareness, the emotions this data can trigger is far from the intimate connection TideConnection generates. The final aesthetics of materials (physical and digital) and the physical forms of the pieces transform the data into meaningful personal narratives, which is the essence of art digital jewellery [25]. We refer to our use of live data as ‘poetic data’ and we discuss their qualities slowness, intimacy and ambiguity within existing literature.

Slowness

This work links to existing work in interaction design that seeks to create meaningful and poetic experiences with digital objects and personal data. Borrowing from the language of atmospheres, data and its digital expression in TideConnection enabled the first author to enter a mindful and self-reflective space. By means of the slow changing of the tide data, TideConnection is an example of “slow technology” [18] that encourages the wearer to reflect. Our work joins Odom et al. [31] in extending the original slow technology theory through our conceptual and practical framing of atmospheres and the role ‘poetic data’ can have within interaction design. In order to experience the tide one needs to spend a consistent long time with it to perceive the variations and understand if the tide is going up or down.

Intimacy

The first author felt different layers of intimacy: the closeness of Thalassa to the body connected her to the place, the connection of the body with the data through the act of drawing, and the connection with the self through embodied reflection while drawing. This layered exploration of data through autobiographical memories and reflexive narratives links to research in somatic HCI first-person explorations that explore bodily data as intimate data [19,37]. However, in somatic HCI, bodily data stays with the self in an intimate yet personal loop. We move beyond the self to understand how public data can create meaningful interactions and intimacy with a place. In so doing we offer another way to understand intimacy with data in HCI and interaction design research.

Ambiguity

Drawing on the work of Gaver et al. [14] and the role of ambiguity as a quality of a design to create interactions more engaging and thought-provoking for people, we highlight the potential of ambiguity when designing with public live data for poetic contexts. We observed that the specific temporal characteristics of tidal data were lost when mapping the data from one form (e.g. server reading) to another (e.g. an LED colour). We experienced that the subtle colour transitions over a tidal cycle (approx. every 6h) invited an ambiguous interpretation of the meaning of light concerning the tides going up or down as the colour would be the same as the data value would be the same. Ambiguity in representing data is a valuable quality for design, however, from our work we conclude that the data needs to be specific enough to be interpreted in such a way that invites people to draw upon their own experiences and engage with data in more emotional ways. TideConnection offered a fine balance between specificity and ambiguity in working with location-specific data. Greve et al [17] refers to this way of working with data as “data transposition” (instead of translation) that brings “the objective measurement together with the ambiguity that stems from measuring” (p.344). We invested a significant amount of time in the development phase to *transpose* the data from the server in ways that could be meaningfully interpreted by the first author.

CONCLUSION AND LESSONS LEARNT

We summarise some lessons learnt that other designers could use when working in contexts where they want to surface emotions about a place, a person or/and a time in one’s life, in other words a concept that is driven by emotional connections that cannot be easily articulated with words.

To pay the same attention to how the digital manifests the embodied feelings of significant moments or places, as well as the design of the form and the materials chosen. We did not expect to spend so much time designing the light and its expression, but we soon realised that the LED colours, the transition between colours, and their brightness itself, held such a significance for the first author as they embody the liveliness of the location. In essence, the design sensibility Material Compatibility for

interaction design extend from merely tangible materials and their qualities to digital material and its expressions.

The concept of atmospheres invites designers to be highly attentive to their bodily, emotional and sensational experiences when designing new IoT devices for poetic contexts. We were surprised that the interaction with TideConnection allowed the first author to draw how she felt in the moment, allowing her to express herself with means other than words and enter a space for self-reflection that can be highly valued in autobiographical design.

The design sensibilities introduced in the pictorial give permission to the designer to stop the design when ‘it feels right’. In this research we offered two pieces to express the same interaction and we found out that both pieces suggested different opportunities for connection with the sea. The framework of atmospheres allowed us to see new design opportunities as we were interacting with the pieces and reflect on their significance with an open mindset.

TideConnection is an example of ‘poetic data’ that could be a starting point for further intimate exploration. For example, future work could extend the use of environmental data to invite intimate connection to other types of affective situations such as events (e.g. a concert, one’s graduation, a sport performance) or to convey a sense of place, for example via weather forecast data.

Through a generative approach we explored the significance of a location and its meaning to inform the design of an IoT device that offers a novel way to make location data ‘precious’. As a closing remark, we offer a provocation to see the creation of personal artifacts such as SeaVessel and Thalassa as art digital jewellery pieces that embody the atmosphere of St.Mary’s lighthouse. In this way, the pieces created an in-between space between the first author and the sea, as a means to connect with her sense of self in the here and now. This can open a new design space for the exploration of IoT artefacts that is less pragmatic and more poetic. We hope our work will inspire others in the field of interaction design interested in designing reflective ways of interacting with digital technology.

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