# In-Situ Seeding: Entangling Place & Technology through Sensory Data Dialogues

Courtney N. Reed
Digital Technologies & Creative Futures
Loughborough University London
London, United Kingdom
c.n.reed@lboro.ac.uk

Marta Ferreira
Instituto Superior Técnico, ITI / LARSYS
Universidade de Lisboa
Lisbon, Portugal
amartaferreira@tecnico.ulisboa.pt

Mónica Mendes
ITI/LARSYS, Faculdade de Belas-Artes
Universidade de Lisboa
Lisbon, Portugal
monicamendes@edu.ulisboa.pt

Pedro Galvão-Ferreira
Instituto Superior Técnico, ITI / LARSYS
Universidade de Lisboa
Lisbon, Portugal
pedro.galvao.ferreira@tecnico.ulisboa.pt

Marion Koelle
Design, Computer Science & Media
Hochschule RheinMain
Wiesbaden, Germany
marion.koelle@hs-rm.de

Alice C Haynes
Media Technology & Interaction Design
KTH Royal Institute of Technology
Stockholm, Sweden
ahaynes@kth.se

Fiona Bell
Information Systems
University of Maryland, Baltimore County
Baltimore, MD, USA
fiona.bell@umbc.edu

Alexandra Teixeira Riggs
Digital Media
Georgia Institute of Technology
Atlanta, GA, USA
ariggs8@gatech.edu

Laia Turmo Vidal
Media Technology & Interaction Design
KTH Royal Institute of Technology
Stockholm, Sweden
laiatv@kth.se

Mathilde Gouin
Instituto Superior Técnico, ITI / LARSYS
Universidade de Lisboa
Lisbon, Portugal
mathilde.gouin@tecnico.ulisboa.pt

L. Vineetha Rallabandi
Inclusive Human Robot Interaction
Technische Universität Dortmund
Dortmund, Germany
vineetha.rallabandi@tu-dormtund.de

Karen Anne Cochrane
University of Waterloo
Waterloo, ON, Canada
karen.cochrane@uwaterloo.ca

## Abstract

Interactive technology design is situated within environmental and sociocultural context. This pictorial develops an In-Situ Seeding method for engaging with site-specific sensory experiences. This method stems from a previous TEI Studio, where we utilized Sensory Portfolios, digital sensors, and other materials to make sense of interaction in place. We present an annotated collection of our Studio experiences and autobiographical retrospective reflections. These Seeds supported in-situ sensory explorations and examination of entanglements between documentation, data, location, history, and human and more-than-human agents. We contribute to literature around (1) walk-and-talk sensory explorations, (2) situated entanglements with technological artifacts, and (3) relationships between human and non-human agents in shared locations and over varied timescales. Our reflections point towards continued development for In-Situ Seeding as a method and suggest its further use and guidance to support future sensory explorers.

### Authors Keywords

Sensory data, Data representations, Somaesthetics, First-person perspectives, Embodied interaction

### CSS Concepts

Human-centered computing – Interaction design


*ACM ISBN 979-8-4007-1868-7/2026/03 https://doi.org/10.1145/3731459.3774489*

## Introduction

Between the abstract, messy world and the concrete concepts needed by digital systems lies one of the biggest challenges and opportunities for creative engagement in Human-Computer Interaction (HCI) [62]. Sensory data from biological and environmental sensors can be relevant to our interactions and experiences. However, these data streams only offer partial representations of perceived experiences; for instance, while accelerometer data may relate to a dancer’s movement, it cannot be considered wholly representative of the experience of either dancing or watching a performance [2, 62, 63].

Sensory experiences are always in relation to the complex sociocultural, emotional, and environmental factors that generate them [38]. Thus, they are inherently subjective and contextualized through individual lived experience(s) [38, 78]. Sensory experiences can also be challenging to articulate or verbalize, as conceptual representations are often rooted in the body [40, 72] and in non-linguistic forms of knowledge [19, 21]. Humans use abstract, metaphorical, and artistic representations to conceptualize and communicate about sensory experiences [64]. But, digital systems often provide only one fixed conceptual framing [62] and, in any case, would be unable to represent the infinite and dynamic sensory perspectives for every individual’s interaction.

This pictorial revisits the Sensory Data Dialogues Studio held at TEI 2025 in Bordeaux, France [10]. The Studio explored the meshing of site-specific data and sensory experience collected through biological and environmental sensors, actuators, body maps, sketches, and journal entries. As a group, we (6 organizers and 17 participants) explored our sensory experiences. The Studio was organized around the five basic human senses most commonly explored in HCI – sight, touch, sound, smell, and taste. The organizers developed a Sensory Portfolio workbook and selected sensors within geolocated and interactive narratives. We consider this process a form of “seeding” in that, based on what we “plant” into interactions, we generate new experiences.

This pictorial introduces our initial exploration towards a method of In-Situ Seeding. Here, experiences are designed through selection of locations, technologies, and prompts. This approach reflects other digital designs, such as how data-enabled artifacts create phenomena through mechanics of measurement [5, 7], serving as a locus for meaning-making [32]. As a developing research-through-design (RtD) method, In-Situ Seeding explores the interplay of interactive factors and takes place directly in an environment to understand relationships between technology and place [31].

We here give an overview and our reflection on In-Situ Seeding in the Studio. Focusing on intersections between place and materials, we outline social, natural, human, and more-than-human agents in our experiences and the sensor technology used to interact with them. This pictorial examines how these factors came together not just to measure or examine but to create these experiences. Additionally, we contribute our:

- Sensory Portfolio, including a zine template,
- Autobiographical reflections from the Studio group on experiences and ideas that emerged,
- Discussion of Seeding as (1) walk-and-talk method, (2) entanglement between technology, data, and documentation in a given space, and (3) evolving relationship between humans and non-humans coexisting in a shared place and over short and historical timescales.

## Situating the Studio

We situate our research at the intersection of place-based inquiry, tangible interaction, and a critical approach to data [10]. The "seeds" that formed the Studio involved a post-human and new materialist theoretical framing, positioning our participants' sensory exploration as an entanglement between themselves, the urban environment, and the tools we provided [29].

### A Situated Methodology: Walking as Embodied Inquiry

Our Studio's engagement with the host city draws on established practices of in-situ design, framing walking as a core methodological strategy. This positions our participants as modern-day flâneurs and flâneuses—leisurely walkers [24] adopting an external viewpoint to observe the multisensory diversity of urban life [41, 45]. Flânerie itself can be a qualitative methodology, a narrative tool that brings new perspectives to familiar places by exploring them through different rhythms [68]. This historical and theoretical framing, also native to and entangled with the history of the country in which we undertook these explorations, provides a rich backdrop for understanding the act of walking not just as movement, but as a mode of perception and reflection within the metropolis [45].

This approach complements more recent methodologies within HCI that also use mobility as a tool for inquiry [20 42]. Our work builds upon established 'walk-and-talk' methods [27] and aligns with contemporary research using participant-led walks for place-based data collection and participatory design [60]. The goal of our studio was to foster a deep, sensory connection to the environment by foregrounding the embodied experience of place. This focus is a central concern in similar HCI explorations of walking meetings [41] and nature-based pedagogies [30]. By incorporating play [52] and technological probes, our *In-Situ Seeding* method uses this embodied engagement not only for data collection but as a generative process to produce novel implications for design [41] and transform the conference setting into a site for critical meaning-making.

### Crafting with Tangibles: Tools for Sensory Exploration

Just as walking situates inquiry within a physical context, tangible interfaces offer a way to bridge digital information with the physical world. Tangible User Interfaces, or TUIs, are defined by their "embodied interaction, tangible manipulation, physical data representation, and embeddedness in real space" [51]. This embeddedness has been leveraged to explore environments in various ways [54]. For instance, systems like Urp use physical models as tangible interfaces for urban planning [26], while other tangibles like the Nature Jar are designed more directly to create an "enjoyable connectedness with nature" [51]. These examples show a move towards using physical artifacts as the primary means of interacting with place-based information.

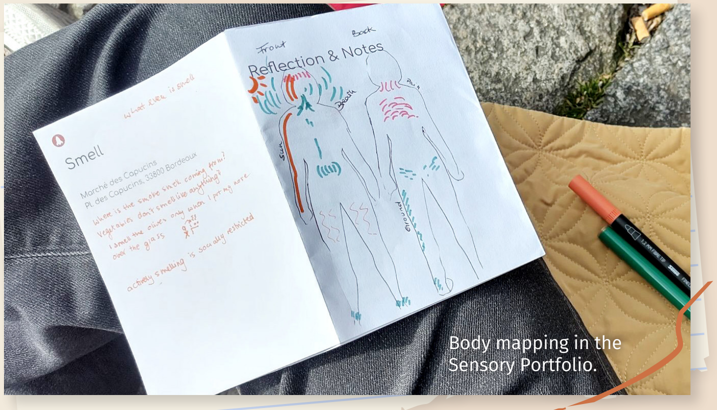
Our work extends this by explicitly connecting tangible interaction with the practice of crafting. The "deep material knowledge" of crafters [48] and the tactile, often therapeutic process of working with materials offers a path toward creating more meaningful interactions [22]. The act of crafting with tangible, often low-cost and provisional materials, is an established creative practice for exploration and ideation [50]. Our Sensory Portfolio follows this tradition, using craft materials not as mere decoration, but as primary tools for making sense of and giving form to experience. Building on this, our *In-Situ Seeding* method uses tangible sensors and materials not merely to represent the environment, but to actively probe it, creating entanglements between data, location, and subjective feeling [29].

### Data as Entangled Experience

At the heart of our approach is a challenge to the conventional view of data. We move beyond a narrow focus on being "fitter, happier, more productive" [25] and instead align with approaches that explore more expressive, subjective representations of lived experience [79]. Our work builds on soma-based methods like body mapping, which serve as generative tools for capturing affective and embodied narratives that are otherwise difficult to articulate [21]. These methods help foreground the ambiguity and messiness of experience, resisting the clean and orderly representations often demanded by traditional data collection.

Crucially, such data is never "raw". It is always already shaped by how it is gathered, analysed, and interpreted. We take up Barad's Agential Realism [7, 8], which frames experience and measurement as mutually entangled phenomena [70]. Likewise, Latour's Actor-Network Theory [46, 47] positions data as emerging through networks of human and non-human actors in dynamic intra-action. Giaccardi's work on more-than-human design positions artifacts not merely as representations of experience, but as active participants in meaning-making [32]—temporarily collapsing ambiguity around particular conceptual framings [62].

We draw on these perspectives to understand how interacting with lived experience is co-constructed by technologies, materials, designers and their practices, and the socio-material conditions of the design environment. This resonates with the concept of data-in-place [77], where data is always situated and entangled with its context. In our own practice, we integrate sensor data into body mapping to explore the dynamic and fluid qualities of felt experience [67]. Rather than treat biodata as objective input, we interpret it as somadata [2, 70]—data made meaningful through embodied reflection. We adapted and applied methods of flânerie and walk-and-talk engagements in the workshop. Our *In-Situ Seeding* method contributes to this broader view of data as a dynamic phenomenon, co-constructed through the interplay of bodies, materials, concepts, and environments. It is within this entangled network that the meaning of data unfolds.




Body mapping in the Sensory Portfolio.

## Seeding & Supporting Materials

Our Studio involved three goals, as outlined in the Studio [10] for exploration of situated sensory experiences, to:

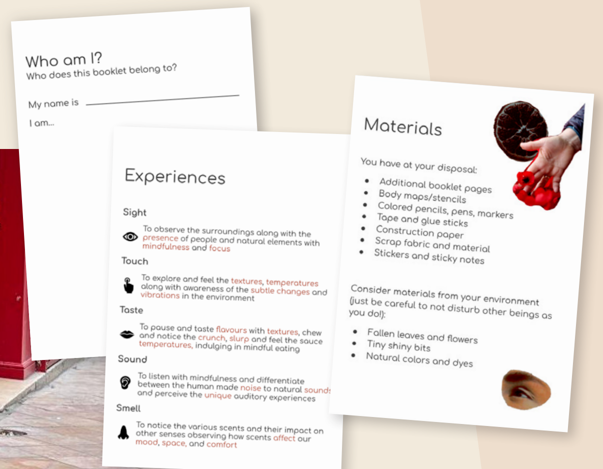
1. Develop methods for gathering and understanding data related to different senses
2. Document rich, multi-media first-person sensory data experiences
3. Examine future steps for engaging with sensory data in the concept of HCI and design research

## The Sensory Portfolio

To support documentation and reflection, we provided participants with a Sensory Portfolio. The Portfolio was provided as a digital file, e.g., for editing on a tablet, and as a physical zine handed out to participants on the day.

In addition to general logistics, we provided initial seeds for examining sensory experiences. This included an initial "Who am I?" page for participants to reflect on themselves and what they might bring to the Studio. Also included were pages for: "Sensors & Kit," detailing the available data streams and suggestions to pair with each sense; "Materials," listing the other physical materials available and suggestions for materials from the environment; and "Experiences," containing suggestions for noticing with each sense. There was a dedicated page for reflecting on and documenting experiences with each sense and an additional two pages for additional reflections and notes. The full Sensory Portfolio used for the Studio, as well as a blank template to be customized for future use, can be found in Appendices A and B.

Sensory Portfolio workbooks


Who am I?
Who does this booklet belong to?
My name is
I am...

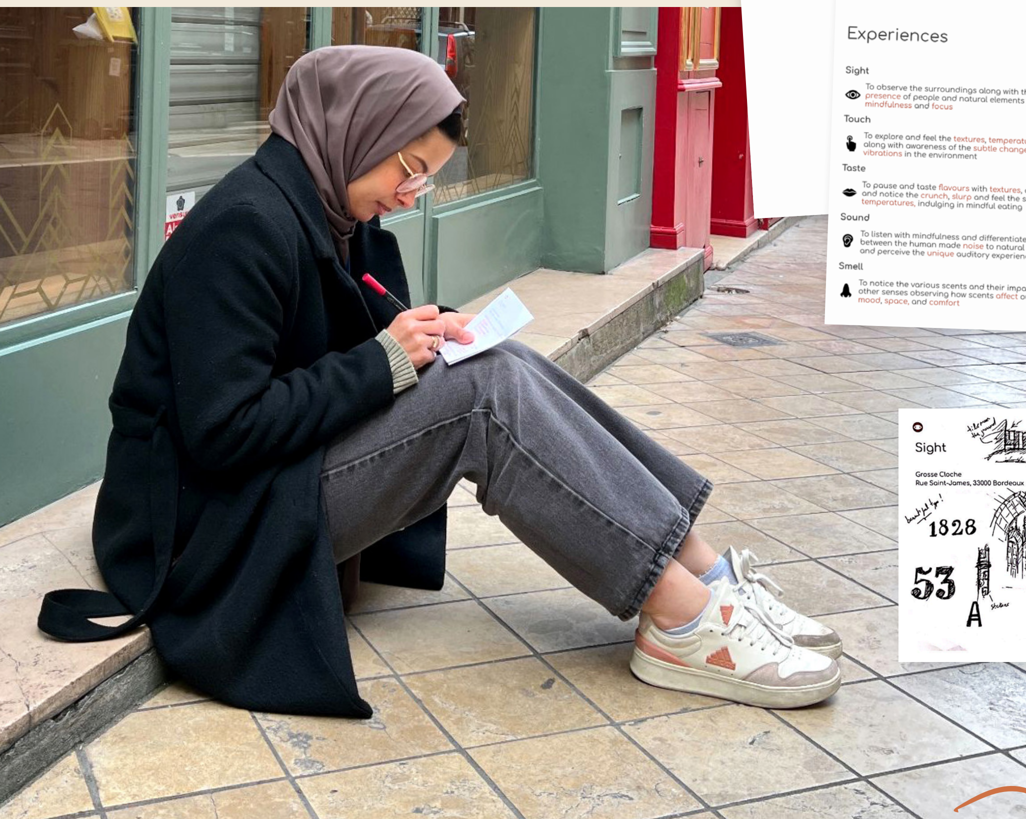
Experiences
Sight
To observe the surroundings along with the presence of people and natural elements with mindfulness and focus
Touch
To explore and feel the textures, temperatures along with awareness of the subtle changes and vibrations in the environment
Taste
To pause and taste flavours with textures, chew and notice the crunch, slurp and feel the sauce temperatures, indulging in mindful eating
Sound
To listen with mindfulness and differentiate between the human made noise to natural sounds and perceive the unique auditory experiences
Smell
To notice the various scents and their impact on other senses observing how scents affect our mood, space, and comfort

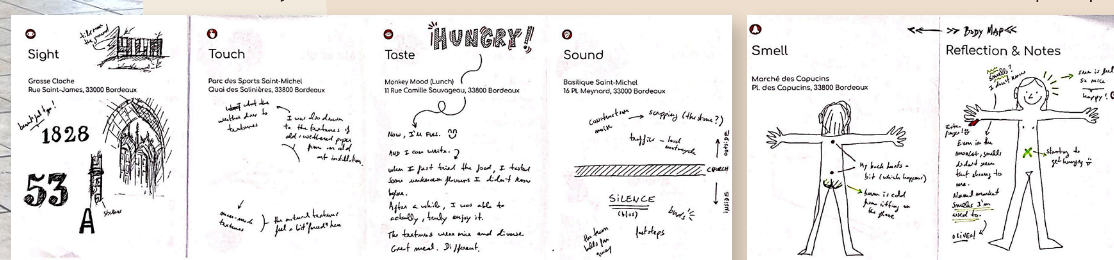
Materials
You have at your disposal:
- Additional booklet pages
- Body maps/stencils
- Colored pencils, pens, markers
- Tape and glue sticks
- Construction paper
- Scrap fabric and material
- Stickers and sticky notes

Consider materials from your environment (just be careful to not disturb other beings as you do!):
- Fallen leaves and flowers
- Tiny shiny bits
- Natural colors and dyes

Pages from the Sensory Portfolio


Experiencing found materials





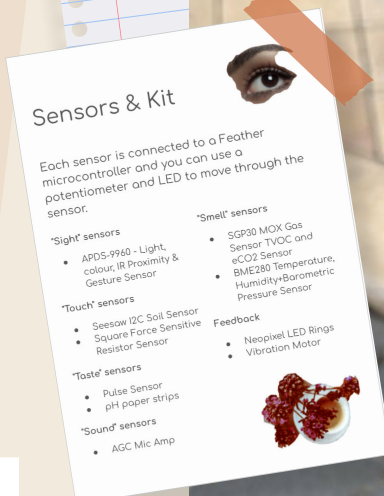
Portfolio from a Studio participant

## Sensors

Reflecting on digital and data entanglements with sensory experiences, we included open-source digital technology to explore live data relating to our bodies and the environment. Eight sensors were available for participants to measure aspects of sensory experience and 2 feedback devices to represent this data in another format. We used Adafruit Feather RP2040 RFM69 Packet Radio (RadioFruit) microcontrollers and LiPo battery power for portable interaction during the Studio walkaround. Analog sensors were connected to an Adafruit ADS1115 16-Bit ADC 4 Channel with I2C Interface; digital sensors had a direct I2C connection. This allowed plug-and-play use of all the sensors with any of the microcontrollers for easy customization and adaptability if participants wanted to swap interactions.
Neopixel 15*5050 RGB (with Integrated Driver) LED Rings were offered to visualise sensor data with color interaction and Lilypad Vibe Board vibration motors for tactile feedback. A potentiometer was also used to allow participants to cycle through colors on the LED rings and customize their interaction. The sensors were chosen based on Cochrane’s prior familiarity with them and their robustness for playful, live interaction in outdoor environments, allowing participants to experiment with different sensory modalities without any recording or data storage.

Litmus Universal Indicator pH Paper Strips

Adafruit Pulse Sensor Amped



Sensors & Kit

Each sensor is connected to a Feather microcontroller and you can use a potentiometer and LED to move through the sensor.

"Sight" sensors

- APDS-9960 - Light, colour, IR Proximity & Gesture Sensor

"Touch" sensors

- Seesaw I2C Soil Sensor
- Square Force Sensitive Resistor Sensor

"Taste" sensors

- Pulse Sensor
- pH paper strips

"Sound" sensors

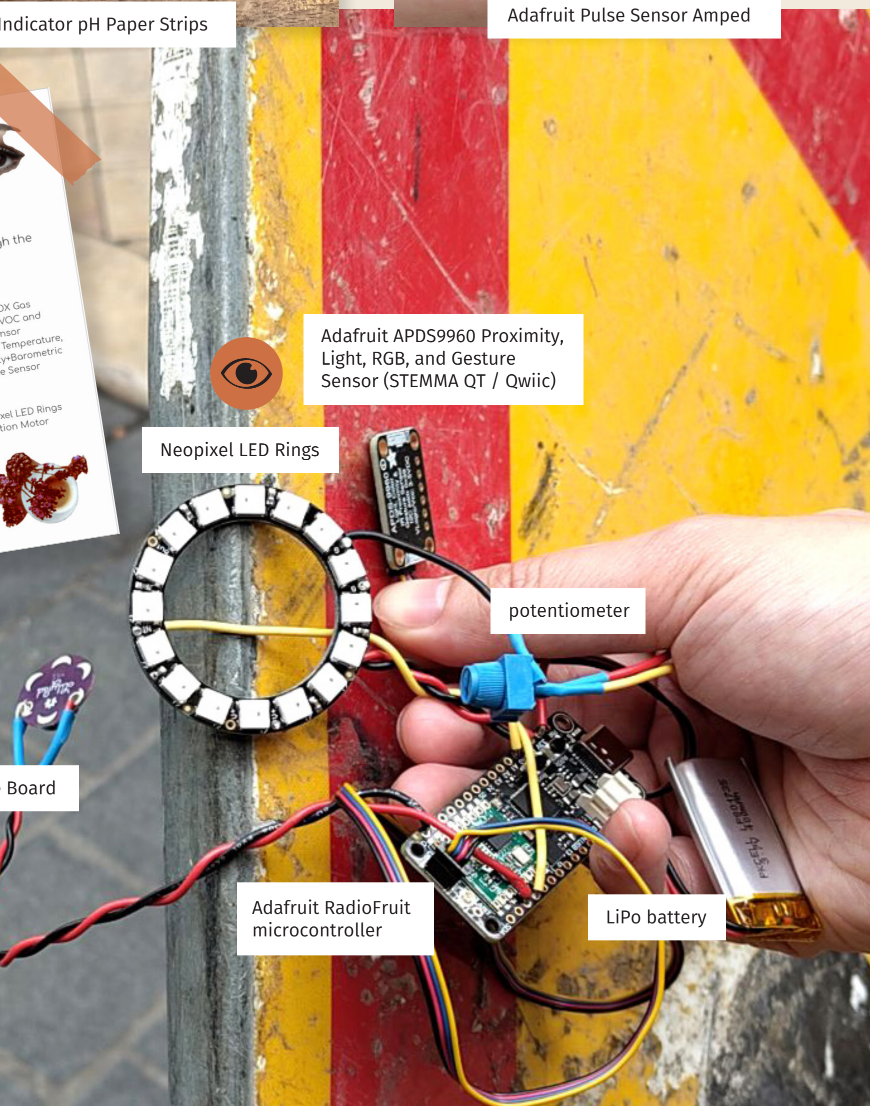
- AGC Mic Amp

"Smell" sensors

- SGP30 MOX Gas Sensor TVOC and eCO2 Sensor
- BME280 Temperature, Humidity+Barometric Pressure Sensor

Feedback

- Neopixel LED Rings
- Vibration Motor



Adafruit APDS9960 Proximity, Light, RGB, and Gesture Sensor (STEMMA QT / Qwiic)

Neopixel LED Rings

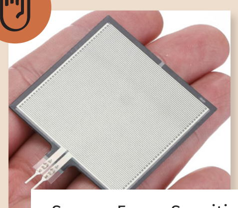
potentiometer

LilyPad Vibe Board

Adafruit RadioFruit microcontroller

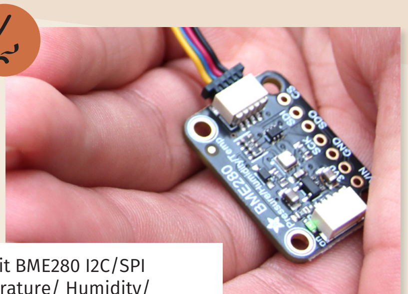
LiPo battery

Adafruit AGC Mic Amp MAX9814

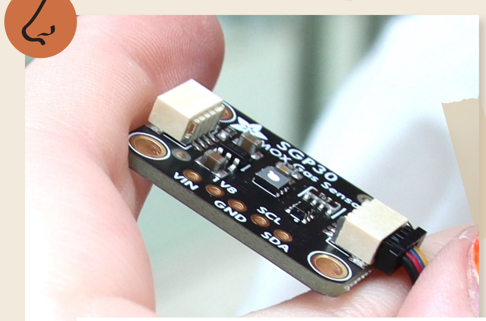


Square Force-Sensitive Resistor (FSR)

Adafruit STEMMA Soil Sensor – I2C Capacitive



Adafruit BME280 I2C/SPI Temperature/ Humidity/ Pressure Sensor (STEMMA QT)





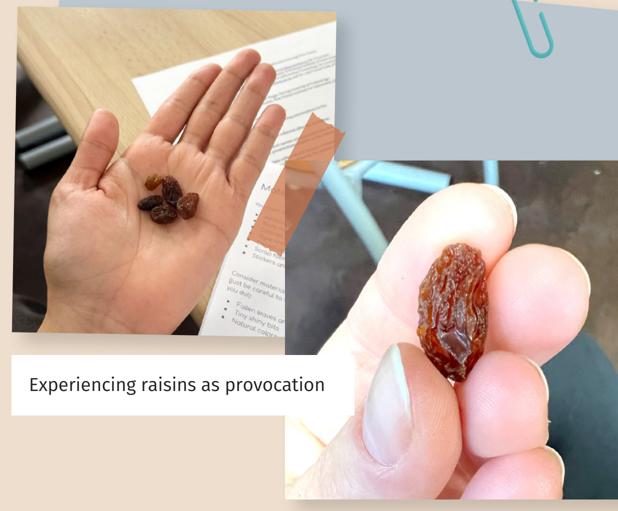
Adafruit SGP30 Air Quality Sensor Breakout – VOC and $eCO_2$ (STEMMA QT / Qwiic)

# Locations & Sensory Explorations

The locations in Bordeaux were chosen based on their relation to each sense. For Sight, we chose a famous landmark scene; for Touch, a park with diverse natural features along the city’s river; for Sound, a notable basilica, and for Smell an active, traditional market. The Taste explorations occurred during a lunch break in a local vegan restaurant.[1]

For each sense, Reed guided the group to the designated space. Cochrane and Haynes introduced the tangible device or devices for that sense, and Cochrane then introduced the corresponding section of the Sensory Portfolio. Studio participants and organizers had one hour to explore the space and annotate the Portfolio. At the end of each exploration, we regrouped for brief, semi-structured reflection using consistent prompts on sensory impressions, interactions with the devices, and site-specific observations, documented through note-taking, Portfolio annotations, and video capture rather than a formal focus group. We then moved to the next location and repeated the process.

The following pages present first-person reflections on each sense from Studio participants and organizers in the order they were experienced. We include Sensory Portfolio documentation and photographs from the day, captured by Koelle, as well as retrospective journal entries based on reviewing these materials. This retrospective process built on earlier attunement activities, including the guided raisin exercise [59] and the introductory body mapping practice during the Smell exploration [21, 67, 79]. Six months later, twelve attendees, including organizers and participants, revisited these materials and contributed to the reflections, forming the author team. Through this combination of in-person and post-hoc perspectives, we offer insights into the experience and into using In-Situ Seeding for sensory exploration.



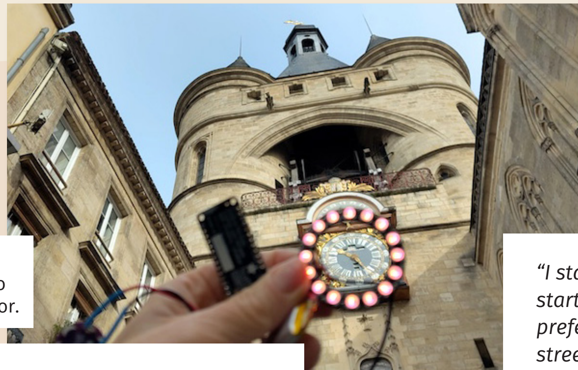
Experiencing raisins as provocation


Prompts were given at each stop to encourage sensory exploration and will have shaped the way participants approached each activity. They are fully outlined in the Studio Proposal [10] and in the Sensory Portfolio (Appendix A).

Walking as a group between locations

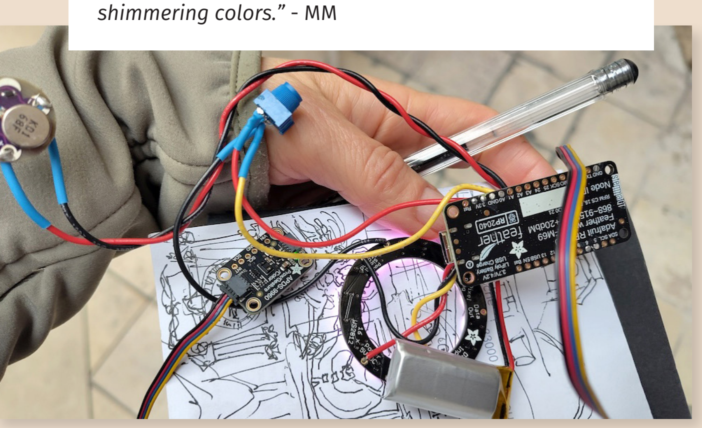
1 - The route differs in the print Sensory Portfolio and its reproduction in Appendix A. The alteration was due to time constraints with the market’s operating hours. The route taken during the Studio is accurate in this pictorial.

# Sight

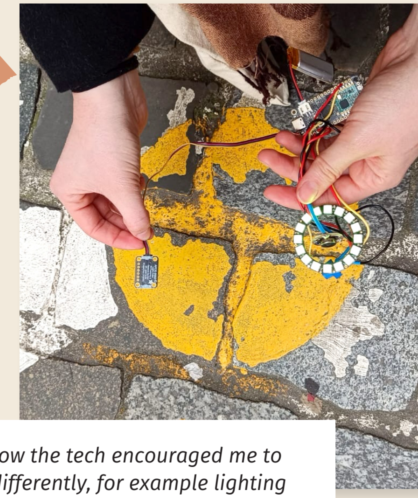


We each used the APDS9960 sensor to sense light and color.

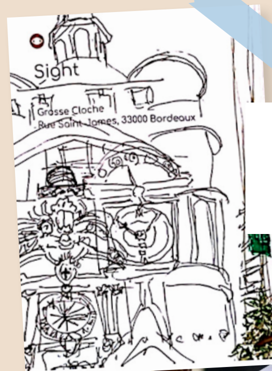
*“The workshop’s sensor kit brought more awareness to colors as the visual interface – when exploring it, I noticed not only the dominant colors and its variety, but also a correlation with the “main” theme of this visual scenario, which was the round clock – the Grosse Cloche – so both the drawing and the photos reflect the lasting memory of the circle interface – then highlighted with shimmering colors.”* - MM



*“I started to notice the things around me and start to focus on the familiar (and towards my preferences): beautiful typography, architecture, street art (the stickers on the pipes). But the prolonged moment of reflection made me see these things more deeply. Some tiles near the ground; why are the walls clean and the stickers only in the pipes? Local regulations?”* - MF



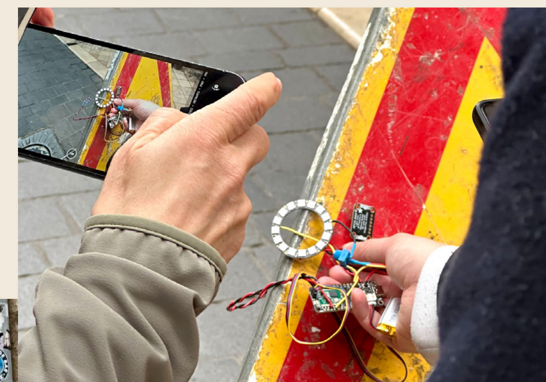
*“It was interesting how the tech encouraged me to look at the objects differently, for example lighting up as red in front of an object that I hadn’t seen as having red hues in before - it made me appreciate the rich colours of the scene where previously it had looked somewhat monotone in grey and sand.”* - ACH




*“I was very tempted to photograph everything, then I took the chance to draw.”* - MM

*“Maybe my favorite thing was discovering little things through the eyes of others: a hidden sticker, some feature from the clock, the texture of the wall where a plant had crawled upon it and left a mark.”* - LTV

*“When experiencing sight, I was not drawn to any of the sensors; instead, I used my phone to take photos, capturing small details and zooming in on aspects of the place that were somewhat unnoticed or overlooked, where human and non-human factors converged such as decaying parts of walls and mossy tiles.”* - FB



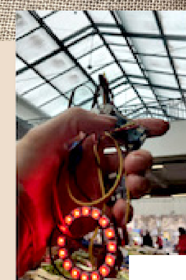
*“While color seemed to be the obvious “sight” experience, perspective emerged during the activity. To me it also felt like participants were also drawn to visible elements with interesting textures.”* - MK

# Smell

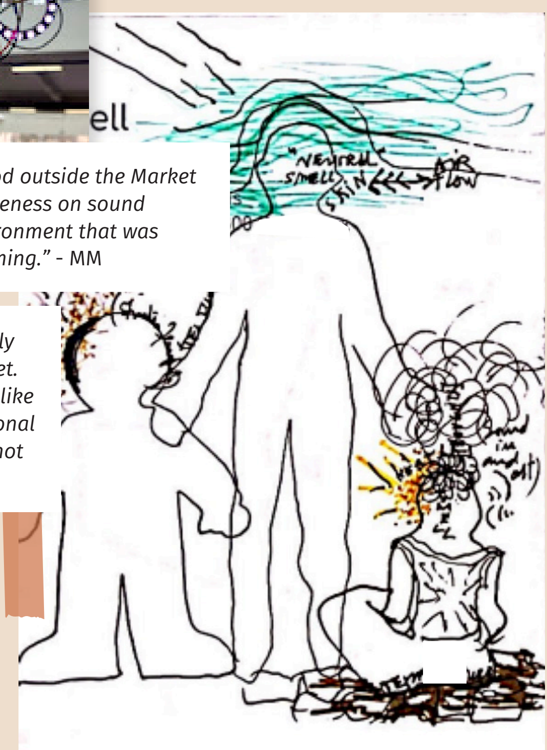
We each used the both the temperature and the $CO_2$/particle sensors to sense smell from gases in the air.


“When I tuned into smell I enjoyed wandering around the market and recognising the varied smells of the different stalls. I didn’t directly engage with the tech but remember some of the others were using it at an olive/fermented vegetables stand and the sensor could pick up the fermented items which we found surprising and exciting. [...] These sensors were maybe the most difficult to get a reading from which made it extra exciting when the olives were picked up by the sensor!” - ACH

“This was the most difficult [sense] to capture visually. Here, the sensors were very helpful in directing attention to things like the fermented olives or the mouldy citrus fruits giving off gas. I also observed some disappointment if certain foods appealing to the human senses did not spark a reaction in the sensor.” - MK



“I enjoyed experiencing smell in a group – walking with people, smelling specific objects, then sharing memories the smells evoked.” - FB


“The bodymap method outside the Market helped sharpen awareness on sound and touch in an environment that was so visually overwhelming.” - MM

“I noted that the other participants were really excited about the various smells of the market. Having grown close to a similar food market like this one (my parents have a shop in a traditional market like this), that atmosphere seems to not have such an impact.” - MF

“The smell of French cheeses was the intensity winner!” - MM

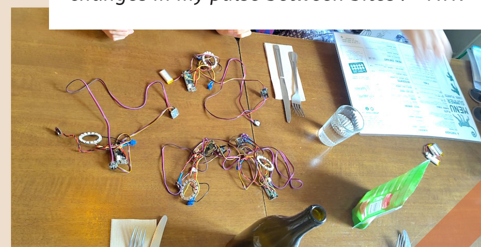
# Taste

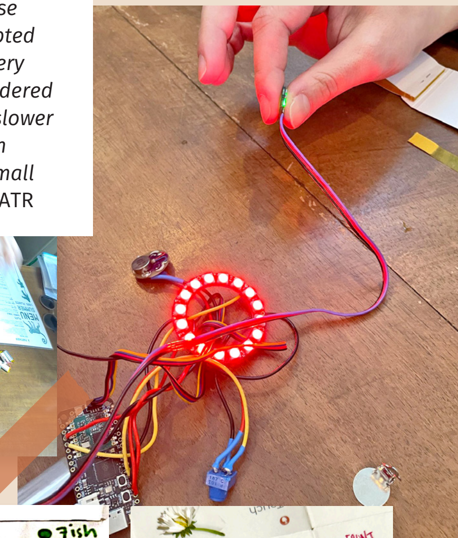
“For this sense I could not compare the “before” and “after” tasting the tasty multi-flavored spiced food, but the heartbeat input, light output was a lively expression of the energy activation provided by food.” - MM

We used pH strips to sense acidity and pulse sensors to sense arousal or excitement.

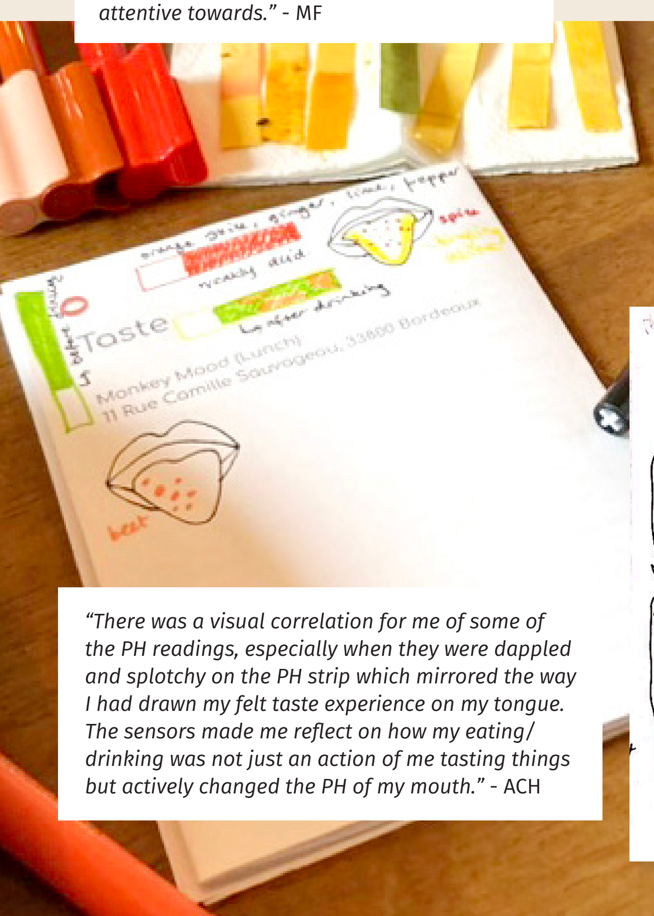

“I have a very transactional relationship with food when compared to them (who appreciate food more). This reflection forced me to try and notice more the flavours and textures of the food, something I’m normally not really attentive towards.” - MF

“It was interesting to play with the pulse sensor while eating because it interrupted the eating experience by making me very aware of my own heartbeat, and I wondered which foods would trigger a faster or slower response, so I would alternate between tasting the food and monitoring the small changes in my pulse between bites .”- ATR

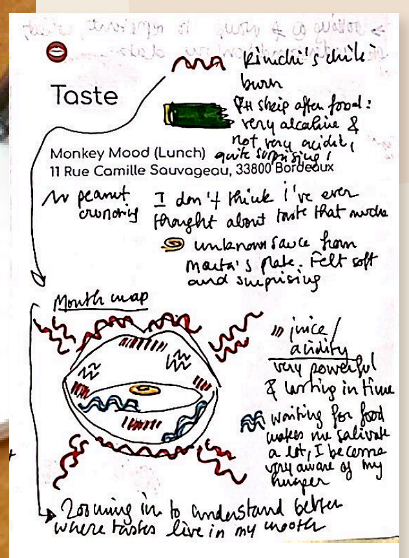


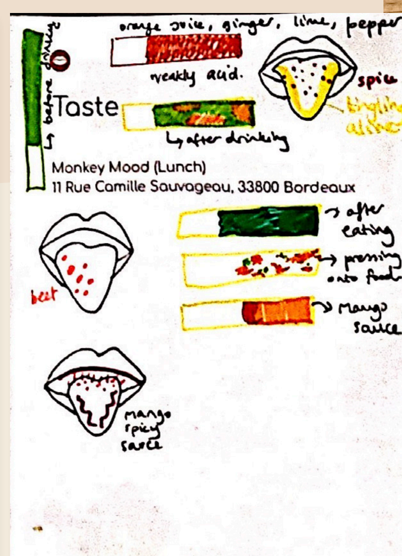


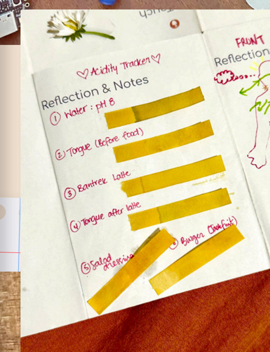
“Playing with the pH strips during lunch was a lot of fun. I realize that they are good at capturing the different tonalities in the moment, but once time passes, they all converge to more similar shades of green, or orange. This made me think about temporality and sensors: how we use them to snap a picture of something that is complex and that evolves - even over the short period of time of a lunch.” - LTV







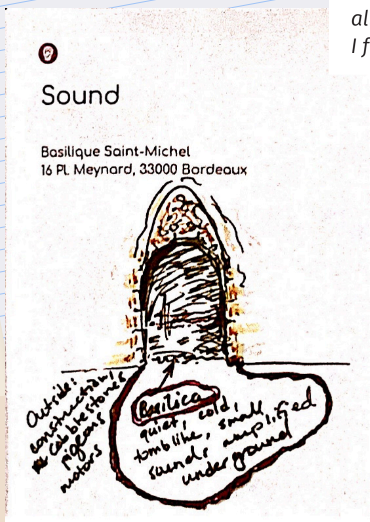




“There was a visual correlation for me of some of the PH readings, especially when they were dappled and splotchy on the PH strip which mirrored the way I had drawn my felt taste experience on my tongue. The sensors made me reflect on how my eating/ drinking was not just an action of me tasting things but actively changed the PH of my mouth.” - ACH

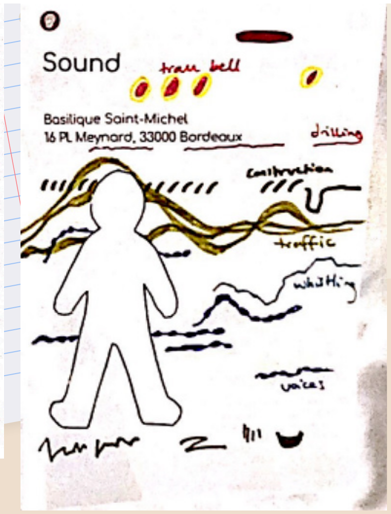
“While the measurements provided by the pH strips enabled me to more deeply reflect on bodily tasting experiences, I realized by the end of the meal that I wanted strips that could measure other experiences, such as salty, sweet, bitter, etc.” - FB

# Sound

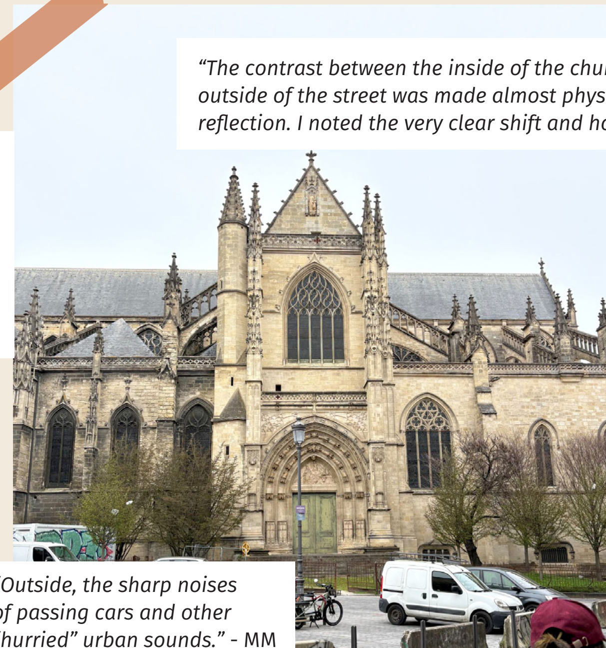
We used the AGC Mic Amp MAX9814 to sense sound.

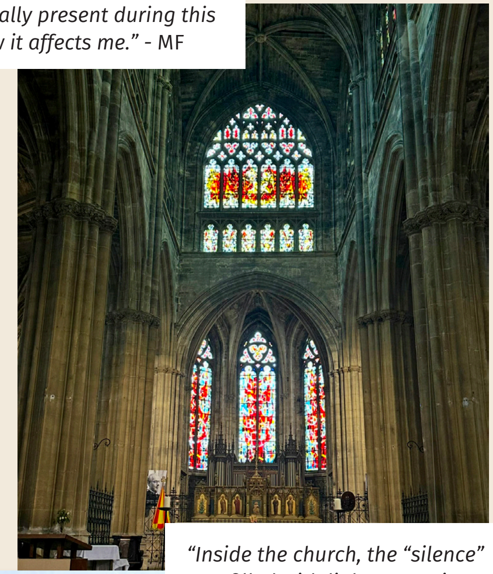



“I experienced it as many layers, some more continuous such as the hum of traffic, then punctuated by the sound of tram bells or studded by construction noises. The sounds had different pitches and textures, and as I allowed the sound to be listened to abstractly, I found it quite a beautiful soundscape.” - ACH

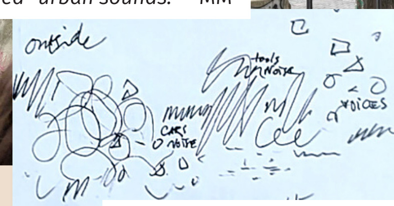


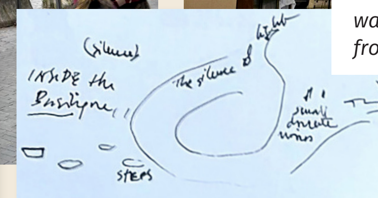

“The contrast between the inside of the church and the noise outside of the street was made almost physically present during this reflection. I noted the very clear shift and how it affects me.” - MF





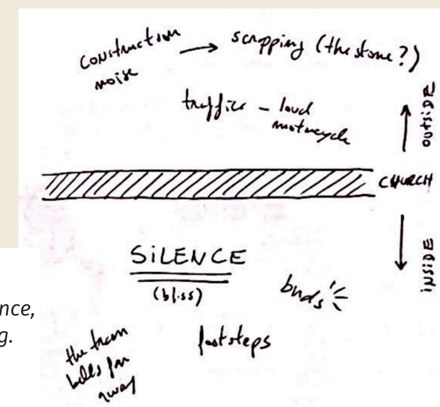
“Outside, the sharp noises of passing cars and other “hurried” urban sounds.” - MM




“Inside the church, the “silence” was filled with light streaming from the windows.” - MM

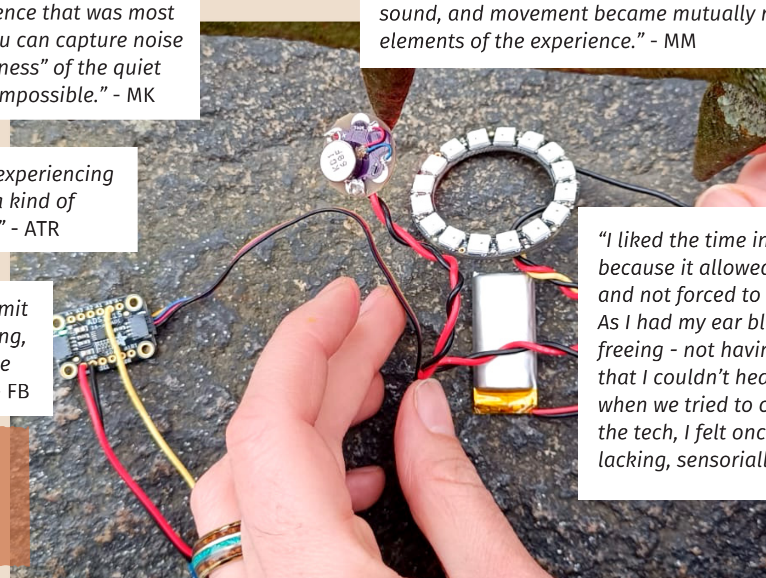
“These overlapping perceptions evoked a synaesthetic response, where sensory boundaries blurred and light, sound, and movement became mutually resonant elements of the experience.” - MM




“I feel that this is the experience that was most difficult to capture. While you can capture noise on video, capturing the “fullness” of the quiet inside the cathedral seems impossible.” - MK

“Walking from the outside in and experiencing this embodied transition created a kind of phenomenological disorientation.” - ATR

“During this experience I tried my best to limit taking photos, using the sensors, and talking, instead choosing to quietly walk and attune my hearing to the environments I was in.” - FB



“I liked the time inside the church because it allowed me to be in silence, and not forced to listen to anything. As I had my ear blocked, that was freeing - not having to remember that I couldn’t hear. But once outside, when we tried to capture sounds with the tech, I felt once again that I was lacking, sensorially.” - LTV

# Touch

We used the FSR and the soil sensor to sense touch.

*“I couldn’t resist/felt compelled to collect a few samples from the ground, to experience their texture and preserve a tangible memory of these textures within the notebook.”* - MM

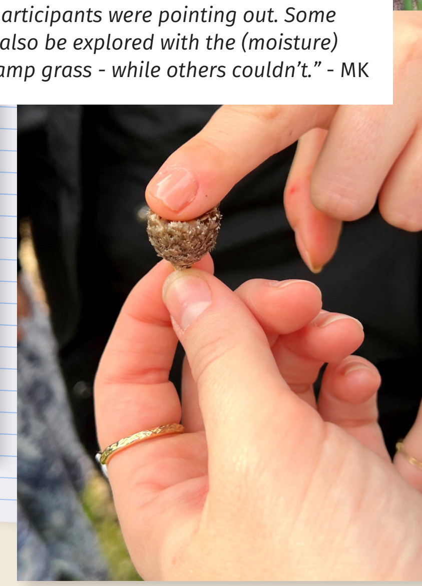
*“Even though we were in a garden, in this particular one, so urbanised, the natural textures felt a bit forced. So I was drawn to the man-made textures. The peeling paper of a wall art installation, weathered by the elements. Numbers on a surface (that I traced on the paper).”* - MF

*“I was drawn to the experience of textures. I tried to capture some of these textures through rubbings; however, I felt like the rubbings only simplified the experience into a static, flat drawing. This led me to experiment with the digital moisture sensors to gain more insight into the textural experiences of wetness and humidity.”* - FB

*“I did not get to play with any of the tech in this one. But I remember it very fondly. The sun was shining, it was the end of the workshop… all in all, beautiful in its own way.”* - LTV

“As I introduced the sensors, participants naturally focused on the ground and on the textures of grass, leaves, moss, and bark while experimenting with the soil sensor and FSR.” - KAC

*“I tried to capture pictures of the textures and surfaces that participants were pointing out. Some of these could also be explored with the (moisture) sensor - like damp grass - while others couldn’t.”* - MK



## Walk-and-Talk Sensory Explorations

Walk-and-talk (or "walkshop" [66]) formats have been used for other generative inquiries and brainstorming exercises in HCI and RtD. Action and situated reflection allows design to arise in context [23] and further incorporate dialogic exchange [34, 60] into the ideation process. The activity of *In-Situ Seeding* during the Studio allowed participants to embrace conversation and novel scenarios; working in a new place with new people and materials, this format generated alternative perspectives through creating networks between people [65]. We especially emphasise the decentering and the disruption from norms that *In-Situ Seeding* can offer, using context to learn from knowledge(s) beyond one's self [33, 37, 55].

Interactive narratives around a map also provided a journey through senses and reflection on assemblages of self, other, and the built environment [42]. Notes, sketches, and Portfolio annotations showed how the walkshop format linked sensory experience with activity, values, and boundaries present in each space. [24, 42, 45]. Active methodologies like this provide opportunities to contextualize interaction in relation to a scene and the lives of other beings, including those also engaging in the sensory exploration. Such narrative practices provide opportunity to engage with and reflect on how sociotechnical relationships and structures generate experiences in-action [61, 57].

Within the dynamic contexts we often find ourselves designing in, this active engagement presents an opportunity to go from merely being present to *becoming* part of a space. Studio participants incorporated others' experiences into their own explorations, e.g., using technology one might not immediately be drawn to or touching others' found textures. Noticing through relationality demonstrates how dialogue can shape and expand the boundaries of individual experience [56] and generate community around interaction. In this process we adapted methods of flânerie and walk-and-talk engagements, using them as the guiding framings for sensory exploration.

Acting within relationality and social configurations, the walk-and-talk dialogues also provided space to communally reflect on experience. Communication and externalisation of experience to others supports development of conceptualizations [64]. Senses also presented themselves as a social aspect. For M. Ferreira, growing up close to a market and familiar with the typical sensory experiences of that environment, certain senses were rooted in lived experience and familiarity, pushing them to more of a tacit domain [19, 63] in M. Ferreira's experience. During Smell, others' experiences, dialogue about what was noticed, and movement through the environment generated new opportunities for M. Ferreira to re-engage with scent in this context.

In other cases, observing participants working with sensors and experimenting also triggered new action, trial-and-error, and collective brainstorming. The pH strips for example were excitedly adopted during the Taste exploration, and new ideas around what to measure and what was linked to the experience were also passed (even literally physically passing heart rate sensors) around the group. The sequence of the walk also shaped experience, as accumulated noticing, energy, and social dynamics influenced later sensory interactions.

## Situated Technical Entanglements in Space

Participants were drawn to (or not) specific sensors based on what they noticed, and moments of mismatch—such as appealing stimuli that produced no sensor change—highlighted both device limits and the richness of human perception. The hegemonic technosolutionism that can dominate design and HCI practices [5, 11, 62], even with good intentions, can often function as a thin veneer over interactions. When implementation occurs without thorough understanding of place and existing sociocultural and relational dynamics [53], it can potentially reinforce power structures and privilege some forms of knowledge [42, 57]. Our *In-Situ Seeding* method and reflections while writing this pictorial challenge two dichotomies that exist between digital vs. analog data and notions of "high-tech" vs. "low-tech."

First, we can challenge the position that digital data streams are somehow superior compared to "lo-fi" or subjective representations of experience. Bringing to mind again the example of the dancer from the Introduction, the nuances provided by the dancer's own account (analog, subjective), in addition to biosensor data streams (digital, "objective"), are useful in getting alternative perspectives and realities [5, 7] in the messy, ambiguous context of subjective experience [62]. It is true that digital systems require defined conceptual mappings when processing data [62], but this is not the only representation of experience possible. In the Studio, the use of both digital (sensors, actuators) and non-digital materials (craft materials, found objects) provided multi-modal links with the space. The devices through which we measure aspects of interaction construct data [7, 62, 63] further experienced in the Studio, e.g., using microphones in the church setting brought awareness to the lack of sound in the quiet space and exaggerated the experience of hearing even quiet noises inside. If we unpack what "technology" can be, the other non-digital technology and materials do the same: found objects and craft also provide reference for experience, e.g., the act of body mapping calls awareness to experiences that may have been more subtle without undertaking the exercise [21]. Digital and analog interactions generate alternate experiences, with neither inherently superior to the other.

Secondly, we can examine supposed dualities between high-fi and lo-fi materials and what we really mean by "data". We used plug-and-play, off-the-shelf tangibles to facilitate the walkshop format and prioritise staying off computers. HCI research often positions rigorous data-output mappings and filtered, low-noise streams as more "accurate" representations of experience; however, the chosen kit for the Studio also provided representations and meaning that developed through play, experimentation [52], and intuitive exploration [6, 7]. Taking time to reprogram recognition algorithms or filter data streams might also remove someone from rapid engagement with direct experience. Seen in this case of sensory exploration, an increase in fidelity is not necessarily a predetermination of engagement. We may also consider what counts as data more generally; situatedness requires examining the ambiguous and what exists outside linguistic representation [33, 64]. Knowledges exist beyond the realm of numeric digital data in embodied [2, 19] and community knowledges [37]. These varied perspectives help us to make sense of our experiences and are often necessary to provide individual context to biodata [15, 76]. Likewise, the body is a source of knowledge that does not fit into assumed norms about the diverse range of human experience [42, 67, 74] and bodies, "biopolitics" often reinforced by the tech industry and in biosensor development [53].

## Humans & More-than-Humans as Factors of Experience

Likewise, the continued decentering of interaction can expand to include the influence of other actors in the experience. We see the influence of Studio participants bringing to light our own embodied hermeneutics [72, 73, 69] and subjectivity as researchers and designers in contrast with that of other humans [16, 17, 73]. This focus on decentering, slowness, and meaning-making in community with technology allowed reflective interaction and deeper understanding in relation to others [28, 31]. Our method emphasizes what it is to interact, not as an individual entity but within networks, space, and place.

Drawing from theories that challenge human-centered paradigms and emphasize the distributed agency of ecological, social, and technical systems [39], our approach positions the designer not as a detached observer, but as an entangled participant in a more-than-human world [54]. Thinkers such as Haraway [35] through her notion of kinship, and artists and researchers Reis & Mendes co-creating *Still Life Ecologies* as performative installations [65], have pushed the boundaries in human–nonhuman relationships, opening up possibilities for reimagining coexistence and mutual entanglement.

Our proposed method contributes to a growing interest in post-human approaches by promoting sensory-based engagement and embodied interaction with local environments. By using site and sense-specific tools, we foreground sensory awareness and situated reflection as core components of engaging with our environments, including nature, meaningfully. These tools can assist participants in making sense of complex, often abstract topics like climate change or environmental degradation. Rather than relying on high-tech systems for environmental sensing or data capture [4], our method embraces embodied, introspective practices in the wild [3] that draw attention to felt experiences, textures, sounds, and rhythms of place. This approach builds on existing research on the value of sketching and material annotations in HCI as means of inquiry, reflection, and dialogue with the self and the environment [14, 49, 75].

Importantly, these sensory and reflective practices also support a repositioning of the human within ecological systems. They facilitate reflection-in-action [71], helping designers critically question their roles and responsibilities in relation to the more-than-human [1, 9, 18]. In doing so, the method moves toward a design practice that is not only situated and embodied but also ethically responsive—encouraging deeper awareness of and engagement with the ecological contexts in which design takes place [54]. Through this, we aim to support a broader cultural and methodological shift in design [12]: one that values presence, sensory attunement, and mutuality over control and abstraction.

We must likewise acknowledge participants in our interaction who have not actively chosen to do so. During the Studio, other humans become entangled in our action. Many people in the spaces we explored asked what we were doing and why.[2] Many non-humans cannot directly inquire about our involvement but contribute nonetheless. It is vital to reflect on our responsibility in their wellbeing and inclusion.

Our interactions are also part of greater networks spanning history. We enact the existing structures of the city's layout and arrangement of social systems as we explore sensory interaction [66]. The history, location, and spatiality created by past humans and non-humans are also parts of the experiential framework. Just as they have developed over time, we bring our own histories to interaction. On the other end of the timescale, these interactions inform futures; although not directly considered in this Studio, a similar walkshop and speculative work within a space can imagine these entanglements as they continue to emerge and the experiences that will be generated as a result.

## Future Directions

To support continued development, we hope that future sensory explorers will engage with the Sensory Portfolio template provided in Appendix B and documenting dialogue. Further, we here provide reflections for future implementations of *In-Situ Seeding* as a method, materials and applications. Likewise, we propose the creation of Sensory Portfolios, perhaps over time and repeated contexts, can be useful as tools for documentation and artistic expression.

To fully develop as a method, we must consider how Seeding is done through future situated explorations; namely, on how participants are guided and prompted to engage and the noticing that emerges as a result. This also applies to the material seeds used in the walkshop. The flexibility of plug-and-play sensors supported intuitive exploration and play. Based on the materials used in this Studio, a more comprehensive Seeding "toolbox" might be developed. In doing so, it is crucial to allow for adaptability toward the goals of a workshop, given the role of sensors in generating meaning-making.

One further limitation to always keep in mind is that it is impossible to design for interaction without biasing the experience in some way. Just as all participants will bring their own perspectives, the choices made in how to engage with sensory experiences and the seeds used will impact the end result. We argue this factor should be acknowledged in HCI work generally: we are responsible for the experiences we design and should account for our input in realizing them for our participants.

A possible initial venue for development is in working in expanded ways with multimedia explorations and subjective, artistic contexts. For example, a walkshop could utilize embodied and sensory engagement as a starting point for building on the blending of technology and artistic practice in creative computing [13, 36, 58]. Further, promoting contextualized learning by engaging with real-world environments can contribute to more embodied technological literacy. Such theoretical and pedagogical foundations are in line with experiential learning and practice-based approaches [43, 44]. Overall, our objectives and the anticipated benefits are more engaging, motivating, and meaningful learning and exploratory experiences. Further, *In-Situ Seeding* can support development of critical thinking around the interplay of body, environment, and technology.

## Developing a Seeding Method

Our reflections in this pictorial provide an initial path for developing *In-Situ Seeding*. This walkshop method of site-specific engagement and the concept of seeding can provide direction to HCI and RtD around what it means to be active in a space and the resulting entanglements between technology, social structures, data, and other beings. Traditionally, evaluations of interaction with sensory data have largely focused on user-device interaction, feedback, and mapping strategies as core aims. Through *In-Situ Seeding*, we propose that designers can make decisions on engaging with sensory experiences and seed examination of particular entanglements. This may constitute a particular Agential Cut [8, 70]; drawing again on Barad [7, 8], we as designers must make choices on measurement, materials, and use cases, acknowledging that these parameters and agents in an ambiguous space play a role in the resulting interaction [62]. We focus *In-Situ Seeding* around the idea of *becoming* as *experiencing*. To work with situated experiences, we must understand our role as a contributing member of the complex networks that generate them. In becoming, we alter experience through the technology, lived experience, and communication we bring to working in a space.

## Acknowledgements

AH and LTV are funded by Sweden's Digital Futures Center; MF and PF are funded by the LoGa Culture Project (Horizon Europe grant 101094036); MM is funded by Portuguese Foundation for Science and Technology (FCT) grants 10.54499/LA/P/0083/2020, 10.54499/UIDP/50009/2020, and 10.54499/UIDB/50009/2020; MG is funded by FCT PhD grant PRT/BD/155046/2024; LVR is funded by Technische Universität Dortmund.

**2 -** Our interaction has impact on others; for example, one of the vendors in the market jokingly asked participants if one of the gas sensors, with all its wires dangling around, was a bomb!

## References


[1] Yoko Akama, Ann Light, and Takahito Kamihira. 2020. Expanding Participation to Design with More-Than-Human Concerns. In *Proceedings of the 16th Participatory Design Conference 2020 - Participation(s) Otherwise* - Volume 1 (Manizales, Colombia) (PDC '20). Association for Computing Machinery, New York, NY, USA, 1–11. https://doi.org/10.1145/3385010.3385016

[2] Miquel Alfaras, Vasiliki Tsaknaki, Pedro Sanches, Charles Windlin, Muhammad Umair, Corina Sas, and Kristina Höök. 2020. From Biodata to Somadata. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (CHI '20). Association for Computing Machinery, New York, NY, USA, 1–14. https://doi.org/10.1145/3313831.3376684

[3] Ferran Altarriba Bertran, Oǒuz 'Oz' Buruk, and Juho Hamari. 2022. From-The-Wild: Towards Co-Designing For and From Nature. In *Extended Abstracts of the 2022 CHI Conference on Human Factors in Computing Systems* (New Orleans, LA, USA) (CHI EA '22). Association for Computing Machinery, New York, NY, USA, Article 315, 7 pages. https://doi.org/10.1145/3491101.3519811

[4] Ferran Altarriba Bertran, Jordi Márquez Puig, Maria Llop Cirera, Eva Forest Illas, Joan Planas Bertran, Ernest Forts Plana, Oğuz 'Oz' Buruk, Çağlar Genç, Mattia Thibault, and Juho Hamari. 2023. Designing and Using the Wild Probes Toolkit (v1) to Co-Design From-the-Wild. In *Proceedings of the 2023 ACM Designing Interactive Systems Conference* (Pittsburgh, PA, USA) (DIS '23). Association for Computing Machinery, New York, NY, USA, 765–778. https://doi.org/10.1145/3563657.3596102

[5] Karen Barad. 1998. Getting Real: Technoscientific Practices and the Materialization of Reality. *Differences: a Journal of Feminist Cultural Studies* 10, 2 (1998), 87–91.

[6] Karen Barad. 2003. Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter. *Signs: Journal of Women in Culture and Society* 28, 3 (March 2003), 801–831. https://doi.org/10.1086/345321

[7] Karen Barad. 2007. *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning.* Duke University Press.

[8] Karen Barad. 2014. Diffracting Diffraction: Cutting Together-Apart. *Parallax* 20, 3 (July 2014), 168–187. https://doi.org/10.1080/13534645.2014.927623

[9] Michelle Bastian, Owain Jones, Niamh Moore, and Emma Roe (Eds.). 2018. Participatory research in more-than-human worlds. Number 67 in *Routledge Studies in Human Geography*. Routledge, Taylor & Francis Group, London.

[10] Fiona Bell, Karen Anne Cochrane, Alice C Haynes, Courtney N. Reed, Alexandra Teixeira Riggs, Marion Koelle, Laia Turmo Vidal, and L. Vineetha Rallabandi. 2025. Sensory Data Dialogues: A Somaesthetic Exploration of Bordeaux through Five Senses. In Proceedings of the Nineteenth International Conference on Tangible, Embedded, and Embodied Interaction (TEI '25). Association for Computing Machinery, New York, NY, USA, Article 131, 1–5. https://doi.org/10.1145/3689050.3708327

[11] Mark Blythe, Kristina Andersen, Rachel Clarke, and Peter Wright. 2016. Anti-Solutionist Strategies: Seriously Silly Design Fiction. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (San Jose, California, USA) (CHI '16). Association for Computing Machinery, New York, NY, USA, 4968–4978. https://doi.org/10.1145/2858036.2858482

[12] Kirsten Boehner, Janet Vertesi, Phoebe Sengers, and Paul Dourish. 2007. How HCI interprets the probes. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (San Jose, California, USA) (CHI '07). Association for Computing Machinery, New York, NY, USA, 1077–1086. https://doi.org/10.1145/1240624.1240789

[13] Victoria Bradbury and Susie O'Hara (Eds.). 2019. *Art Hack Practice: Critical Intersections of Art, Innovation and the Maker Movement (1 ed.)*. Routledge. https://doi.org/10.4324/9781351241212

[14] Nathalie Bressa, Kendra Wannamaker, Henrik Korsgaard, Wesley Willett, and Jo Vermeulen. 2019. Sketching and Ideation Activities for Situated Visualization Design. In *Proceedings of the 2019 on Designing Interactive Systems Conference* (San Diego, CA, USA) (DIS '19). Association for Computing Machinery, New York, NY, USA, 173–185. https://doi.org/10.1145/3322276.3322326

[15] Anne-Marie Brouwer, Elsbeth van Dam, Jan B. F. van Erp, Derek P. Spangler, and Justin R. Brooks. 2018. Improving Real-Life Estimates of Emotion Based on Heart Rate: A Perspective on Taking Metabolic Heart Rate Into Account. *Frontiers in Human Neuroscience* 12 (July 2018). https://doi.org/10.3389/fnhum.2018.00284

[16] J. M. Carroll and W. A. Kellogg. 1989. Artifact as theory-nexus: hermeneutics meets theory-based design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '89). Association for Computing Machinery, New York, NY, USA, 7–14. https://doi.org/10.1145/67449.67452

[17] J. M. Carroll and W. A. Kellogg. 1989. Artifact as theory-nexus: hermeneutics meets theory-based design. *SIGCHI Bull.* 20, Si (March 1989), 7–14. https://doi.org/10.1145/67450.67452

[18] Rachel Clarke, Sara Heitlinger, Ann Light, Laura Forlano, Marcus Foth, and Carl DiSalvo. 2019. More-than-human participation: design for sustainable smart city futures. *Interactions* 26, 3 (April 2019), 60–63. https://doi.org/10.1145/3319075

[19] Karen Anne Cochrane, Yidan Cao, Audrey Girouard, and Lian Loke. 2022. Breathing Scarf: Using a First-Person Research Method to Design a Wearable for Emotional Regulation. In *Proceedings of the Sixteenth International Conference on Tangible, Embedded, and Embodied Interaction* (Daejeon, Republic of Korea) (TEI '22). Association for Computing Machinery, New York, NY, USA, Article 24, 19 pages. https://doi.org/10.1145/3490149.3501330

[20] Karen Anne Cochrane, Lian Loke, Matthew Leete, Andrew Campbell, and Naseem Ahmadpour. 2021. Understanding the First Person Experience of Walking Mindfulness Meditation Facilitated by EEG Modulated Interactive Soundscape. In *Proceedings of the Fifteenth International Conference on Tangible, Embedded, and Embodied Interaction* (Salzburg, Austria) (TEI '21). Association for Computing Machinery, New York, NY, USA, Article 18, 17 pages. https://doi.org/10.1145/3430524.3440637

[21] Karen Anne Cochrane, Kristina Mah, Anna Ståhl, Claudia Núñez Pacheco, Madeline Balaam, Naseem Ahmadpour, and Lian Loke. 2022. Body Maps: A Generative Tool for Soma-based Design. In *Proceedings of the Sixteenth International Conference on Tangible, Embedded, and Embodied Interaction* (Daejeon, Republic of Korea) (TEI '22). Association for Computing Machinery, New York, NY, USA, Article 38, 14 pages. https://doi.org/10.1145/3490149.3502262

[22] Eleni Economidou. 2025. This Is How I Felt: Crafting Conductive Wool Artefacts as an Embodied Practice to Regulate Anxiety. In *Proceedings of the Nineteenth International Conference on Tangible, Embedded, and Embodied Interaction* (TEI '25). Association for Computing Machinery, New York, NY, USA, Article 71, 7 pages. https://doi.org/10.1145/3689050.3706011

[23] Chloe Eghtebas, Gudrun Klinker, Susanne Boll, and Marion Koelle. 2023. Co-Speculating on Dark Scenarios and Unintended Consequences of a Ubiquitous(ly) Augmented Reality. In *Proceedings of the 2023 ACM Designing Interactive*

*Systems Conference* (Pittsburgh, PA, USA) (DIS '23). Association for Computing Machinery, New York, NY, USA, 2392–2407. https://doi.org/10.1145/3563657.3596073

[24] Lauren Elkin. 2017. *Flâneuse: Women Walk the City in Paris, New York, Tokyo, Venice, and London*. Farrar, Straus and Giroux.

[25] Chris Elsden, Mark Selby, Abigail Durrant, and David Kirk. 2016. Fitter, happier, more productive: what to ask of a data-driven life. *Interactions* 23, 5 (Aug. 2016), 45. https://doi.org/10.1145/2975388

[26] Mohsen Ensafjoo, Chau Nguyen, Paul H. Dietz, Roozbeh Manshaei, and Ali Mazalek. 2025. Exploring Approaches for Handheld Geometric Shape-Changing Tangible Interfaces. In *Proceedings of the Nineteenth International Conference on Tangible, Embedded, and Embodied Interaction* (TEI '25). Association for Computing Machinery, New York, NY, USA, Article 92, 9 pages. https://doi.org/10.1145/3689050.3705982

[27] James Evans and Phil Jones. 2011. The Walking Interview: Methodology, Mobility and Place. *Applied Geography* 31, 2 (April 2011), 849–858. https://doi.org/10.1016/j.apgeog.2010.09.005

[28] David Everiss. 2025. Exploring the online learning experiences of health and social care students.: A phenomenological study of the lived experience of online study for health and social care students studying at a university in the United Kingdom during Covid-19. In *Proceedings of the 2024 8th International Conference on Education and E-Learning* (ICEEL '24). Association for Computing Machinery, New York, NY, USA, 186–191. https://doi.org/10.1145/3719487.3719516

[29] Christopher Frauenberger. 2019. Entanglement HCI The Next Wave? *ACM Trans. Comput.-Hum. Interact.* 27, 1, Article 2 (Nov. 2019), 27 pages. https://doi.org/10.1145/3364998

[30] Pedro Galvão Ferreira, Marta Galvão Ferreira, Teresa Maritza Gouveia da Silva, Nuno Jardim Nunes, and Valentina Nisi. 2025. The Entangled Tales that Landscapes Tell: An Embodied HCI Pedagogy for Re-enchanted Nature Walks. In *Proceedings of the Nineteenth International Conference on Tangible, Embedded, and Embodied Interaction* (TEI '25). Association for Computing Machinery, New York, NY, USA, Article 13, 13 pages. https://doi.org/10.1145/3689050.3705012

[31] William Gaver. 2012. What should we expect from research through design?. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Austin, Texas, USA) (CHI '12). Association for Computing Machinery, New York, NY, USA, 937–946. https://doi.org/10.1145/2207676.2208538

[32] Elisa Giaccardi. 2019. Histories and Futures of Research through Design: From Prototypes to Connected Things. *International Journal of Design* 13, 3 (2019), 139–155.

[33] Mathilde Gouin, Nuno Jardim Nunes, and Valentina Nisi. 2025. Critter Connect, wearable design for place-based & multisensory species encounters. In *Proceedings of the 2025 ACM Designing Interactive Systems Conference* (DIS '25). Association for Computing Machinery, New York, NY, USA, 103–118. https://doi.org/10.1145/3715336.3735426

[34] Luke Haliburton, Natalia Bartłomiejczyk, Albrecht Schmidt, Paweł W. Woźniak, and Jasmin Niess. 2023. The Walking Talking Stick: Understanding Automated Note-Taking in Walking Meetings. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems* (Hamburg, Germany) (CHI '23). Association for Computing Machinery, New York, NY, USA, Article 431, 16 pages. https://doi.org/10.1145/3544548.3580986

[35] Donna J. Haraway. 2016. *Staying with the Trouble: Making Kin in the Chthulucene*. Duke University Press, Durham. https://doi.org/10.1215/9780822373780

[36] Garnet Hertz. 2023. *Art + DIY Electronics*. The MIT Press, Cambridge, MA. https://doi.org/10.7551/mitpress/ 9324.001.0001 Series Foreword, Leonardo.

[37] Sarah Homewood, Amanda Karlsson, and Anna Vallgårda. 2020. Removal as a Method: A Fourth Wave HCI Approach to Understanding the Experience of Self-Tracking. In *Proceedings of the 2020 ACM Designing Interactive Systems Conference* (Eindhoven, Netherlands) (DIS '20). Association for Computing Machinery, New York, NY, USA, 1779–1791. https://doi.org/10.1145/3357236.3395425

[38] Kristina Höök, Steve Benford, Paul Tennent, Vasiliki Tsaknaki, Miquel Alfaras, Juan Martinez Avila, Christine Li, Joseph Marshall, Claudia Daudén Roquet, Pedro Sanches, et al. 2021. Unpacking non-dualistic design: The soma design case. *ACM Transactions on Computer-Human Interaction* (TOCHI) 28, 6 (2021), 1–36.

[39] Tisha Hupkes and Anders Hedman. 2022. Shifting towards non-anthropocentrism: In dialogue with speculative design futures. *Futures* 140 (June 2022), 102950. https://doi.org/10.1016/j.futures.2022.102950

[40] Kristina Höök. 2018. *Designing with the Body: Somaesthetic Interaction Design*. The MIT Press, Cambridge, Massachusetts.

[41] Mélodie Jacob, Ida Damen, and Carine Lallemand. 2023. Exploring the Embodied Experience of Walking Meetings through Bodystorming – Implications for Design. In *Proceedings of the Seventeenth International Conference on Tangible, Embedded, and Embodied Interaction* (Warsaw, Poland) (TEI '23). Association for Computing Machinery, New York, NY, USA, Article 24, 14 pages. https://doi.org/10.1145/3569009.3572795

[42] Sylvia Janicki, Shubhangi Gupta, and Nassim Parvin. 2025. Reflexive Data Walks: Cultivating Feminist Ethos through Place-Based Inquiry. *Proc. ACM Hum.-Comput. Interact.* 9, 2, Article Cscw156 (May 2025), 28 pages. https://doi.org/10.1145/3711054

[43] Alice Kolb and David Kolb. 2018. Eight important things to know about The Experiential Learning Cycle. In *Experience Based Learning Systems, ACEL National Conference* 2018, Vol. 40.

[44] Alice Y. Kolb and David A. Kolb. 2022. Experiential Learning Theory as a Guide for Experiential Educators in Higher Education. *Experiential Learning and Teaching in Higher Education* 1, 1 (Sept. 2022), 38. doi:10.46787/elthe.v1i1.3362

[45] Fabio La Rocca. 2017. *A Theoretical Approach to the Flâneur and the Sensitive Perception of the Metropolis*. Sociétés 135, 1 (2017), 9–17.

[46] Bruno Latour. 1987. *Science in Action: How to Follow Scientists and Engineers Through Society*. Harvard University Press.

[47] Bruno Latour. 2007. *Reassembling the social: An introduction to actor-network-theory*. Oxford University Press.

[48] Zsofia Levai. 2025. Soft Interface Sculpture: Participatory Social Crafting Through Project Kaláka. In *Proceedings of the Extended Abstracts of the CHI Conference on Human Factors in Computing Systems* (CHI EA '25). Association for Computing Machinery, New York, NY, USA, Article 747, 5 pages. https://doi.org/10.1145/3706599.3721174

[49] Makayla Lewis, Miriam Sturdee, Jason Alexander, Jelle Van Dijk, Majken Kirkegård Rasmussen, and Thuong Hoang. 2017. SketchingDIS: Hand-drawn Sketching in HCI. In *Proceedings of the 2017 ACM Conference Companion Publication on Designing Interactive Systems* (Edinburgh, United Kingdom) (DIS '17 Companion). Association for Computing Machinery, New York, NY, USA, 356–359. https://doi.org/10.1145/3064857.3064863

[50] Wenhao Y. Luebs, Garreth W. Tigwell, and Kristen Shinohara. 2024. Understanding Expert Crafting Practices of Blind and Low Vision Creatives. In *Extended Abstracts of the CHI Conference on Human Factors in Computing Systems* (Ho-

nolulu, HI, USA) (CHI EA '24). Association for Computing Machinery, New York, NY, USA, Article 346, 8 pages. https://doi.org/10.1145/3613905.3650960

[51] Amy Melniczuk, Meng Liang, and Julian Preissing. 2025. Exploring Tangible Designs to Improve Interpersonal Connectedness in Remote Group Brainstorming. In *Proceedings of the Nineteenth International Conference on Tangible, Embedded, and Embodied Interaction* (TEI '25). Association for Computing Machinery, New York. NY, USA, Article 26, 14 pages. https://doi.org/10.1145/3689050.3704933

[52] Josh Aaron Miller, Kutub Gandhi, Matthew Alexander Whitby, Mehmet Kosa, Seth Cooper, Elisa D. Mekler, and Ioanna Iacovides. 2024. A Design Framework for Reflective Play. In *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (CHI '24). Association for Computing Machinery, New York, NY, USA, Article 519, 21 pages. https://doi.org/10.1145/3613904.3642455

[53] Dawn Nafus and Jamie Sherman. 2014. This One Does Not Go Up to 11: The Quantified Self Movement as an Alternative Big Data Practice. *International Journal of Communication* 8 (2014), 11.

[54] Hye Yeon Nam, JaNiece Campbell, Brendan Harmon, and Andrew M Webb. 2025. FloraWear: Crafting Living Wearables with Sustainable Materials. In *Proceedings of the Extended Abstracts of the CHI Conference on Human Factors in Computing Systems* (CHI EA '25). Association for Computing Machinery, New York, NY, USA, Article 729, 6 pages. https://doi.org/10.1145/3706599.3721188

[55] Iohanna Nicenboim, Marie Louise Juul Søndergaard, Joseph Lindley, Anuradha Reddy, Yolande Strengers, Johan Redström, and Elisa Giaccardi. 2024. Unmaking-with AI: Tactics for Decentering through Design. *ACM Trans. Comput.-Hum. Interact.* 31, 6, Article 82 (Dec. 2024), 20 pages. https://doi.org/10.1145/3685275

[56] Claudia Núñez Pacheco and Anton Poikolainen Rosén. 2024. Articulating Felt Senses for More-Than-Human Design: A Viewpoint for Noticing. In *Proceedings of the 2024 ACM Designing Interactive Systems Conference* (Copenhagen, Denmark) (DIS '24). Association for Computing Machinery, New York, NY, USA, 1029–1043. https://doi.org/10.1145/3643834.3661554

[57] Andrea Olmedo. 2022. Procesos de mediación artística y sociotecnológica en la cocreación de sistemas comunicativos locativos disruptivos y comunitarios (Artistic and sociotechnological mediation processes in the co-creation of disruptive and community-based locative communication systems). Ph. D. Dissertation. Universidade de Évora.

[58] Dan O'Sullivan and Tom Igoe. 2004. *Physical Computing: Sensing and Controlling the Physical World with Computers.* Thomson Course Technology, Boston. ISBN-10: 1-59200-346-X.

[59] Mario O. Parra, Luis A. Castro, and Jesus Favela. 2023. Enhancing Well-being Through Food: A Conversational Agent for Mindful Eating and Cooking. In *Adjunct Proceedings of the 2023 ACM International Joint Conference on Pervasive and Ubiquitous Computing & the 2023 ACM International Symposium on Wearable Computing* (Cancun, Quintana Roo, Mexico) (UbiComp/ISWC '23 Adjunct). Association for Computing Machinery, New York, NY, USA, 423–427. https://doi.org/10.1145/3594739.3610732

[60] Sebastian Prost, Vasilis Ntouros, Gavin Wood, Henry Collingham, Nick Taylor, Clara Crivellaro, Jon Rogers, and John Vines. 2023. Walking and Talking: Place-based Data Collection and Mapping for Participatory Design with Communities. In *Proceedings of the 2023 ACM Designing Interactive Systems Conference* (Pittsburgh, PA, USA) (DIS '23). Association for Computing Machinery, New York, NY, USA, 2437–2452. https://doi.org/10.1145/3563657.3596054

[61] Fran Quiroga and Andrea Olmedo. 2016. Ruraldecolonizado. Caminando por pluralismos epistemológicos (Rural Decolonization: Moving Through Epistemological Pluralisms). *Convocatoria Laboratorio* 987 (2016).

[62] Courtney N. Reed, Adan L. Benito, Franco Caspe, and Andrew P. McPherson. 2024. Shifting Ambiguity, Collapsing Indeterminacy: Designing with Data as Baradian Apparatus. *ACM Trans. Comput.-Hum. Interact.* 31, 6, Article 73 (Dec. 2024), 41 pages. https://doi.org/10.1145/3689043

[63] Courtney N. Reed, Landon Morrison, Andrew P. McPherson, David Fierro, and Atau Tanaka. 2024. Sonic Entanglements with Electromyography: Between Bodies, Signals, and Representations. In *Proceedings of the 2024 ACM Designing Interactive Systems Conference* (Copenhagen, Denmark) (DIS '24). Association for Computing Machinery, New York, NY, USA, 2691–2707. doi:10.1145/3643834.3661572

[64] Courtney N. Reed, Paul Strohmeier, and Andrew P. McPherson. 2023. Negotiating Experience and Communicating Information Through Abstract Metaphor. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (Hamburg, Germany)* (CHI '23). Association for Computing Machinery, New York, NY, USA, Article 185, 16 pages. doi:10.1145/3544548.3580700

[65] Catarina Reis and Mónica Mendes. 2025. Still Life Ecologies: Co-creating the representation of plants. In *Proceedings of the Nineteenth International Conference on Tangible, Embedded, and Embodied Interaction* (TEI '25). Association for Computing Machinery, New York, NY, USA, Article 112, 4 pages. https://doi.org/10.1145/3689050.3707687

[66] Andrea Resmini, Dan Klyn, Bertil Lindenfalk, Miriam Tedeschi, Daniel Szuc, and Josephine Wong. 2024. A Danish Blend: The Copenhagen Walkshop. In *Companion Publication of the 2024 ACM Designing Interactive Systems Conference* (IT University of Copenhagen, Denmark) (DIS '24 Companion). Association for Computing Machinery, New York, NY, USA, 392–395. https://doi.org/10.1145/3656156.3658394

[67] Alexandra Teixeira Riggs, Sylvia Janicki, Tim Moesgen, Noura Howell, and Karen Anne Cochrane. 2025. Queer/Crip Body Mapping: Expressing Dynamic Bodily Experiences with Data. In *Proceedings of the 2025 ACM Designing Interactive Systems Conference* (DIS '25). Association for Computing Machinery, New York, NY, USA, 2884–2900. https://doi.org/10.1145/3715336.3735438

[68] Jessica Rizk and Anton Birioukov. 2017. Following the Flâneur: The Methodological Possibilities and Applications of Flânerie in New Urban Spaces. *The Qualitative Report* (Dec. 2017). https://doi.org/10.46743/2160-3715/2017.2913

[69] Nihar Sabnis, Dennis Wittchen, Gabriela Vega, Courtney N. Reed, and Paul Strohmeier. 2023. Tactile Symbols with Continuous and MotionCoupled Vibration: An Exploration of using Embodied Experiences for Hermeneutic Design. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems* (Hamburg, Germany) (CHI '23). Association for Computing Machinery, New York, NY, USA, Article 688, 19 pages. https://doi.org/10.1145/3544548.3581356

[70] Pedro Sanches, Noura Howell, Vasiliki Tsaknaki, Tom Jenkins, and Karey Helms. 2022. Diffraction-in-action: Designerly Explorations of Agential Realism Through Lived Data. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems* (New Orleans, LA, USA) (CHI '22). Association for Computing Machinery, New York, NY, USA, Article 540, 18 pages. https://doi.org/10.1145/3491102.3502029

[71] Donald A. Schön. 2017. *The Reflective Practitioner.* Routledge. https://doi.org/10.4324/9781315237473

[72] Marja Schuster. 2013. Hermeneutics as Embodied Existence.

*International Journal of Qualitative Methods* 12, 1 (Feb. 2013), 195–206. https://doi.org/10.1177/ 160940691301200107

[73] Richard Shusterman. 2008. *Body Consciousness: A Philosophy of Mindfulness and Somaesthetics*. Cambridge University Press.

[74] Katta Spiel. 2021. The Bodies of TEI – Investigating Norms and Assumptions in the Design of Embodied Interaction. In *Proceedings of the Fifteenth International Conference on Tangible, Embedded, and Embodied Interaction* (Salzburg, Austria) (TEI ’21). Association for Computing Machinery, New York, NY, USA, Article 32, 19 pages. https://doi.org/10.1145/3430524.3440651

[75] Miriam Sturdee and Joseph Lindley. 2019. Sketching & Drawing as Future Inquiry in HCI. In *Proceedings of the Halfway to the Future Symposium* 2019 (Nottingham, United Kingdom) (HTTF ’19). Association for Computing Machinery, New York, NY, USA, Article 18, 10 pages. https://doi.org/10.1145/3363384.3363402

[76] Melanie Swan. 2013. The Quantified Self: Fundamental Disruption in Big Data Science and Biological Discovery. *Big Data* 1, 2 (June 2013), 85–99. https://doi.org/10.1089/big.2012.0002

[77] Alex S. Taylor, Siân Lindley, Tim Regan, David Sweeney, Vasillis Vlachokyriakos, Lillie Grainger, and Jessica Lingel. 2015. Data-in-Place: Thinking through the Relations Between Data and Community. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (Seoul, Republic of Korea) (CHI ’15). Association for Computing Machinery, New York, NY, USA, 2863–2872. https://doi.org/10.1145/2702123.2702558

[78] Vasiliki Tsaknaki, Madeline Balaam, Anna Ståhl, Pedro Sanches, Charles Windlin, Pavel Karpashevich, and Kristina Höök. 2019. Teaching Soma Design. In *Proceedings of the 2019 on Designing Interactive Systems Conference* (San Diego, CA, USA) (DIS ’19). Association for Computing Machinery, New York, NY, USA, 1237–1249. https://doi.org/10.1145/3322276.3322327

[79] Laia Turmo Vidal, Yinchu Li, Martin Stojanov, Karin B Johansson, Beatrice Tylstedt, and Lina Eklund. 2023. Towards Advancing Body Maps as Research Tool for Interaction Design. In *Proceedings of the Seventeenth International Conference on Tangible, Embedded, and Embodied Interaction* (Warsaw, Poland) (TEI ’23). Association for Computing Machinery, New York, NY, USA, Article 20, 14 pages. https://doi.org/10.1145/3569009.3573838

## Contact

**Meeting Point**
University of Bordeaux - Campus Pey-Berland
35 Pl. Pey Berland, 33000 Bordeaux, France

**Contact**
In case of emergency, dial 112

*approximate schedule*

| *Time* | *Activity* |
|---|---|
| 09:00 - 10:00 | **Introduction** |
| 10:00 - 10:15 | Walk to location for "Sight" |
| 10:15 - 11:15 | **Sight** |
| 11:15 - 11:30 | Walk to location for "Touch" |
| 11:30 - 12:30 | **Touch** |
| 12:30 - 12:45 | Walk to to location for "Taste" |
| 12:45 - 14:00 | **Taste** with Lunch |
| 14:00 - 14:15 | Walk to location for "Sound" |
| 14:15 - 15:15 | **Sound** |
| 15:15 - 15:30 | Walk to location for "Smell" |
| 15:30 - 16:30 | **Smell** |
| 16:30 - 17:00 | **Closing** |
| 17:00 - | Optional Dinner |

## Sensors & Kit

Each sensor is connected to a Feather microcontroller and you can use a potentiometer and LED to move through the sensor.

"Sight" sensors
- APDS-9960 - Light, colour, IR Proximity & Gesture Sensor

"Touch" sensors
- Seesaw I2C Soil Sensor
- Square Force Sensitive Resistor Sensor

"Taste" sensors
- Pulse Sensor
- pH paper strips

"Sound" sensors
- AGC Mic Amp

"Smell" sensors
- SGP30 MOX Gas Sensor TVOC and eCO2 Sensor
- BME280 Temperature, Humidity+Barometric Pressure Sensor

Feedback
- Neopixel LED Rings
- Vibration Motor

## Materials

You have at your disposal:
- Additional booklet pages
- Body maps/stencils
- Colored pencils, pens, markers
- Tape and glue sticks
- Construction paper
- Scrap fabric and material
- Stickers and sticky notes

Consider materials from your environment (just be careful to not disturb other beings as you do!):
- Fallen leaves and flowers
- Tiny shiny bits
- Natural colors and dyes

## Experiences

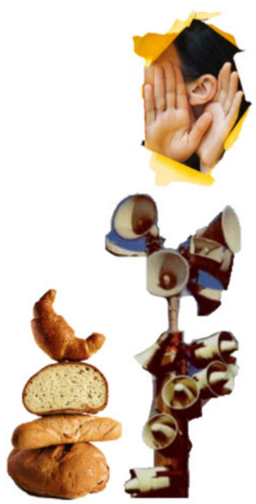
**Sight**
To observe the surroundings along with the presence of people and natural elements with mindfulness and focus

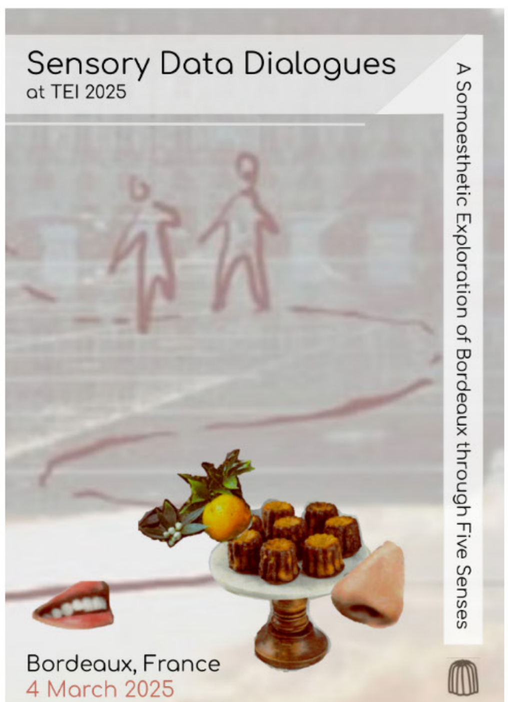
**Touch**
To explore and feel the textures, temperatures along with awareness of the subtle changes and vibrations in the environment

**Taste**
To pause and taste flavours with textures, chew and notice the crunch, slurp and feel the sauce temperatures, indulging in mindful eating

**Sound**
To listen with mindfulness and differentiate between the human made noise to natural sounds and perceive the unique auditory experiences

**Smell**
To notice the various scents and their impact on other senses observing how scents affect our mood, space, and comfort





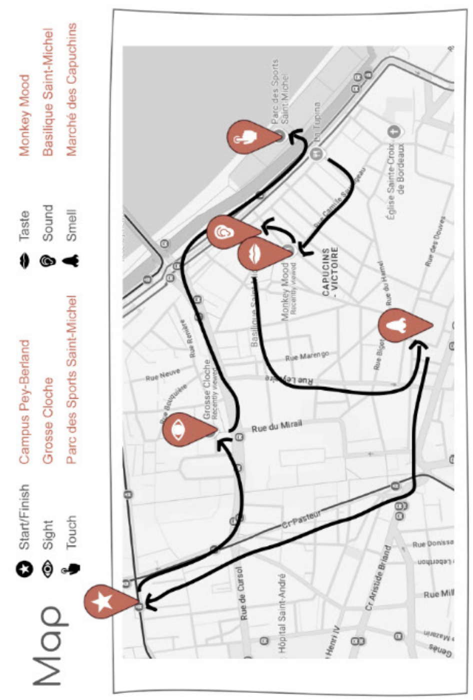

## Who am I?

Who does this booklet belong to?

My name is ______________________

I am...

## Map



# Appendix B: Sensory Portfolio Template

*(suggested seeding for page)*

cut here



*provocations for noticing*

Experiences

Sight

Touch

Taste

Sound

Smell

*non-electronic materials*

Materials

*electronic materials*

Sensors & Kit

*walkaround logistics and safety info*

Contact

*extra space*

*title page*

*personality provocations & reflection*

Who am I?

Who does this booklet belong to?

My name is ______________________

I am...

*walkaround map & sense locations*

Map