Designing for Microbreaks: Unpacking the Design Journey of Zenscape

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ABSTRACT

This research aims to support positive wellbeing by encouraging people to take regular microbreaks from continuous on-screen work. We present *Zenscape*, an innovative tangible system that offers subtle reminders to engage in non-work related creative micro activities, through the stirring water action and sound. *Zenscape* integrates the ideologies of the Zen garden philosophy in its design and features a mini Zen garden consisting of sand and stones, and a water cup with a stirrer, all offering multiple micro activities for the user to get an escape from their work. Unlike time management apps, we do not target productivity, but rather focus on making the most of the microbreaks. We present a descriptive account of how we brought *Zenscape* into being through a conceptual framing of *Diversion, Destination, Play* and *Return*. We hope that our design reflections will inspire future systems on microbreaks beyond reminder and notification systems.

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Authors Keywords

Microbreaks, Zen garden, wellbeing

CSS Concepts

• Human-centered computing • Human computer interaction (HCI) • Interaction systems and tools

INTRODUCTION

Today, screens have become an integral part of our lives. Most of us spend long hours in front of screens for work and pleasure. With COVID-19 and work-from-home necessities, there has been a further increase in the screentime [45,70]. This increased screen time, however, can have potentially significant effects on one's mental, physical and social well being [16,41]. For instance, issues like screen fatigue, asthenopia, and insomnia are often attributed to increased screen use [19]. To deal with this issue, experts recommend taking frequent microbreaks from and after continuous work for recovery [12,61].

Microbreaks are brief periods that individuals spend on non-work related activities such as drinking water, doing stretching exercises, browsing the internet, listening to music and socializing with others [5]. On the outset, microbreaks could appear as a potential disruption to the ongoing work activity. However, studies have shown that microbreaks are, in fact, helpful to restore focus [34,61] and self-initiated micro-breaks can provide the necessary disengagement from work just in time of need, and can contribute to one's well being, performance and recovery [35,62].

However, despite the known benefits of microbreaks, practicing them, in reality, is challenging, and little is known about how to utilise them properly. Most of the work so far has been done primarily on reminding users to take a microbreak, but lesser exploration has happened on the actual microbreak itself. For example, many smartphone apps make use of the popular Pomodoro technique [11] to encourage a microbreak after a sustained period of work. Companies like Apple and Google have introduced screen time tracking apps on their devices to help users understand their screen usage and to guide them in limiting the screen time if and when required [52]. Moreover, websites like E.ggtimer [39] allow users to set their own countdown timers to schedule their work tasks while Stand Up! [74] is a flexible work-break timer that alerts users to stand up and take a break periodically. Within academia, researchers have also designed tangible systems [7,25,26,60,71] to encourage physical fitness activities during microbreaks in an office setting. Some works have also looked into physiological sensors to monitor individuals' cognitive load and to prompt breaks when necessary [4,29,30]. Although these methods of time and work management are well intentioned, they also

do appear as patronising and restrictive [6] and in situations, they could inhibit one's ability to get into a flow state [40]. Moreover, these works primarily focus on productivity rather than the quality of microbreaks which this research specifically aims to address.

This research aims to uncover and develop a more nuanced understanding of how to design technologies to not only encourage people to take regular microbreaks but also to help them in making the most of the microbreaks. We present *Zenscape*, a novel tangible system that subtly reminds individuals to take micro breaks and offers them a variety of activities to explore during those microbreaks. The design of *Zenscape* is inspired by the Japanese Zen garden [15], while the activities are guided by four foundational recovery experiences of relaxation, mental detachment, positive challenge, and feelings of being in control [63].

In this pictorial, we offer a descriptive account of the design and making of *Zenscape* and illustrate the strategies and challenges we faced along the way. Unfolding of the design process is a crucial activity to understand the chain of reasoning that leads to a final artifact and to populate the intermediate space between the particular artifact and general theory [43]. To this end, we draw designers' attention to four key aspects of microbreak systems, namely *Diversion, Destination, Play* and *Return*. We hope that these design aspects are useful for designers and TEI researchers in creating more meaningful microbreak systems and contribute to the discussion on the design-oriented forms of knowledge production in the HCI community [2,3].

ZENSCAPE

Zenscape stands for Zen Escape, i.e., offering a brief escape to the Zen garden. *Zenscape* is a portable tangible system (see Figure 1) designed to encourage people to take regular microbreaks from their screen based work. Zen Buddhism [46] encourages the practice of approaching and experiencing things thoroughly with a calm mind and through simple and practical activities in everyday life [24]. *Zenscape* draws on this practice to give individuals a momentary escape from their work routine and provides the flexibility to explore micro-activities of their interests in those moments.

Zenscape features the following components:

(1) A water cup with a stirrer that reminds the user to take a microbreak through a subtle stirring sound and stirring water action. The cup is made up of glass while the stirrer is made up of bamboo and has a magnetic stir bar [75] attached to its bottom. The stirring action is controlled by an ESP32 microcontroller, 12V DC Fan and 2 high strength neo magnets. This hardware assembly is concealed in the bottom enclosure, made up of cement.

(2) A miniature Zen garden featuring white sand, rocks and a small succulent plant along with drawing accessories such as a raking tool made up of bamboo.

(3) A resting dock made up of clay to place the stirrer.

Figure 1: Zenscape offers subtle reminders to engage in non-work related creative micro activities, through the stirring water action and sound.

Scenario Of Use:

At the start of the day, the user sets up a time interval for taking micro breaks that can vary between 30 mins to 1 hour. (In the current prototype, the time interval is set by the research team to be 30 mins.) The user then switches on the *Zenscape* by connecting it to the power supply, and continues with their work routine. *Zenscape* will work in the periphery and will remind the user to take microbreaks at the set interval through the stirring water action and sound. For every reminder, the user can decide whether to take the break or not. If they decide to take the break, they can interact with *Zenscape* in different ways. For example, they can scribble or write in the sand canvas using the provided raking tool, or they can play Tic-Tac-Toe with pebbles, or water the plant.

Users are also free to do any other activity during these microbreaks. There is no timer to suggest the end of the microbreak, and the user is free to decide when to finish the activity. However, given that most of the prescribed micro activities are simple and can be done in a short amount of time, we expect microbreaks to last for not more than 5 minutes. Irrespective of the time spent in a microbreak, the system will again remind the user to take another microbreak at the set interval.

Drawing inspiration from earlier works such as SWAN [33], Brad the Toaster [76] and FoBo [31], *Zenscape* aims to create a symbiotic relationship with the user as their companion and not as their coach. *Zenscape* respects individuals' well being and can be adapted to individuals' work routine. So if the user is in the flow state and does not want to be disturbed by the stirring sound, they could simply take the stirrer out from the cup and place it on the resting dock to activate the "do not disturb" mode.

MAKING OF ZENSCAPE

We employed Constructive design approach [37] to develop *Zenscape*, where the need to design was guided by the gap formulated from the existing literature on the reminder systems for microbreaks. Constructive design is a variation of the research-through-design [73] that gives more focus to the making, and highlights the need to discuss the iterative and messy design process that generates insights along the way and feeds back into the continuation of the design process [37]. The knowledge produced is in the form of descriptions and explanations of the designed artefacts and the process of making them (ibid). These insights then serve as inspirations for industry, opening up new possibilities for future design work [22].

When we started ideating over the design of a microbreaks system, we asked ourselves the following questions:

(Q1) How should we divert peoples' attention from onscreen work related tasks or in other words, how should we notify users to take microbreaks?

(Q2) Where should we divert the user's attention? What should be the point of interest or destination?

(Q3) What should the user do when he/she decides to take a microbreak? What activities should be offered and what should be the duration of engagement?

(Q4) How should a user transit back to work after taking a microbreak? Should the system notify the end of microbreak

(Q5) Should we keep track of the number of microbreaks taken by the user everyday?

There were no easy and immediate answers to these questions. When we looked at the prior literature, we found that most works primarily focus on Q1 [50,54,57] and Q5 [11,30] while Q2-Q4 have rarely been discussed. Therefore, answering these questions also involved constant discussions amongst the research team, design explorations, failed as well as successful development trials and in-house testing over a 5 month period. The design was led by a multidisciplinary team with expertise in the fields of HCI, product design, game design and digital health. Two members of the research team also used the system during the final stages of the design, which helped us determine appropriate levels of sounds caused by the stirring action and to determine the cup dimensions. Each design decision unfolded sequentially and was guided by the previous choice. We reflect on our journey in the form of four design themes, namely *Diversion, Destination, Play* and *Return* that we discuss next (see Figure 2).

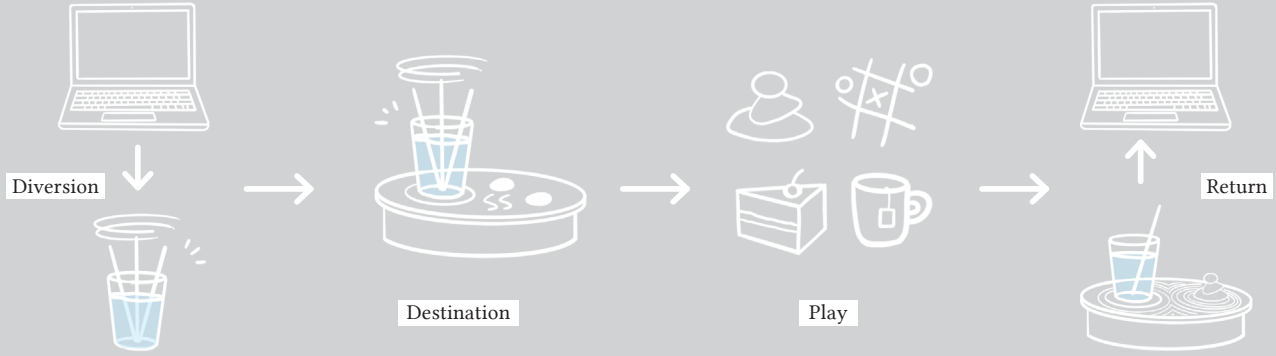


Figure 2: We explored the design of *Zenscape* across four key aspects: *Diversion, Destination, Play and Return.*

1) DIVERSION: CREATING DIVERSION FROM ONSCREEN WORK

The first important design aspect of any microbreaks system is the *Diversion* mechanism. A diversion is nothing but a trigger or a notification to switch users' attention from the primary onscreen work to a secondary non-work related task [13]. To design notification for diversion, the crucial challenge is to balance the subtleness with the effectiveness of the notification, while ensuring that the diversion remains momentary and does not turn into a disruption.

While designing *Zenscape*, we initially considered making the diversion purely digital, like a smartphone based notification that encourages users to take a break through on-screen prompts (as seen in Figure 3.a). However, we realised that a digital diversion might not be appropriate as it would not distance the user from the source of distractions, i.e. the screen [9] and could be easily ignored [44].

Instead, we thought of implementing a diversion mechanism through ambient sounds. Existing literature on sonic interaction design [21,55,67] reports the effectiveness of sound or sonic artifacts in creating subtle, aesthetic and embodied experiences [36,55,67], and as notification mechanism [1]. While selecting sounds, we focussed on distinctiveness and familiarity to minimise the learning curve. At first, we considered using digital sounds and playing them on external speakers (as seen in Figure 3.b), however they felt a little intrusive and most importantly they did not offer any visual feedback. To overcome this limitation, we decided to use mechanical methods of producing sounds. Our reasoning behind this was to give users visual feedback on action so that in case they do not hear the sound, they can at least see the mechanical action happening in the periphery of their attention.

Drawing inspiration from earlier works on multimodal ambient systems such as SensaBubble [59], NotiFall [23], Heart Waves [18] and TastyBeats [32], we first thought of using bubble sound. We tried to create such a sound using an immersible water pump as shown in Figure 3.c. The overall design and the bubbling sound however felt inconvenient for the work setting, when two of our team members used it in situ. So we turned our attention to stirring sounds (see Figure 3.d), which we commonly hear in homes or cafes when we are mixing any drink, coffee or tea. Stirring sound was perfect for us as it was aesthetically pleasing to hear and contextually appropriate. However, we needed a mechanism to automate the process of stirring and improve its visual appeal. Both these actions required multiple explorations and trials, which we cover next.

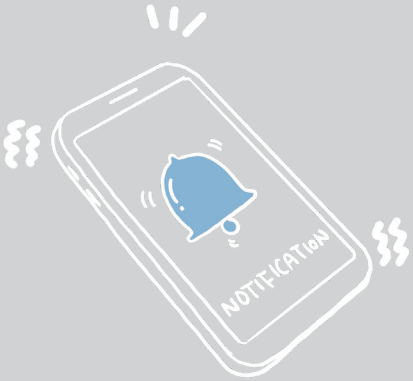


Figure 3.a: Creating diversion on smartphones may not distance users from the source of distraction i.e. screen.

Figure 3.b: Playing digital sounds through external speakers offered no visual feedback.

Figure 3.c: Sound of the water bubble was familiar and noticeable but the setup was clumsy.

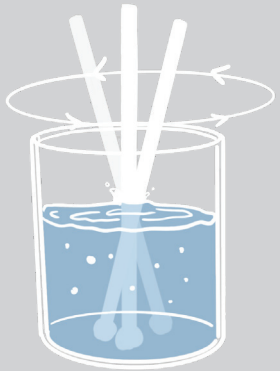


Figure 3.d: Finally we settled on stirring based sounds as it was familiar and aesthetically pleasing.

Designing The Stirring Mechanism:

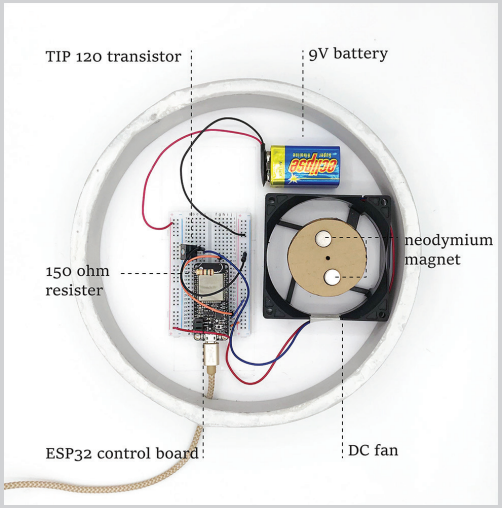


Figure 4.a: The underlying hardware assembly to control the stirring action.

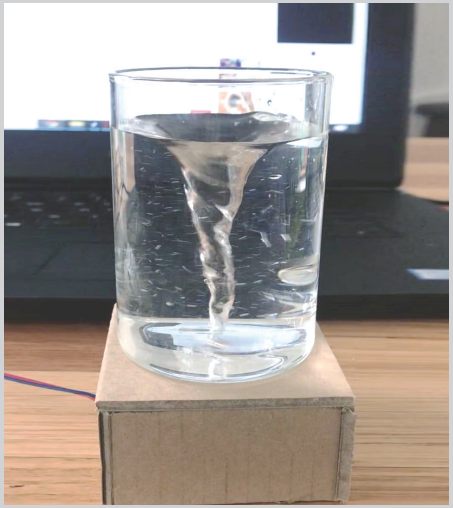


Figure 4.b: The magnetic stirrer can produce a vivid tornado effect with a stir bar but the produced sound was not loud enough.

Figure 4.c: Addition of metal rod increased the sound volume but sound was not consistent.

Figure 4.d: We finally decided to use a stir bar along with a wooden stirrer that produced decent quality sound consistently.

We explored the stirring mechanism using a magnetic stirrer [69] - a device widely used for stirring or mixing a solution in chemistry labs. A magnetic stirrer utilizes a rotating magnetic field to cause a stir bar immersed in a liquid to spin very quickly and thus causing the stirring action. A stir bar is a small magnet wrapped inside a food grade plastic capsule, which aids in the stirring action. We were fascinated by the simplicity and subtleness of a magnetic stirrer [69], besides, such stirring action can also produce a vivid tornado effect in the water (see Figure 4.b) that we thought could also serve as a visual reminder for microbreaks. However, commercial magnetic stirrers are costly and difficult to customise, hence we decided to make one by ourselves following online DIY videos [64].

Having understood the magnetic stirrer mechanism, we first designed the base assembly consisting of motors and magnets. We initially thought of using a brushless DC motor that can hold the magnets and drive the magnetic stirring mechanism. However, such motors are generally costly. Therefore, we decided to use a DC fan that served our purpose while also saving the cost. We utilized a 12V DC fan and made a circular platform out of cardboard and placed two small high strength neodymium magnets side by side in the center of the cardboard. These two high strength magnets attract the magnetic stirring bar in the cup, so when the fan is spinning, the stirring bar will follow the motion to create the stirring effect. In terms of controlling the entire mechanism and powering it, we used an ESP32 control board and 9V external battery as shown in Figure 4.a.

During in-house testing and trials, we found that although the tornado effect was appealing to look at, the produced sound was not loud enough. We were also concerned that users may accidentally swallow the magnet if they decide to drink water from the cup or they may lose it while cleaning the cup. To overcome these concerns, we added a metal rod to the design (see figure 4.c) that can be rotated using the base magnets and that while stirring, can produce a louder sound by hitting the walls of the cup. For the stirring to happen correctly without a stir bar or magnet, we had to bend the bottom part of the stirrer to increase the contact area with the magnets mounted underneath. However, this experiment did not work well as the wire was too thin, which could not produce a smooth spin that we were looking for. We could have used heavier metal wires but we were afraid that it might break the cup after continuous stirring. Instead, we decided to use the commercial stir bar (6mm x 20mm) [75].

To increase the visual appeal, we also used a wooden stirrer that can securely hold the stir bar. When the stirrer spins, it regularly hits the glass, making a charming sound (see Figure 4.d). However, this mechanism did not produce the vivid tornado effect during stirring, but it made the design safer to use.

Enhancing The Visual Appeal Of Stirring:

Figure 5.a: We first considered 'a waving hand' look for the stirrer to invite the user's attention.

Figure 5.b: We also tried using herb-based stirrer to add fragrance and flavour to the water.

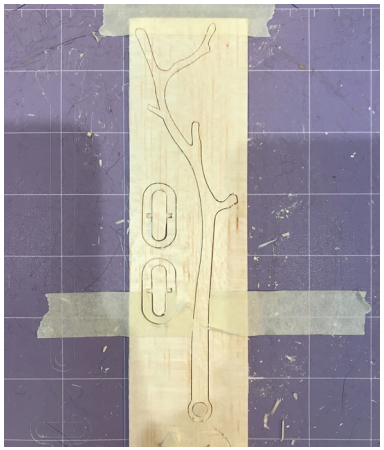


Figure 5.c: We used a Cricut machine to cut balsa wood in an organic twig shape.

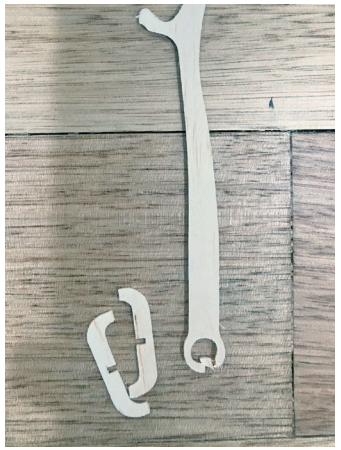


Figure 5.d: We found that Balsa wood can break easily, hence we discarded it.

Figure 5.e: Finally we settled on the laser-cut bamboo twig as the stirrer and used tung-oil to waterproof it.

After deciding to use the stir bar, we next focussed on the design of the stirrer to enhance the visual appeal of the stirring action. Our initial idea was to give it a hand-like shape (see Figure 5.a), so that when the stirrer rotates, it gives the impression that someone is waving a hand to invite attention. However, we dropped this idea as it looked artificial and unrelated to Zen garden philosophy, which we cover in next Section.

We instead decided to give an organic twig-like form to the stirrer to create the scenery of walking around the lake, where we may see a dead twig fallen in the lake with only a part of it visible on the surface. This scene symbolizes the impermanence of life and the beauty of imperfection, which resonated with our understanding of Zen garden.

We found that production of sound was dependent upon different factors such as material of the stirrer, material of the cup and amount of water in the cup. We aimed at creating a soothing sound, hence we carefully chose the material of the stirrer. For instance, we initially tried iron rods (See Figure 5.a) to create sound, however the sound generated was sharp and not soothing.

We also explored the use of edible materials like aromatic herbs or non-toxic plant material such as lavender, rosemary, mint, or any non-toxic wooden twig (see Figure 5.b), which may be easy to collect from the home garden. Using aromatic herbs as a stirrer has the benefit of generating aroma and adding flavors to the water, which we thought may encourage more water intake. However, we discarded the herb idea due to hygiene and maintenance issues. We then tried to use balsa wood as it can be easily cut by hand or with any craft cutting machine like Cricut (see Figure 5.c). Since the stirrer will be immersed in water for long hours, we also considered the issues around water absorption and durability of material. During testing, we found that balsa material was less durable and was easy to break, hence we looked for other wood types (see Figure 5.d). In the final version, we used bamboo as the stirrer material. Since the stirrer will be immersed in water for long hours, we also considered the issues around water absorption and durability of material. To address this issue, we applied a coating of the organic tung oil on the stirrer to make it waterproof, as shown in Figure 5.e.

During testing, we found that the stir bar could easily slip out from the bamboo stirrer while stirring. Hence, to keep the stir bar intact on the stirrer, we designed a two-piece locking mechanism, as shown in Figure 6.

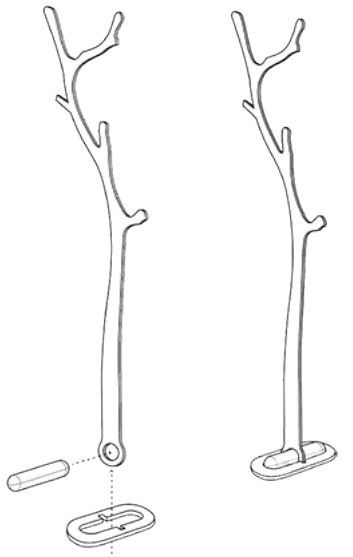


Figure 6: We designed a locking mechanism to safely secure the stir bar (i.e. the magnet) to the stirrer.

Making the feedback noticeable:

During the in-house testing, we also found that different material and size of the cup can produce different sounds during stirring. With the aim of generating noticeable stirring sound, we tested different cups with varying heights. The height of the cup was also an issue in making the stirrer spin correctly. We tried cups of different heights (refer to Figure 7) and found that the flat-bottom cup with height of 11cm and a spinning angle of 70 degree worked well with our design. We also finalised 1 minute as the duration for which the stirrer would rotate to create a subtle yet noticeable diversion.

To conclude, creating an effective diversion using a stirring sound method, requires careful consideration in terms of the choice of material not only for what is being stirred (i.e. the stirrer) but also where it is being stirred (i.e., the cup). Although in the process, designers may need to compromise on certain aspects (such as Tornado effect owing to the safety issues), there are other ways to offer and enhance the visual feedback on stirring action (e.g., using organic twig shape and transparent cup).

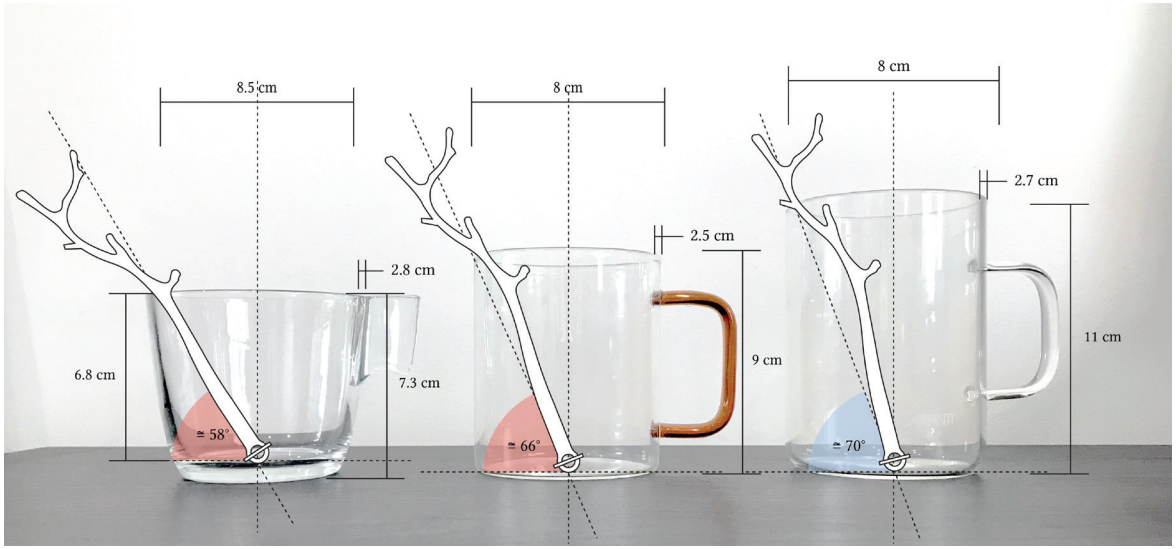
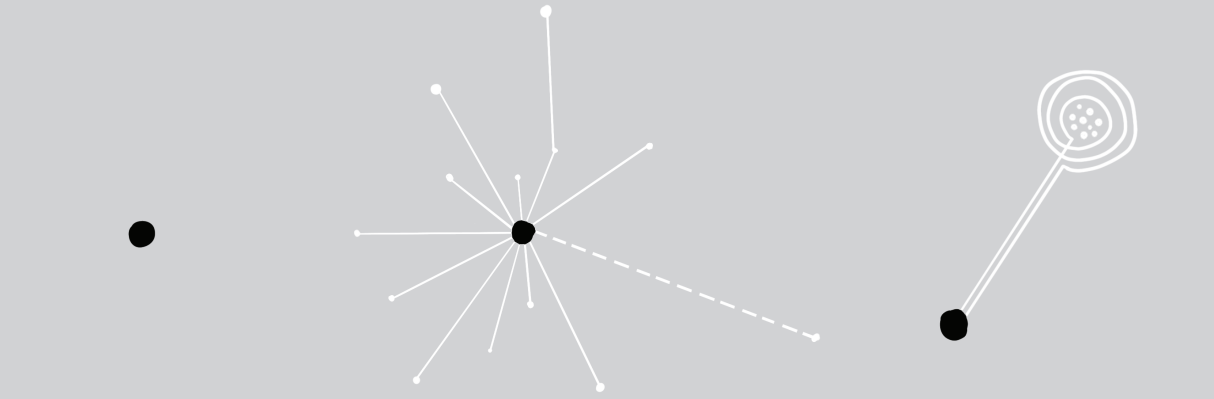


Figure 7: The first two cups did not support a smooth spin of the stirrer, whereas the rightmost cup with height of 11cm and keeping the stirrer at 70 degrees from the centre worked well for our design.



a) Work with no microbreaks

b) Work with scattered microbreaks

c) Work with microbreaks centered around a single point of interest.

Figure 8: Having a singular point of interest allowed us to streamline the microbreaks engagement.

2) DESTINATION: DESIGNING THE POINT OF INTEREST

Once we identify the mechanism for diversion, the next important design consideration is to design the destination to which the user's attention should be diverted.

When we started exploring the idea of a destination, we had discussions about creating a single attention point or multiple attention points. We realised the importance of having a single point of interest when it comes to microbreaks, otherwise users may wander around without any plan. In the absence of any guidance, the activities could be spatially scattered and potentially take a varied amount of time to complete (see Figure 8.b). Having a single point of interest could ensure more stability to microbreaks and smoother transition back to work, hence we aimed at designing a singular attention point (see Figure 8.c).

We thought of designing a destination that could offer momentary relief from on-screen work. We took inspiration from the Japanese Zen garden (karesansui) to develop the diversion destination (refer to Figure 9). The Zen garden is meant to restore one's mind by allowing a view of the idealized nature. A Zen garden typically features a dry landscape stylized with rocks, water features and sand each with specific meanings imbued in them [68]. For instance, the stone may represent mountains or trees or animals. The sand may symbolize a field of water or a waterfall slithering down a mountain [68]. Zen monks also use a rake to draw wavy patterns on the white sand, and by doing this action, they mimic undulating movements of streams. The sand raking creates compelling patterns, not just for the creative pleasures but also as a form of moving meditation similar to Yoga or Tai Chi.

The salutogenic benefits of natural landscapes and elements are widely recognised as aesthetically rewarding [28,66]. Studies suggest that spending time in nature or even merely watching nature sceneries can improve cognitive functioning [58]. Nature also helps to clear the mind from unwanted thoughts and provides opportunities for broader reflection by directing attention to key aspects of life [28], which is needed to make microbreaks restorative and refreshing. As access to natural landscapes or greenery may not be feasible for everyone living and working in dense urban environments, we felt that a miniature zen garden would be a possible indoor alternative to extract the many benefits of Zen garden towards mindfulness and recovery. We also took inspiration from prior HCI works such as Inner Garden [56] and AtmoSPHERE [17] that embeds the concept of Zen garden to create multisensory mixed reality experience for other contexts.

Zen gardens emphasize the principles of naturalness (Shizen), simplicity (Kanso), and austerity (koko), which we tried to embed in our design. We started by designing a blank canvas space in Zenscape and filled it with white sand to create a mini Zen garden for the workspace. We initially considered a pear like shape for the zen garden but finally settled on a round shape as it allowed easy portability and metaphorically represented a central diversion destination (Refer Figure 10). We also added other elements like stones, a small plant and a water cup to create a small Zen garden for the workspace. We adopted both still water (like ponds) and moving water (like waterfall) metaphors in our design through a water cup to represent the different meanings of work and leisure. For instance, still water in Zen garden metaphorically suggests that the universe comes to a stable position after a turmoil. Besides, still water is also important to support reflection and relaxation. In *Zenscape*, water remains still for the duration set by the user thus, allowing users to focus on their work; and then it stirs to notify microbreaks thus, encouraging users to be mobile and work on their inner turmoil (e.g., work related stress).

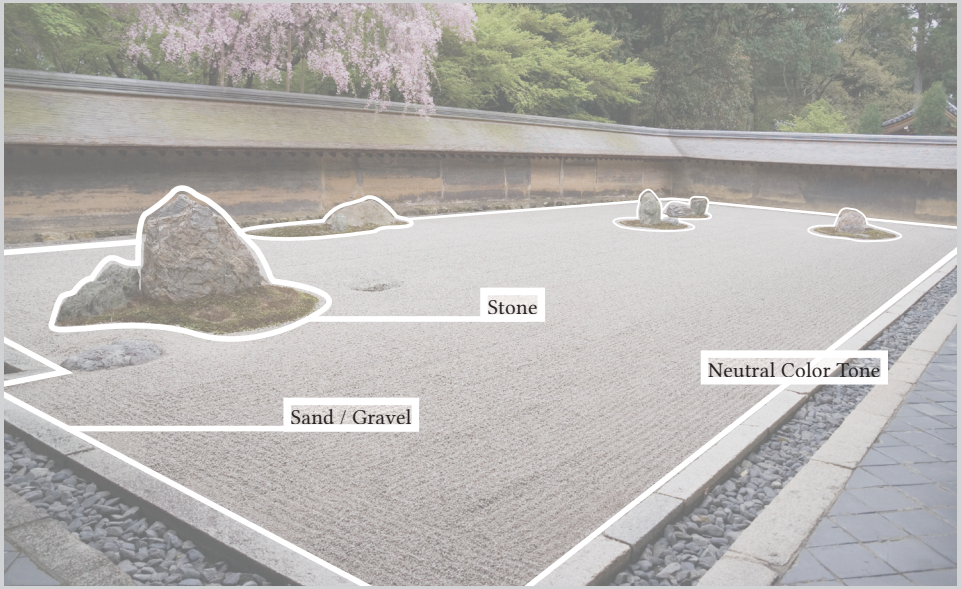


Figure 9: A snapshot of the Zen garden.

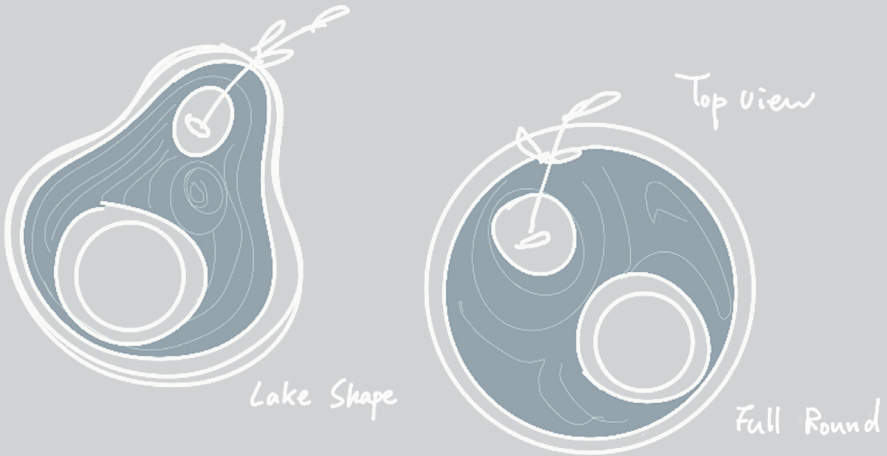


Figure 10: Early sketches of Zenscape also included a pear shape design, however finally chose a circular shape.

Stone art

Raking

Gardening

Snacking

Data logging

Messaging

Figure 11: *Zenscape* features a variety of different micro activities that users can engage with.

3) PLAY: ENGAGING WITH THE ZEN GARDEN

The third key design aspect of our system is *Play*, which describes the addition of micro activities that users can perform during the microbreak. By *Play*, we refer to the voluntary nature of the engagement [42] .

We asked ourselves what kinds of activities would be engaging and enlivening for users to perform in a microbreak, how familiar these activities should be, what should be the duration of these activities, and how many activities to offer. We thought of choosing those activities that are familiar to users so that there should not be a learning curve before starting any activity. These activities should also fit well with the theme of Zen garden. Moreover, these activities also need to be short so that they do not break the flow of the task-at-hand. Finally, these activities should not trigger any strong emotions (positive or negative) which could distract users from their work. In response to these queries, we decided to offer open-ended activities [65] because such activities do not follow any set rules, have no specific time duration and no definite outcome. Also, such activities do not trigger emotions of winning or losing yet still releases the stress. Painting, drawing, sand play and playing with clay are described as open ended activities. We thought that open ended activities are better for microbreaks as users will have the agency to decide the duration of these activities without losing the track of their work.

Taking inspiration from the metaphors of Zen garden, we initially added sand to *Zenscape* to allow sand raking. Then we also added rocks to allow the possibility of stone arrangement art - one of the popular activities performed on beaches. We also added a small air plant to add a little greenery to the Zen garden. *Zenscape* enables playing micro games [47,48] like Tic-Tac-Toe using rocks and sand. Moreover, users can also use the sand canvas as a diary to log their activities or plans. For example, users can log the number of times they have taken breaks or consumed water by scribbling on the sand. Finally, we added a water cup and a small snack tray that users can use to replenish their energy during microbreaks. All the activities are selected based on the four essential aspects of recovery, which include relaxation, mental detachment, positive challenge and feelings of being in control [63]. Figure 11 shows the activities that *Zenscape* offers. The system is also customizable to add more activities. Given that all these activities are non-digital in nature, they offer necessary detox against the constant screenwork.

4) RETURN: DECIDING THE TRANSITION TO WORK

The final aspect is *Return*, which talks about the duration and frequency of microbreaks, and managing the transition from microbreak activity to work.

The existing literature does not suggest a defined duration or frequency of microbreaks that users should take everyday. Microbreaks can be taken frequently whenever individuals want to step away from the work psychologically, and may vary from just a few seconds to even longer than 5 minutes [12,38]. Traditional applications of time management utilise explicit methods of letting users know when to take a break, how long the break should be and when they should return back to work. For example, Pomodoro technique organizes time into focused work periods which are typically 25 minutes long. Each work period is followed by a short, five-minute break. Every four work periods are then rewarded with a longer break of 15–30 minutes. This method of micromanagement however has been criticized in the literature. Leshed mentions how such tools do not "combat rush, busyness, and overload" ([40], p.61), which are the norm in today's culture. Many times, the timing of the microbreak collides with the users' attention on work or flow state, prompting users to end their microbreaks too soon or skip them altogether and sometimes the microbreak activity becomes far more engaging resulting in far longer delays in returning back to work. Both these situations undermine the benefits of microbreaks.

Considering the issues related to scheduling the start and end of microbreaks, we did not add any timer in *Zenscape*. Instead, we carefully selected the micro break activities that are relaxing yet take less time to complete so that people would return back to work within a couple of minutes. Moreover, we intentionally kept the footprint of *Zenscape* small (24cm diameter x 4 cm height) so that it can be placed on the work desk or somewhere next to it (see Figure 12). *Zenscape* thus remains in the periphery of the user's attention and it will allow quick return to work. Finally, although we set *Zenscape* to remind users to take a break every 30 mins, users are also free to ignore the reminder. We also made a provision of "Do Not Disturb" mode (refer to figure 13) where users can stop the reminders (i.e., the stirring sound) for the duration of their choice by simply taking the stirrer out of the cup.

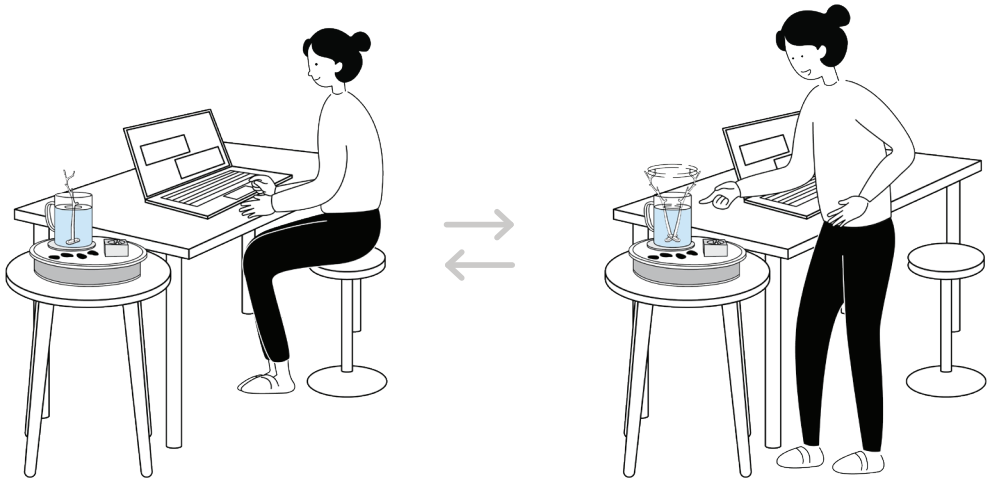


Figure 12: Being in the periphery of users' attention and having micro activities that can finish quickly will allow quick transition and return back to work.

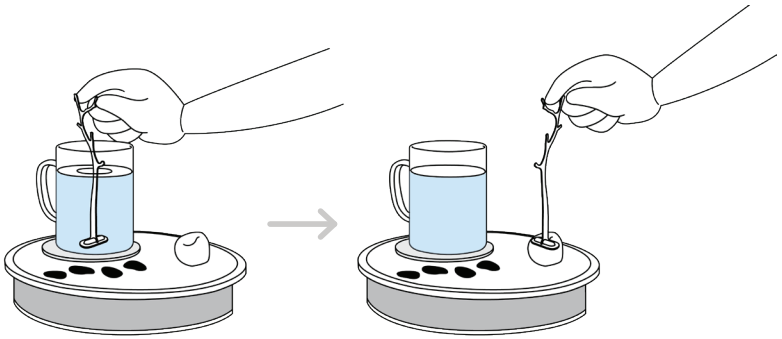


Figure 13: *Zenscape* features *"Do not disturb"* mode which involves taking the stirrer out of the cup to stop stirring and hence no reminder.

ZENSCAPE AS A RESEARCH PRODUCT

We consider *Zenscape* as a domestic research product [49] that aims to support a research inquiry on supporting mindfulness and positive wellbeing, while juggling work and busyness of modern life. The topics of maintaining work-life-balance and managing screen time through regular microbreaks has been actively discussed in academia [8,10,51,53] as well as practice. Complementing the existing works on persuasive technologies [20], digital mindfulness [14,72], effort recovery model [27] and ambient notification systems [50], this work introduces the key steps for creating microbreak systems that go beyond simple reminders and notifications. Through *Zenscape*, we highlight the importance of thinking about a single microbreak destination and sketching out micro activities that users can perform to relax and recover from work stress.

Although *Zenscape* can be used in a variety of different contexts such as home and office, we envision its primary use in a home context, where increased screen time and working from home is becoming a norm. *Zenscape* is designed for long term use and can work without the intervention of a researcher. This is reflected in the sturdy design of *Zenscape*. *Zenscape* makes use of electronic components and materials that have been used in industrial products in order to bring in the sense of finished product quality. We decided to use grey cement as the main material for the bottom enclosure and for the coaster on which the water cup is placed. We earlier considered using wood or bamboo but decided to use cement as it has high absorbency, hence it will help to keep the coaster dry and will also prevent any short circuits.

As Odom and team [49] note, research products have a high quality finish to them and people's engagement with these artifacts is "predicated on what it is (i.e., a thing) as opposed to what it might become (i.e., a prototype)". *Zenscape* is designed to look and feel like a commercial product. There are no exposed electronic components. All its elements are replaceable, if needed. *Zenscape* features a minimalistic design with no flashy sounds or visuals. We used white sand and neutral color schemes so that *Zenscape* can merge with the typical surrounding of a home. If users do not choose to interact with it, the system can serve as a standalone art piece.

We also took time in designing an appealing packaging for *Zenscape*. The system packaging also consists of a brush to clean the sand, a white sand box, an adapter to power *Zenscape*, an air plant, and a brochure on how to use the system, as shown in Figure 14).

Figure 14: *Zenscape* packaging.

CONCLUDING REMARKS

In this pictorial, we presented *Zenscape*, a tangible system - that not only aims to encourage users to take regular microbreaks but also helps them to make the most of their microbreaks. The design of *Zenscape* is inspired from the Zen garden that symbolises naturalness, simplicity and mindfulness through different elements. *Zenscape* represents the Zen garden both physically and metaphorically. On one hand, *Zenscape* takes inspiration from the physical components of the Zen garden. For example, *Zenscape* features trees, sand, stones and water in a small and compact form suitable for work setting. On the other hand, the Zen garden principles also motivated our design decisions such as our choice of material (no flashy component), gentle notification mechanism, nature based micro activities and scheduling of microbreaks (with agency to users), so that users can feel relaxed during microbreaks.

We unfolded the design process behind *Zenscape*, illustrating challenges and our strategies to resolve them. We articulated four key design aspects of a microbreak system, namely, *Diversion, Destination, Play* and *Return* that guided the development of *Zenscape*. While creating a diversion mechanism, we discussed how different materials affect the quality of sound and hence the effectiveness of the notification mechanism. We highlighted that the sound alone might not be enough as a diversion mechanism, and it may need to be complemented with other modality such as visual or olfactory feedback. However, while creating richer visual aesthetics (such as a tornado effect), designers should also pay attention to other concerns such as safety of the overall mechanism and issues like water absorption that may surface up with the longitudinal use of the wooden material immersed in water.

For *Destination*, we designed *Zenscape* with a single point of interest to guide users on possible activities to explore. For *Play*, *Zenscape* provides an array of short open-ended activities that users can explore during microbreaks to feel refreshed from screen fatigue. We tried to include activities that cater to different user needs. For example, someone after heavy cognitive onscreen work, may prefer a stretching or relaxing activity, whereas someone may want to engage in creative sand raking after a boring day at work - both of which are supported by *Zenscape*. Our design for both destination and the activities are inspired by Zen garden and foundational recovery experiences. Designers can look into other nature driven experiences to support users in making the most of their microbreaks. Finally, *Return* may seem like another reminder to assist users to go back to work. However, respecting users' work practices, *Zenscape* supports *Return* by: 1) creating a single microbreak destination that resides in the periphery of users' attention, and 2) utilising creative activities that take less time to complete but are fun to engage in.

Our next step is to conduct a field study of *Zenscape* to understand its effectiveness as a microbreaks system (the study got postponed due to the COVID-19 restrictions). Despite the lack of user insights on our work, this work makes an important contribution by offering a conceptual framing on the design of a microbreak system. We hope that these insights will guide designers in creating future systems for work-life balance. We envision that the design process and the four design themes may also guide the development of ambient tangible systems for other contexts, for example, reminding users about medication and drinking water.

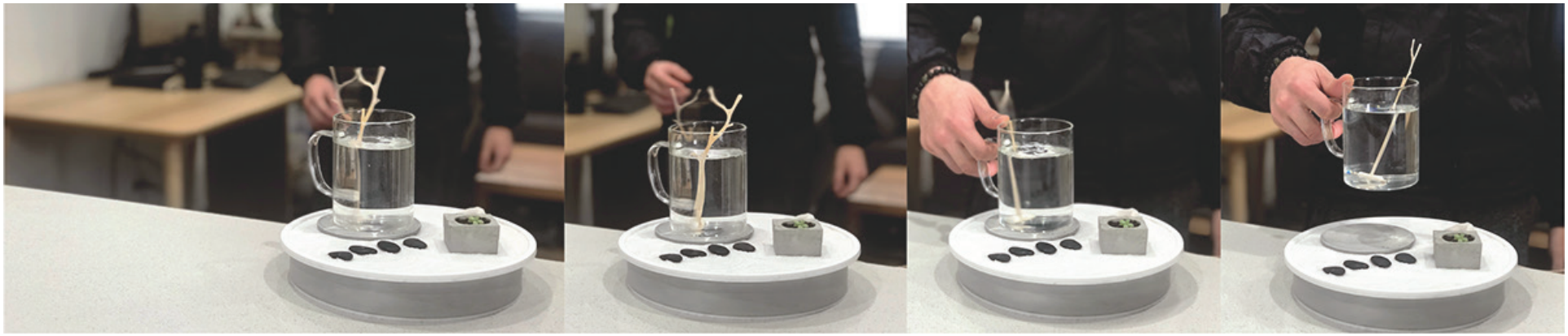


Figure 15: *Zenscape* in action.

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