Exploring the role of unobtrusive technology in mindful nature experiences

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Abstract

Spending time in nature will improve your physical and psychological health, but doing this is currently an exception rather than the norm. Technology has enabled simulated immersive nature experiences that can be experienced on the users' conditions, but these lack the physical and multisensory qualities that authentic nature have.

The aim of this thesis was to explore how technology could be used to enable and strengthen authentic nature experiences, without stealing attention. The findings from a user-centred design process served as the foundation for a forest bathing inspired service. The design proposal used a holistic approach that intended to make nature experiences more accessible, but also more mindful and undemanding. The user tests showed promising results, but future work could benefit from taking a more narrow approach, to generate more specific knowledge to the growing field of interaction design in a nature context.
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1 Introduction

Nature can be called the home of humankind, a refreshing place to seek experiences and adventure. It is a place for both active and restorative activities (Häkkilä, Bidwell, Cheverst, Robinson, Schöning, & Colley, 2016).

Regardless of this positive perception of nature, a study in the United Kingdom showed that physically experiencing nature regularly, is actually the exception rather than the norm (Cox, Hudson, Shanahan, Fuller, & Gaston, 2017). The authors argue that the trend of urbanisation can diminish people’s possibility of daily contact with nature.

Modern urban lifestyles are generally related to a strong omnipresence of technology, which enables people to be constantly connected with their social network and to consume an immense amount of information. Research shows that excessive use of mobile phones and a feeling of constant availability can relate to mental health problems (Thomée, Härenstam, & Hagberg, 2011).

Technology can also simulate nature experiences through immersive virtual environments and create scenes that sound and look extremely close to authentic nature. From a user perspective it can make sense, to conveniently experience some of the beautiful qualities from nature without having to make the effort to actually go to a remote forest.

This technology-driven direction can be intriguing, but what are the consequences of substituting authentic, physical nature experiences with simulations? Research shows that spending time in nature areas, especially forests, have great impact on humans’ health (Kuo, 2015). This benefit is also acknowledged in Sweden, where 81 % says that outdoor recreation is good for your health and 54 % believes that nature experiences makes their life more meaningful (Fredman, Ankre, & Chekalina, 2019).

What if the field of interaction design could contribute to get people out in nature, and to encourage and support interactive and meaningful experiences in authentic and physical environments? This idea has started to get some attention, but the challenge of how to design unobtrusive digital services for a nature setting is still rather unexplored.

1.1 Aim

The purpose of this project was to explore how an unobtrusive digital service could support a mindful and restorative experience in a nature setting. Nature and technology are traditionally not associated with each other, and this unconventional relationship is discussed based on literature and qualitative research. Through a user centred design process, the practice of
interaction design was applied to explore possible ways of human interaction with both nature and technology. The aim was to promote an undemanding nature experience where the digital qualities take a step back, and promote the authentic physical qualities in the environment. This project aspires to contribute to the growing field of interaction design in a nature context.

1.2 Research question
How might we make young urban dwellers utilize and value restorative nature experiences more, with the support from an unobtrusive digital service?

1.3 Target group
The target group of this design project are young urban dwellers, 18-29 years old, that rarely spends time in nature.

Folkhälsomyndigheten (2018) reports that only one-sixth of young adults spends time in nature once per week, compared to one-third which is the average of the population. The report also states that people living in urban areas spend less time in nature compared to people that live in rural areas. Young people (16-29 years old) does feel more stress than the average in Sweden. This data suggests that there are opportunities for improving young urban dwellers relationship with nature. The health benefits of nature are many, and will be further explained in section 2.2.

1.4 Ethical concerns
This project respected the rules about ethics and norms in research as constituted by The Swedish Research Council (2017). A letter of consent was provided to each person that participated in the project. The letter of consent presented the conditions of participation and explains the usage and storage of personal data.

The intention of this project was not to degrade urban dwellers way of living in any way, or cause individuals to feel guilty for not spending time in nature or for using their mobile phones too much. The goal was to motivate them by introducing new perspectives when experiencing nature. This ambition might not seem too bold. However, research proves that having a relationship with nature correlates with being more considerate and conscious about the health of our environment (Schultz, Shriver, Tabanico, & Khazian, 2004).
2 Background

This chapter will introduce and explain information and terms that are essential for the domain of this design project. It will also present related works that in various ways have informed and influenced the design process. The chapter will end with a short summary, that highlights the key findings that were essential for the design process.

2.1 What do we mean by nature?

Nature is a broad term that can be interpreted in various ways and carries different meanings depending on the reader’s personal preferences.

In this project, the term nature was used to describe non-urban and quiet forests. In order to have a limited and clear design space, urban nature was not in focus. This decision was grounded in both literature and qualitative research and will be discussed in section 2.2 and 2.4.

2.1.1 Nature’s role in Sweden

Sweden has the most generous right of public access to nature areas, called allemandsrätten (Fredman et al., 2019). Allemandsrätten enables the population to roam freely almost everywhere, as long as it is done respectfully (Fredman et al., 2019). This great access has allowed generations to use nature as a free space for outdoor recreation. Fredman et al. (2019) says that the most appreciated activities in nature are intuitive and uncomplicated, such as walking in the forest and fields. These basic activities are also what people express they want to do more of.

Nature does also act as a place for contemplation and recovery. Ahmadi (2006) researched how Swedish cancer patients cope with the news of their diagnosis. The result shows that contact with nature is one of the most important coping methods. Ahmadi (2006) mentions the combination of nature romanticism, the practically unlimited access to nature and the direction towards a more secular and individual society in Sweden as possible factors.

2.2 The health benefits of nature

Kuo (2015) summarised multiple studies that prove the physical and psychological benefits of spending time in nature.

When comparing the health benefits of walking in urban nature and in forests, it becomes clear that urban nature is a viable supplement but it does not compete with authentic forests. Walks in forest increases certain health protect factors that urban nature does not. Some of these factors are anti-
obesity, anti-diabetic and anti-cancer (Kuo, 2015). Nature does also provide psychological benefits such as stress reduction and relaxation. These factors are directly connected to improving sleep, which itself generate both psychological and physiological benefits. In short, Kuo’s (2015) study proves that nature is a large and valuable public health resource for society.

### 2.3 Forest bathing

One activity that acknowledges and utilizes the health benefits of nature is forest bathing. Park, Tsunetsugu, Kasetani, Kagawa, & Miyazaki (2010) says that *Shinrin-yoku*, which means forest bathing, was initiated in 1982 by ministries of Japan. Forest bathing can be explained as interacting and taking in the atmosphere of nature. The activity often involves aimless walking in a calm forest with focus on using the senses, drawing upon mindfulness practices. “Mindfulness is defined as paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally” (Murphy, Mermelstein, Edwards, & Gidycz, 2012, p.342).

In forest bathing, there should be no demands or goals, and distractions such as mobile phones and cameras are not present. The activity is often done in groups, led by trained guides.

Park et al. (2010) claims that the purpose of forest bathing is to improve the physical and psychological well-being of the user. The health benefits of nature are well proven (Kuo, 2015), and so are also the effects of practicing mindfulness (Murphy et al., 2012). The method of forest bathing has spread across the world and is considered to be the activity that is most related to forests and human health (Park et al., 2010).

### 2.4 Urbanisation

The popularity and spread of forest bathing might be a counter reaction to the trend of urbanisation. United Nations (2016) report that 68% of the world’s population will live in cities year 2050, which will affect the direct contact with nature. 85% of Sweden’s population is currently living in urban or conurbation areas.

As previously mentioned, Sweden provides great access to nature areas, but the population is not all experiencing nature in the same way, or as often. Lin, Fuller, Bush, Gaston & Shanahan (2014) attempts to explain these differences through what they call *orientation and opportunity*. Orientation can be described as a person’s interest towards interacting with nature and opportunity is based on the access to these interactions. These two factors are results of many demographic parameters such as age, gender, ethnicity, education as well as living location. Considering that urban dwellers generally do not have the same access to nature areas as people living in rural areas,
urbanisation is affecting people's opportunity to interact with nature (Fredman et al., 2019).

The increasing urbanisation has made city planners and landscape architects keen to create green spaces in cities, since urban nature is essential for the well-being of the cities inhabitants. Green spaces allow for indirect, incidental and intentional contact with nature, which has great impact on people's health (Cox et al., 2017).

2.5 The obtrusive side of technology

The smartphone is arguably the most evident example of the omnipresence of technology. According to a national survey by Internetstiftelsen (2017), 85% of the population in Sweden had access to a smartphone. The smartphone has become an integral device in many people's modern lives and it is present in most situations (Häkkilä et al., 2006). The smartphone allows people to communicate, share and consume information where ever and whenever they want.

Even so, there are also documented challenges related to the omnipresent state of mobile phones. Jarvenpaa, Lang, & Tuunainen (2006) conducted an empirical study to investigate humans relationship with their mobile phones, and found several conflicting paradoxes. One of them is called the empowerment-enslavement paradox, which can be described as the privilege of constant access to information, but also the pressure of always being connected and available for contact. The mobile phone can suddenly crave unwanted attention with a phone call or an email, which can feel stressful and also make it challenging to separate social and professional life.

According to Jarvenpaa et al. (2006), there is also an engaging-disengaging paradox. This conflict presents the difficulty of interacting with something without disengaging from something else. One of their interviewees gave an example:

“People want to know what is going on, but on the other hand, they also want to be in the middle of a forest” (Jarvenpaa et al., 2006, p.38).

Other studies has proven that peoples’ awareness of their surroundings decrease when they interact with a mobile phone (Hyman, Boss, Wise, Mckenzie, & Caggiano, 2009).

Furthermore, a Swedish study showed that young adults who use their mobile phones frequently and feel stress about always being connected, are more likely to report mental health issues such as sleep disturbances, anxiety and depression (Thomée et al., 2011).
2.6 The role of interaction design

The obtrusive effect of technology is a challenge where the practise of interaction design play a role. The pure definition of the term interaction is a transaction between two entities (Saffer, 2010). The purpose of interaction design is to create the opportunity for interaction, not necessary the interaction itself. Naturally, an interaction can be almost anything, but traditionally it refers to the interaction between people, machines and services.

2.6.1 Implicit interactions

One approach to manage the obtrusive side of technology might be by designing implicit interactions. Ju, Lee, & Klemmer (2008) explains that implicit interactions are based on implied input, while explicit interactions are based on apparent input, such as user commands. Ju et al. (2008) created a framework that can be used to describe and evaluate interactions (figure 1).

The purpose of the framework was not to indicate that one type of interaction is better than the other, but rather to show the wide spectrum of different types of interactions. The context in which an interaction takes place, does often determines the outcome.

![Figure 1: The model of the implicit interactive framework (Ju, Lee & Klemmer, 2008, figure 1).](image)

The framework is divided by two axes, attentional demand and type of initiative by the system. Notifications are one example of an obtrusive interaction that can be labelled as proactive/foreground. Notifications appear by the initiative of the system and the output is often designed to grab the users attention.

The opposite of a proactive/foreground interaction is called reactive/background. These interactions operate without the user’s attention, since the interaction is initiated by the system and the output is not apparent. One obvious example of a proactive/background interaction is the screensaver. However, an engagement with a system does often contain different
types of interactions that varies depending on the intended outcome. The implicit interaction framework will be applied to analysed and evaluate the interactions in the design proposal.

2.6.2 The value of interaction design in nature

Saffer (2010) explains that interaction design is highly contextual and uses the available materials to solve a specific problem. The practice should not be restricted to specific technologies, but rather be adaptable to the current circumstances and situation. Considering that interaction design can be applied in a wide array of contexts, designers often need to learn from other disciplines, which can create a broad, multidisciplinary perspective on the design problem (Saffer, 2010).

Nature is one example of an unconventional context for interaction design. Häkkilä et al. (2016) says that nature is generally perceived as a calm and purifying space, disconnected from the more hectic urban lifestyle. However, the arrival of technological devices and their communicative qualities might make nature feel less distant from the urban life, since the user can still be in contact with the urban life. This presents new challenges for interaction designers, considering that modern technology often is aimed towards urban settings (Häkkilä et al., 2016).

Jones, Cheverst, Anderson, Häkkilä, & Daiber (2018) claims that human computer interaction (HCI) in outdoor recreation is a growing field. HCI is closely related to interaction design but specifically more focused on computing. So far, there are practical and utilitarian services for outdoor activities such as navigation, hiking, skiing and documentation, but HCI in a nature context is still relatively unexplored (Jones et al., 2018).

Obrist, Gatti, Maggioni, Vi, & Velasco (2017) states that multisensory experience design is another unexplored, but growing field in HCI. Multisensory experience design aims to create richer and more nuanced experiences by combining multiple different senses into one experience. This concept is not something new in museums and art galleries, where multisensory stimulation together with interactive components and displays have proven to enhance the overall experience (Obrist et al., 2017).

Obrist et al. (2017) argues that multisensory experience design can open up for new opportunities in service and product experience within human-technology interactions. While this may be true, there is also a clear opportunity to explore multisensory experience design within human-technology-nature interactions. Nature is a context where all human senses can be stimulated and experience authentic sensations. Therefore, the challenge for interaction design is not to add something new, rather how to encourage and support the things that are already there.
Jones et al. (2018) argues that it is important that designers understand why and how to create interactive systems and services that promote and enable outdoor recreation. Increasing the number of people that engage in outdoor recreation can have a positive impact on public health and also strengthen the users relationship to the environment (Schultz et al., 2004).

2.7 Theory

This section will present theories that aim to deepen the understanding of the domain of the project. The theories raised awareness of the complexity of the context and provided insights that served as inspiration in the design process.

2.7.1 Biophilia

*Biophilia* is a theory that argues why humans’ are so attracted to nature in different forms (Kahn, Severson, & Ruckert, 2009). The theory suggests that humans have strong affiliations with nature from the time when humans lived in the wild (Kahn et al, 2009). Advocates of the theory argues that biophilia is still a part of the human mind and that we cannot achieve full meaning apart from nature. Multiple studies have shown that even minimal contact with nature in any form have positive health effects (Kahn et al, 2009). Biophilia is one theory to why there are so many examples of artifical nature in our world.

2.7.2 Technological nature

Cox et al. (2017) found that watching nature through a window is the most common way to experience nature for people in the United Kingdom, which is interesting because it happens without the user being physically present in nature. The same can be said about technological nature, where nature is mediated or simulated through technology such as virtual and augmented reality, but also through traditional media such as television, digital games and recorded nature sounds (Kahn et al, 2009). Technology makes nature experiences more accessible since the user can often decide how, where and when they take place. This convenient type of experience might make the distant physical nature area feel less appealing, even though it lacks the physical qualities of nature.

2.7.3 Environmental generational amnesia

Kahn et al. (2009) argues that there are possible consequences of technological nature replacing authentic, physical nature experiences. Each generation has their own perception of nature experiences, which is often based upon their childhood memories. Naturally, they see that perception as the normal state, considering that they have not experienced something else. Kahn et al. (2009) calls this phenomenon *generational environmental amnesia*, which means that each generation will adapt to more technological
nature and less physical nature, and be unaware of this shift. If this theory becomes reality, it will deprive future generations of the physical and psychological benefits of authentic physical nature experiences (Kahn et al., 2009).

2.8 Related work

The current market of digital interactive services in nature is clearly aimed towards functionality and information, with common themes such as wayfinding, outdoor sports and nature facts. Aesthetics and qualities from nature are often used in digital mindfulness services, but not with the user physically being in a nature context (figure 3). The concept of using an unobtrusive digital service to support a mindful nature experience does not yet seem to be explored. Therefore, this section will present services and projects that have some qualities and/or features that has inspired and informed the design process,

2.8.1 Naturkartan

_Naturkartan_, which means the nature map, is a digital outdoor-guide that presents information about nature areas in Sweden. Naturkartan provides detailed documentation about each area, such as transportation options, facilities, available activities and level of accessibility (figure 2).

![Image of Naturkartan app](http://outdoormap.com/naturkartan/?offset=1509374661836)

_Figure 2. Naturkartan enables users to find information about nature areas through lists and map. (Retrieved from http://outdoormap.com/naturkartan/?offset=1509374661836)._  

The service is used by authorities, organisations and companies to help people discover and explore new locations. In this project it served as a point of reference of how to gather and provide relevant information about nature areas.
2.8.2 Wildfulness

Wildfulness is an unguided mindfulness app with a nature theme. The aim of the service is to combine the positive effects from mindfulness with the benefits from being in nature. However, the user is not intended to be in nature, since Wildfulness simulates nature through drawn nature scenes and 3D-soundscapes (figure 3).

![Figure 3. Examples of simulated nature scenes from the Wildfulness app. (Retrieved from http://www.getwildfulness.com).](image)

Wildfulness catchphrase is:

"Relax in the forest whenever you want, just by pulling out your phone."

This app is a good example of the previously mentioned term *technological nature*, where digital media is marketed as a substitute to nature. However, Wildfulness only offers these qualities through visuals and audio, which is arguably inferior to the multisensory experience that physical nature provides.

2.8.3 Headspace

Headspace is a guided meditation and mindfulness app with voice based instructions. It serves as a teacher that presents the techniques of meditation and mindfulness in a simple way. There are multiple types of techniques and levels of difficulty within the app. Headspace playful and almost childish visual identity (figure 4) relates to the service’s uncomplicated and leisurely approach on the methods of meditation and mindfulness. This style served as an inspiration, since it was believed to suit the young target group.
2.8.4 Yondr

Yondr is a service that creates a phone-free experience in contexts such as concerts, events, courts and schools. In the phone-free area, Yondr’s staff will place the participants muted phones in locked cases, before returning it. If a participant want to use their phone during the phone-free period of the event, they need to step outside of the phone-free area and unlock the case at a certain station.

The concept of Yondr represents a movement in society where digital devices are banned from various contexts as they are distracting it’s owner from being fully present in an experience or activity. The existence of this kind of service indicates that many people are not able or willing to optionally disconnect from their phone in certain situations. Yondr served as an extreme example of how to encourage people to be more present in an experience.

2.9 Background summary

- Research proves that nature areas are valuable resources for physical and psychological health. There are also multiple theories that argue for the importance of humans relationship with authentic nature. The circumstances in Sweden argue for clear opportunities to utilize nature as a valuable resource.
- Young urban dwellers might be the group in society that has the greatest need to get a better relationship with nature.
- From a macro-perspective, urbanisation creates a geographical distance to authentic nature while omnipresent technology makes the urban life less distant from nature experiences.
- The nature context is relatively unexplored in interaction design and mainly focused on utilitarian purposes. However, it is a growing field and implicit interactions (Ju et al., 2008) as well as multisensory experience design (Obrist et al., 2017) can be examples of possible approaches to expand and deepen the field.
The design project draws inspiration from the method of forest bathing, guided meditation, nature information services and the concept of removing the presence of technology to increase awareness in an experience.

3 Methods

This chapter will present the design process, research approach and methods that served as the foundation of the final design proposal. The purpose is to inform and explain the methodology and why it was suitable for this project.

3.1 Double Diamond

The process of this design project was based on the Double Diamond model, that is an iterative design process model created by the British Design Council (2005). The idea is to apply divergent and convergent thinking in both the research and design phase. The iterative process aims to screen out irrelevant information and weak ideas in order to focus on the key findings and consequently come up with the best possible solution. The model is based on four stages: Discover, define, deliver and develop. Figure 5 shows how the double diamond was applied in this design project. The descriptions below are based upon the information from British Design Council (2005).

Figure 5. The model presents what methods that were used in each stage. The model is based on the double diamond by the British Design Council (2005).
3.1.1 Discover

The first part of the Double Diamond is focused on gathering rigorous insights about the design problem. Divergent thinking with an open mind is important, in order to understand the design space and to notice details that could be valuable. Common data gathering methods are viewing related works, reading literature as well as conducting surveys, observations and interviews.

3.1.2 Define

This stage is devoted to analyse the large amount of data gathered in the previous stage. The data needs to be unpacked and boiled down to understand the opportunities and problems of the design space. Convergent thinking is applied to narrow down what is truly interesting and important. The outcome is a clear design brief that the design project will be based upon. Affinity diagrams, journey maps and personas are methods and tools that could help to make sense of data.

3.1.3 Develop

Once again, divergent thinking is used to open up possible ways to solve the narrow design brief. It is encouraged to create multiple concepts that attack the problem from different angles. Concepts are created and tested quickly, in order to allow multiple iterations. The develop phase contains methods such as both lo-fi and hi-fi prototyping and user testing.

3.1.4 Deliver

The final stage of the Double Diamond is where the design project results in a fully functional launched product or service. The best concept has been iterated to a degree where quality should be ensured.

However, the deliver stage will not be fully accomplished in this design project, due to prioritisation of the limited time of this bachelor thesis. Instead, the aim was to design a functional hi-fi prototype.

3.2 Research approach

According to Muratovski (2016), user centred design is a human-focused research process that is driven by the information generated by the users. The purpose of the human-focus is to create products and services that are adapted to its users, not the other way around. This research was conducted with a phenomenology approach, meaning that learnings about the individuals experience was gathered through a face-to-face kind of fieldwork (Muratovski, 2016).
The domain of interaction with nature and technology are connected with complex issues such as human values and relations. According to Muratovski (2016), qualitative research methods are best suited for dealing with situations and social phenomenon’s that has multiple layers. This design project used many different qualitative research methods to get rich and varied data, with the aim to create a deep understanding of the design problem (Muratovski, 2016).

3.3 Interviews

Talking to people is an efficient method to use when the aim is to uncover diffuse information such as personal experiences and values (Saffer, 2009). In this project, two types of interviews were used.

3.3.1 In-depth interviews

In-depth interviews were conducted in an early phase of the design process to get an insight in young urban dwellers relation and behaviour towards nature and technology. The method was also used to learn from experts in their field of environment psychology.

Muratovski (2016) describes in-depth interviews as thorough conversational interviews that aims to learn about individuals feelings and opinions. In-depth interviews are based on prepared open-ended questions, that enables the interviewee to engage and give extensive answers (Muratovski, 2016). Close-ended questions were avoided as much as possible, as they limit the interviewee’s ability to use their own words.

3.3.2 Focus group

To complement the individual in-depth interviews, one focus group interview was conducted with young urban dwellers. Focus groups are suitable for finding motivations, values and memories (Goodman, Kuniavsky, & Moed, 2012). The purpose was to observe and learn from the information that evolved from the discussion between the interviewees. It is important to be aware that while the presence of other interviewees can create a more social and informal atmosphere, it can also create the risk of peer pressure which can influence the results. The session also had similarities to a workshop, since the interview was based on ranking and association activities. The purpose of the activities was to have something to base each discussion on, and to make the interview feel more dynamic and interactive.

3.4 Observations

According to Saffer (2010), what people say and what people do can be two different things. That is why observing peoples’ behaviour can complement and validate the findings from interviews. To generate candid and authentic
insights, the observer should affect the subject's experience as little as possible (Muratovski, 2016).

Considering that the context of this project, nature experiences, generally includes walking, it was necessary to follow the subject to maintain visual contact. To avoid being accused of stalking, the subject was contacted and briefed beforehand. The observations were followed by a short interview, as a way to debrief and ask questions related to the observation.

### 3.5 Participatory visual research

Unlike the previously mentioned methods, participatory visual research does not rely on the physical presence of the researcher, as the participants are asked to provide documentation of certain situations in their lives (Muratovski, 2016). This independent research method was chosen since the researcher's absence could make the participants act more natural and hopefully generate in more candid data.

The documentation does generally consist of photos, video or sound recordings. This type of media can communicate nuances and details that words might not. Muratovski (2016) says that people tend to be more willing to discuss issues that relate to their own photographs. Furthermore, it is important to emphasize the irrelevance of the documentation's quality and fidelity to the participants, as this can affect the authenticity of the result (Muratovski, 2016).

### 3.6 Affinity diagram

The previously mentioned qualitative research methods generate a huge amount of raw data, that needs to be structured and analysed into clear findings before it will be used to drive the design project forward (Saffer, 2019). The affinity diagram is a data analysis method that uses clustering to make sense of large amount of information, often in the form of colourful post-it notes. The purpose of the affinity diagram is to swiftly group and connect information in a visual manner. It gathers all different kinds of data that previously have been separated into one, colourful diagram that presents an overview of the project's research findings. The outcome of the affinity diagram can be a foundation for ideation and concept development.

### 3.7 Research-driven workshop

Goodman et al. (2012) says that the goal of a research-driven workshop is to create a shared reference point for solving problems together. The data-driven workshop does often have “how might we..” questions as a starting point for generating ideas. The purpose of collaborating with others is to open up for new perspectives and to build on each other’s ideas. Workshops are
usually short and focused, with the ambition to rapidly write or sketch multiple ideas.

3.8 Prototyping

Houde & Hill (1997) explains that prototypes are used to explore and express the design of interactive artefacts. Usually, prototypes represent different stages of the design, since it can be challenging to prototype the whole concept in an early stage. Houde & Hill (1997) suggests that designers can improve the way they talk about prototypes by stating the purpose of the prototype. According to Houde & Hill (1997), there are three main purposes of a prototype: Role, look & feel and implementation. Role prototypes tests what the artefact could actually do for the user. Look & feel aims to investigate how the user experiences the interaction with the artefact. Lastly, prototypes with the purpose of testing the implementation of the artefact focus on the technical aspects, if and how it will actually work. This design project will use role and look & feel prototypes to test and validate the design proposal.

3.9 User testing

According to Goodman et al. (2012) usability tests can quickly reveal how people understand and interacts with a prototype. User tests are valuable since they can reveal misinterpretations of the findings from the user research, which enables the designer to talk with the users and correct the error in an early phase of development (Saffer, 2010).

Prior to the test, the researcher should have identified specific features or aspects of the prototype that they want to observe and evaluate. Even so, the researcher should document other behaviour, misinterpretations and errors that emerge during the test. It’s important to communicate to the participant that it’s not them that are being tested, it is the prototype. The user test is generally finished with short interview, where the researcher gets the possibility to ask questions related to the test and get more information about how the user experienced the prototype.
4 User research & findings

This chapter will present all user research activities together with their outcome and findings. The analysed results of the qualitative research will be summarised in the form of design opportunities.

4.1 In-depth interviews with target group

Semi structured individual interviews were conducted with five young city dwellers. The interviewees relationships with nature varied greatly. Some visited nature areas frequently, while others only did so a couple of times per year. This varying relationship was intentional, to generate different perspectives on the domain of the project. The prepared questions revolved around the interviewees behaviour, relationship and attitude in relation to nature. There was also a focus on their thoughts about the health aspect of nature, as well as their usage of technology in nature settings.

4.1.1 Outcome

Even though the interviewees relation and definition nature varied, their respect and appreciation for it was unanimous. Feelings such as calmness, genuineness, grandness and beauty was often mentioned. The main motivation for spending time in nature was to take a break from the ordinary, often stressful life in the city. The break meant a refreshing pause from their everyday surroundings but also a moment to disconnect from their social media network and the feeling of information overload.

The majority of the interviewees wanted to spend more time in nature. Logistics, weather conditions, lack of time and knowledge about available nature areas were named as the main obstacles for going to nature areas.

Urban nature such as parks were considered to be “nature light”, and while they were appreciated and perceived as a supplement to forests, they were not viewed as the same type of experience. This was mainly due to the presence of other people and traffic in urban nature. When there are other people around, there are also certain norms involved that unconsciously affects how to behave and where to walk. One interviewee mentioned the lack of roads as the main difference between rural forest and urban nature.

All interviewees said that their usage of their smartphone was lower in rural nature settings than otherwise. Some of them explained that they wanted to be present, since nature experiences were not that common for them. Walking was also named as the main activity and that the physical engagement decreased the need for interacting with the smartphone.
In nature, smartphones most used functions were the camera and navigation apps such as Google maps. The main contribution of technology in a nature setting was the sense of safety that it provides. The negative side was the attention that it draws, because it is hard to ignore the vibration or sound from notifications.

“You could perceive the mobile phone as a maroon. It is there for you if something goes south.”

The interviews ended with questions about the health effects of nature. A common answer was that nature is “good for you”, and it clears your head and lowers your anxiety. However, they could not provide more specific answers. The majority claimed that they felt much better after spending some time in a nature setting, but even so, they did not mention the health aspect as one of their main motivations.

4.1.2 Insights

- Nature is perceived as a calm and genuine place that offers a refreshing break from a stressed everyday life.
- Authentic, rural forests are preferred. Getting away from people is one of the main benefits of nature experiences.
- The majority of the interviewees expressed that they want to spend more time in nature, but struggle to make it happen.
- Technology can offer a feeling of safety, but it’s presence should stay in the background.
- The positive health impact is an underlying motivation for spending time in nature.

4.2 Interview with researchers

Swedish University of Agriculture Sciences (SLU) Alnarp is one of the most prominent universities that work with environment psychology. Environmental psychology focuses on the interaction and relation between humans’ and their surroundings, often in an outdoor context. Naturally, this practice is relevant to the domain of this project and the interview was a great opportunity to draw from a more scientific perspective.

Therefore, one semi-structured interview with two researchers at SLU Alnarp was conducted. They both researched in environment psychology, but had different kinds of expertise, one was specialised in landscape architecture and the other one in behaviour science. The purpose of the interview was to learn from the researchers expertise and to get an insight in the current state of environment psychology. As previously mentioned, Saffer (2010) says that interaction designers can draw from other disciplines to take advantage of
their field-specific knowledge and that there lies a big value in this collaboration.

### 4.2.1 Outcome

The interview started with them explaining how environment psychology is a growing field and that SLU plans to perform field experiments to measure how human’s react to different environments. Sometimes it can be hard to know if it is the physical activity or the environment that produces the positive health effect. Therefore, SLU has made studies on this and found that the effect of just being in a green space, have positive impacts, for an example of the body mass index (BMI).

Another topic of discussion was the fact that outdoor environments enables people to behave more freely, there are not as strict rules as in an urban environment. It is much harder to do something wrong, which itself can be liberating. One example of an undemanding and intuitive activity is walking. One researcher called walking a non-activity – and explained that walking is as close as you can get to doing nothing, whilst still engaging in something that is perceived as an acceptable activity. She argued that this type of undemanding non-activity is practiced a lot and does probably serve as a valuable break from the usual, result-driven activities that is a big part of everyday life.

This topic sparked the question about forest bathing (section 2.3) and how it relates to a non-activity. The researchers were familiar with the method, and thought that the concept of forest bathing itself is valuable, but that it is a clear example of a very basic and obvious activity that has been labelled into something more complicated and exotic than what it actually is.

### 4.2.2 Insights

- Just being in a nature environment has positive health effects, it is not necessarily related to physical activity.
- The nature references of each generation is changing and there is a value to promote local nature to not lose it’s substantial health benefits.
- Walking as a non-activity. There lies a value in a non-activity, and how can design support this?

### 4.3 Observations

One female young city dweller was observed in two different types of nature settings, first in a city park and later in a rural forest. The purpose was to observe her behaviour and identify possible differences between the two nature settings. The session would end with a short interview to learn about
her experience. The participant got instructions to behave as she normally would, and try to forget that she was being observed.

4.3.1 Outcome

**Urban nature**

The participant walked in a crowded city park in Malmö (figure 6). She listened to something through ear headphones and walked a bit faster than normal walking pace. She followed the paths of gravel and asphalt and did not stop during the walk.

![Figure 6. First observation in urban nature. The participant felt the need to be on the alert in the presence of other people.](image)

There were birds in the pond, which she seemed to study while walking. The participant did not interact with her smartphone, or with any other person in the park.

In the interview afterwards, she described that she liked the city park because it is large which enables her to go for a long walk without needing to cross roads with traffic. She explained that she listened to a podcast, which she usually does when she walks alone. It serves as some sort of company while also silencing distracting sounds from the surroundings, such as traffic and construction noise. However, the audio from the headphones caused her to be more aware of other pedestrians and cyclists, as she felt the need to be on the alert to not stand in the way. The presence of other people was also a bit distracting, she mentioned how a young child was playing near the pond and it made her afraid that he could fall into it.

**Rural nature**

The observation in the rural forest and there were not a lot of people in the area. The participant had been to the forest before and this time she did not
wear any headphones. In comparison to the city walk, she walked at a normal pace and slowed down and stopped at certain locations to study the view. She did not interact with her phone or with the few people that she encountered during the walk.

When asked about the experience, she expressed how she felt relaxed and content afterwards. She stated how beautiful the area was and continued to describe how the tall trees made her feel cosy and safe. The lack of people in the forest was something positive, as it made her less distracted and more calm. Visiting nature areas were not a common activity for her, so she said that she wanted to take in the surroundings and therefore not wear headphones. Usually, she goes to nature with someone else, which makes the experience more of a social trip. She prefers going to rural forests, but the effort and time to go there makes her often visit urban nature instead.

When finishing the interview, she was asked how it felt to be observed, and she admitted that it was challenging to ignore that she was being studied and that made her a bit more aware of her behaviour.

4.3.2 Insights

- Headphones can be used to block out disturbing sound, but they decrease the users awareness of their surroundings which can make them feel uncomfortable.
- Nearby people can increase the self-awareness of the users behaviour, which can distract the actual experience.
- The presence of the observer can influence the outcome, therefore it could be valuable to conduct a qualitative research method that is carried out by the user alone.

4.4 Participatory visual research

Three young city dwellers accepted to conduct the participatory visual research. They got instructions to visit a nature area of their choice, and answer certain nature related questions through photos, sound and text notes. The documentation was made in the Evernote app, an organisation and planning service. Evernote had all the required tools - camera, sound recording and text editor, which allowed the participants to only use one app for completing the exercise and gather all the documentation in one place.

This research method had two purposes, the first was to learn about their answers and their nature experience. The second purpose was to investigate how the participants felt about having to pay attention to a screen based service while in nature.
4.4.1 Outcome

All participants went to nature areas that they had visited before and were easy to get to. They spent their time by walking for about 30 minutes. The participants were asked to try find something in their environment that they had not noticed or thought about before, but none of them could find anything new. Afterwards, they answered that they felt calm and positive, but that documenting and answering questions on the smartphone made them distracted and took away some of the pleasure from the nature experience. Two out of three did not answer all the questions.

4.4.2 Insights

- All participants chose nearby nature areas that were familiar to them. This relates to the interviewees answer about logistics, lack of time and knowledge about nature areas being the main challenges for discovering new places.
- It might be challenging to find new details in familiar environments without any guidance.
- The participatory visual research proved that screen focused information and tasks distracts the user from the actual nature experience. This insight combined with the research in chapter 2.6 made a strong case for exploring how to use non screen communication in a nature setting.

4.5 Focus group interview

The focus group session was a combination of an interview and a workshop. The idea was to conduct an indirect form of interview through activities such as card sorting and association exercises, with the purpose of creating a more dynamic atmosphere that could support interesting discussions. The goal was to get deeper insight in their emotions, perception and motivation regarding nature. All activities were initially done individually, and then later discussed in the group. Their written answers were later collected. This was done to try to decrease the risk of peer pressure. Three young urban dwellers participated and the session lasted for one hour and was recorded and transcribed.

4.5.1 Outcome

To start of the session, the participants were asked to define what the word nature means for them. Reflecting about this question was supposed to provide a foundation that they later could use when in the following exercises. The session continued with a card sorting exercise where they would rank seven different reasons for visiting nature areas. These reasons were based upon the answers from previous in-depth interviews, but they were encouraged to add their own reasons as well. Even though their answers
differed, it was one reason that was ranked first or second for all of them, and that was reflection. During the following discussion they explained that nature experiences allow for reflection and stress management. One expressed it this way:

“You rarely give yourself the time to unwind and reflect upon what you are doing or feeling right now.”

The final activity revolved around the participants spontaneous thoughts and associations to nature related photographs and audio. The presented content consisted multiple themes, such as different types of nature areas, technology in nature, tactile sensations and subtle sounds from nature. When discussing the difference between a forest and a city park two of them said this:

"I can’t get away from other people. That is often why I want to get out to nature, to be alone or be with someone close. Otherwise, I don’t get that connection to nature that I want.”

“In the park I need to follow the norms of society because I know there are other people there. I act in the same way there as in the streets of the city, but that I would not have done in the forest.”

Figure 7. Participants writing down their individual associations and feelings to the image that is presented.

In general, when presenting photographs and sounds of nature, they shared strong and detailed associations and memories. For an example, they expressed in detail how moss would feel in their hand or how they used to
play with it as children. When they studied a forest with a lot of fallen branches on the ground, one smirked and said:

“You can really feel the crackle under your foot when you step on one of those branches, mhmm!”

4.5.2 Insights

- The lack of people and norms in nature, results in a sense of freedom that enables a more relaxed behaviour.
- The strongest motivation to spend time in nature is the reflective quality. Allowing oneself to be in the present and gather the thoughts.
- Nature triggers memories related to senses. Smells, feelings, views and sounds are easy to remember.

4.6 Affinity diagram

The user research phase was now completed and had resulted in huge amounts of data from all different methods. The activities had been documented with different tools and stored in different files and folders, making it hard to get a clear overview of the gathered information. The affinity diagram was therefore used to map out all data and make it possible to draw connections.

![Figure 8. Initial groups in the affinity diagram.](image)

4.6.1 Outcome

The diagram got through an iterative process, first mapping the notes in large general groups such as motivation, values, behaviour, interactions, technology and nature (figure 8). This was helpful as it gathered all similar findings, and re-discovered some insights that otherwise might have been forgotten. In order to draw connections and go forward in the define phase, the notes were re-grouped into more specific themes that were more concrete and could be building stones for potential concepts.
The key insights from the affinity diagram will be presented in the following section, in the form of design opportunities.

### 4.7 Design opportunities

The affinity diagram made it apparent that there were multiple design possibilities that were related to the research questions:

*How might we make young urban dwellers utilize and value restorative nature experiences more, with the support from an unobtrusive digital service?*

However, at this stage there was a need to narrow the scope and some insights stood out and appeared frequently throughout the research phase.

The role of a “non-activity” in a hectic, performance driven lifestyle. In relation to cities, nature is often seen as a calm and undemanding place. Less people relates to less norms, which could mean that nature is a place where people can be comfortable and try new things without being judged.

Presence and awareness are key elements in a nature experience. Forest bathing could be one approach of focusing on the human senses to utilise the multisensory qualities of nature to unwind, reflect and connect to the physical environment.

Technology can act disturbing and it should stay in the background during the experience, but having an access to it provides a sense of safety. This balance can be explored by using implicit interactions. How can technology be used to support the interaction with the environment, without stealing attention?

There is a lack of knowledge about available nature areas and how to get there, which creates an obstacle for young city dwellers. How might we provide this information in a concrete and inspiring way?
5 Design process

This chapter will present how the findings from the previous research phase were developed and conceptualised into a design proposal. Each design method will be displayed and explained how it pushed the design process forward. The chapter will conclude with a summary of the iterations of prototyping and user testing.

5.1 Ideation session

To open up the design space and get other people’s perspective, three fellow designers, that also was a part of the target group, were invited to a ideation session. The first activity was brain dumping, were the participants rapidly wrote or sketched down ideas related to the design opportunities that were stated in the previous chapter. Each design opportunity got 3 minutes, the brain dumping was done individually and then discussed in group.

The session concluded by the participants collaborating to build on each other’s work to narrow down their broad and varied thoughts to more specific ideas (figure 9).

Figure 9. Participants collaborating in the research-driven session.

5.1.1 Outcome

The participants were encouraged to think quantity over quality, in order to generate many different ideas instead of being to considerate and...
judgemental of their ideas. This was something that they achieved because there were a lot of different ideas related to geocaching, nature art and mindfulness, to name a few.

One of the participants practiced guided mindfulness regularly, with the help of headphones. She sparked the idea of a mindfulness guide in nature and how it relates to the importance of presence and awareness. The fact that there are less people and less norms in nature was also positive, since mindfulness is best practiced in a calm and solitary setting. Together, they discussed how interaction design could be related to mindfulness and what role technology could play. They believed that the smartphone could take the role of a passive tool that contributes by playing the mindfulness guide while also providing a sense of safety. The interaction takes place with the physical environment instead of the technology.

The ideation session was valuable and generated promising ideas, but there were still some more work to be done to tie up the loose ends.

5.1.2 Insights

- The circumstances in a nature area resonates well with mindfulness and forest bathing. Guided meditation could be used to encourage the qualities of presence and awareness.
- The smartphone could be used as a passive, secondary tool that provides audio and feeling of safety. The user’s primary interaction should focus on the physical environment instead.
- Audio might be useful for guidance or enhancing certain nature elements, but headphones might also block the authentic sounds from nature and therefore diminish the experience. This relates to the finding from the observations (section 4.3.2).

5.2 Design proposal

After the ideation session, the attention was redirected back to the affinity diagram to go through the key findings once again. When re-grouping some post-it notes, new connections emerged and formed a pattern around the idea of a digital forest bathing guide (figure 10).
The visual representation of the affinity diagram helped to add the last piece of the puzzle, that would be the foundation of the digital forest bathing guide.

5.2.1 The concept

The digital forest bathing guide aims to promote well-being by introducing a relaxed and undemanding “non-activity” in a restorative nature setting. The narrated instructions in the guide were heavily inspired by forest bathing, but in a more accessible and local manner. The purpose of the guide is to introduce new ways of experiencing nature for young urban dwellers, and it’s only positive if the user learns the techniques and experiences nature without any guidance.

The guide was in the form of an smartphone app that enables users to discover and get to new nature areas, listen to the guide and also disconnect the obtrusive side of technology. The downloaded, local form of an app, relates to the idea of a personal guide that you can trust on. The key elements of the concept is visualised below (figure 11).
Figure 11. The key elements of the concept.

5.2.2 Arguments for forest bathing

As previously mentioned, the target group of this project spends the least amount of time in nature while also being the most stressed age group in Sweden (Folkhälsomyndigheten, 2018). Forest bathing is an example of a “non-activity” that aims to counter stress and demands. The purpose was to have a forest bathing activity in nature, a space that is scientifically proven to have positive impact on health (Kuo, 2015) to combine two beneficial elements in one experience.

The lack of norms in nature has been mentioned several times throughout the research, and this makes nature a suitable place to learn and practise forest bathing and mindfulness, activities that most likely will be completely new for many users.

Forest bathing encourages free movement, to step outside the path and interact with elements in nature that one normally would might not interact with, which relates to the findings from the participatory visual research (section 4.4.2). This type of analogue and physical multisensory experience with nature was worth to explore as an approach to interaction design in nature.

Introducing a new more accessible variant of forest bathing and mindfulness was intended to promote new perspectives of experiencing nature. It is worth noting that the purpose of the digital guide is to introduce and encourage a mindful and aware mindset when experiencing nature, a mindset that can be applied in other situations of life as well. The simple techniques were easy to learn, which hopefully makes the digital guide redundant after a while.
5.2.3 The forest bathing guide

The techniques were based on a short mindfulness guide about appreciating nature (Headspace, 2017), that had techniques that related to the methods of forest bathing (Shinrin-Yoku Sweden, 2018). The goal was to provide positive, short and open advice with a long interval that allowed the user to decide where to go and when to end the guide.

![Image](image.png)

*Figure 12. Sketches of the humans senses and possible qualities and elements of nature than can be used to activate the senses.*

The forest bathing techniques relates to Obrist et al. (2017) concept of multisensory experience design, but in an analogue form. They are one way of using digital qualities to support rich interactions with the physical surroundings. Below are some examples of what the guide could focus on:

- The guide starts with a breathing exercise, in order to let the user unwind and get in to a calm state.
- Feel the path/surface underneath the feet while walking.
- Sit down and observe the surroundings. The user chooses their own spot.
- Pick up an object and study it like it was the first time. Look closely. Feel. Listen. Smell.
- Slow down and listen carefully to notice and differentiate all the sounds.
- Take a short break and let the mind wander.
- Return to the breathing exercise, in order to unwind and finish the walk.

The techniques are supposed to make the user more present and aware of their surroundings, but only the user tests will determine if it works. It is worth noting that external circumstances such as weather and season will affect the experience. This is something that the guide could take advantage of, by providing different techniques depending on the weather and matching the visuals in the app to correspond with the outdoor conditions.
5.2.4 Arguments for a digital service

As mentioned earlier, Saffer (2010) discuss how interaction designers should utilise the available materials in the current context. People are already bringing their smartphones in nature experiences, so why not explore different ways of using it? It is unnecessary to add new technology, when the aim is to make the experience as accessible as possible. Naturally, the smartphone allows the digital guide to be mediated through audio, which was decided to be the most logical way to communicate the instructions, since the insights from the participatory visual research showed that on-screen information can distract the user from the nature experience.

One of the key features of the digital guide was its ability to temporarily ignore incoming messages and notifications during the nature experience. It’s an attempt to explore the idea of using technology to disconnect from technology. Unlike the previously mentioned service Yondr (section 2.8.4), the user does have an active choice to activate the “don’t-disturb-mode” or to leave it inactive during the experience. The reasoning behind this is that the service should offer an undisturbed nature experience, but it should never force the user.

Digital services have the capacity to efficiently inform and motivate people. The digital forest bathing guide makes the experience more accessible than the traditional forest bathing, because there is no need to pay for a guide or to book a tour. The user can do it by themselves, anytime they want. It might not be the same experience, but it can serve a purpose as an introduction.

The digital service can also provide information of available nature areas and how to get there, something that has been requested throughout the research phase.

5.3 Prototyping & user testing

In order to test and validate the concept of a digital forest bathing guide, physical and digital prototypes needed to be created. The first iteration was focused on testing the role of the prototype. The following iteration was further developed and more detailed, with the aim of also testing the look & feel of the prototype (Houde & Hill, 1997).

5.3.1 Lo-fi physical prototype

The digital guide would communicate the techniques through audio, but as learned from user observations, ordinary on-ear headphones would remove many of the subtle sounds from the surroundings, which could diminish the richness of the auditory experience. After doing some research, wearable speakers was seen as an alternative solution. The U-formed speakers rests on the users shoulders and directs the sound towards the ears, which lets the
user hear the audio as well as the sound from the surroundings. However, as a result of the steep price, it was determined that a rough prototype would be enough to investigate if the solution of wearable speakers would be valuable.

The lo-fi prototype was made of old dismembered headphones, rubber carpet, styrofoam and piece of a hose (figure 13). The wearable speakers worked good enough to be tested for the role of the prototype.

![Figure 13. The first iteration of the wearable speakers.](image)

### 5.3.2 First digital prototype

The digital prototype had two main functions, present basic information about the guide and when the user was ready, automatically play the guide’s instructions and techniques with a long delay between. The delay would allow the user to listen and try the technique in a slow tempo.

The main functions were created by using the prototyping software tool Flinto. Each technique from the Headspace (2017) lesson, was divided into separate sound files that were attached to screens.

![Figure 14. First digital prototype made in Flinto. The screenshot shows the instruction screen as well as the black screens that were present when the guide was active.](image)
The do-not-disturb mode was added as an option, to give the user the impression that they could temporarily ignore incoming traffic, but in reality the mode would have been activated beforehand by the designer. Icons symbolising access to phone call and a map were displayed as shortcuts when the guide was active, since they are examples of functions that provide safety. Safety was repeatedly mentioned in the user research as a valuable quality of technology. The idea was that if the user would have tried to reach these functions through navigating through the native interface, they would possibly be distracted by unread notifications and messages (figure 14).

5.3.3 First user test

The test of the first prototypes was conducted in the nature area Käglinge outside of Malmö with a 24 year old urban dweller. She had not visited Käglinge before and had no previous experience from mindfulness or forest bathing. The same guide was repeated with ordinary on-ear-headphones to see if/how the experience differed. The goal was to investigate the following questions:

- How does it feels to be guided only by audio?
- Are wearable speakers a viable solution?
- Are the techniques of forest bathing and mindfulness meaningful?
- How will the don't-disturb-mode be received?

Outcome

The user read the instructions, activated the do not disturb mode and started the guide. She walked by herself in the forest for about 15 minutes, before returning and replacing the wearable speakers with the on-ear-headphones and then she repeated the guide.

Afterwards, there was a short interview. She thought that the overall experience was positive and interesting, since she rarely focuses on the surroundings and her own presence. Usually, when she walks alone her mind is occupied with music or podcasts. The mindfulness guide was easy to follow and she said that the techniques strengthened the nature experience, instead of disturbing it. She appreciated that they were straightforward, and not too fuzzy and spiritual.

The wearable speakers enabled her to notice subtle sounds from the frogs in the pond, something that she did not hear with the other headphones. The wearable speakers could have been a bit more comfortable and the volume was a bit too low, so she needed to listen carefully to hear the guide (figure 15). She finished the interview by stating that she felt content and calm after the guide.
Findings

- There is a potential in the overall concept of a digital forest bathing guide.
- The guide does strengthen the restorative nature experience.
- The concept of wearable speakers works in a quiet nature setting, but the comfort and volume needs to improve.
- The don’t disturb mode was a bit unclear. The shortcuts on the dark screens (figure 14) were more distracting than helpful.

5.3.4 Iteration

With the feedback from the user test as a foundation, the concept of the forest bathing guide was further developed. The iteration took a more holistic approach, with the intention to create a conceptual service with a local touch.

The service was named Ture, to build on the metaphor of the guide as a friendly companion. The English speaking guide from Headspace (2017) was replaced with a native Swedish guide that adapted the new and expanded techniques to the nature area of Käglinge, with the purpose of making the experience feel more unique and local.

The digital prototype was re-designed and extended, with more emphasis on explaining what Ture is (figure 16) and how the don’t disturb mode works (figure 17, screen 9).
A feed of available nature areas was created, that allowed users to view nature areas near them (figure 17, screen 6). If interested, more detailed information was presented (figure 17, screen 7). The service Naturkartan (section 2.8.1) and data from interviews served as inspiration for the content.

To create a clear identity, nature photos became the core of the design (figure 16 & 17). All in-app photos that are related to Kägling are authentic and was taken by the author. The purpose of visualising the nature areas was to create a more direct connection to the listed areas and to create inspiration and motivation to actually go there. The decision was also inspired by the fact that technological nature in the form of photos can make people feel better (Kahn et al., 2009).
In the first digital prototype, there were shortcuts to a phone call and a map when the guide was active. There was a risk that the icons encourage on interactions with the screen during the experience, which was not the point. After some reflection, these shortcuts were removed in the second digital prototype, as they were not considered to be essential for the user experience.

Considering that the lo-fi wearable speakers had some limitations, a pair of Bose Soundwear was purchased (figure 18). Bose Soundwear delivered better sound and comfort while also providing a wireless experience, that could decrease the perceived presence of technology. The intention was to use the buttons on the speakers to control the audio guide, but this was unfortunately very limited. The prototyping tool only allowed the wearable speakers to control the volume. This made the experience less interactive and controllable than initially planned.

![Figure 18. The Bose Soundwear speakers. The discrete design does not draw a lot of attention.](image)

The conceptual idea of loaning wearable speakers at available nature areas was added in the prototype to make the service feel more accessible, as the wearable speakers are expensive. The scenario was that a user could unlock a locker by scanning a QR-code, pick up a pair of wearable speakers and borrow them during their walk, before returning them on the way back (figure 16, screen 5).

5.3.5 Second user test

The second user test had a similar setup like the first. It was the same participant in the same nature area. With the addition of more information pre-guide, the first part of the app was tested before travelling to Käglinge, in order to simulate a realistic scenario. The second user test focused on:

- If the app provides relevant and clear information.
- If the improved wearable speakers affects the experience.
- The overall user flow of the conceptual service.
Outcome

The first part of the test focused on the user experience before the actual nature experience. The overall flow of the app was easy to understand and navigate through, and she appreciated the look and feel that was supported by the nature theme. She came with some minor suggestions regarding how to make the information and user interface more clear. It is worth noting that it might have been easier for her to understand the service, as she had tried the first prototype before.

When starting the guide in Käglinge there were some technical issues with the audio, the delayed sound files overlapped and made it hard to hear and understand. This caused frustrated, since she did not understand what happened or how to fix it.

When the audio worked as it should, the new wearable speakers were much appreciated. She expressed that they were more comfortable, better sound and no disturbing wires. After a while, she forgot that she was wearing them.

Findings

- The information in the app seemed to serve its purpose of informing and motivating the user.
- The new improved wearable speakers were less noticeable which strengthened the overall experience.
- When technology does not work as expected, it creates a lot of frustration that can break the experience. This is major challenge when designing implicit interactions.

5.3.6 Third user test

The audio issues as well as the minor text and user interface problems were resolved prior to the third user test. This time the test took place in a city park in Malmö, with two participants that had not tried the service before. One of them had previous experience from mindfulness. The user tests were individual and had the same structure as the second user test, with a pre-guide app test, the guided nature walk and a concluding interview. The third and final user test focused on:

- Evaluate the role and look & feel of the prototype.
- Explore if the concept of a forest bathing guide with wearable speakers could work in an urban nature setting.
- Receive concrete feedback that could generate new ideas for improving the concept.

Outcome

The content, visuals and overall flow of the app received positive feedback. The map and the timetable for buses were considered to be convenient.
features that would make it easier to take the decision to visit the nature area. The photos of the nature areas made them feel inspired and intrigued.

When interviewing them separately after the guide, they both felt that the park was a bit too crowded to make them completely comfortable with wearing the wearable speakers. One of them mentioned that the sound leaks out too much, so he felt that he disturbed others, which made him avoid people if possible.

Even so, both were optimistic about the concept and would have liked to try it in a more quiet forest where the circumstances might have been better. They felt relaxed and content afterwards. They appreciated the mindfulness techniques that focused on their senses and the guide felt like a companion that made them feel more present. The participant that had previous experience from mindfulness expressed that this type of outdoor mindfulness made him feel more energised and fresh, than sitting inside in and meditating in a comfortable chair.

Both noticed the freedom of choice that was consistent throughout the service. They expressed that as a user, you really dislike being forced and controlled, but with Ture you always had a choice. The instructions did not feel commanding and to instructive, but more like gentle advice.

The freedom of choice was also present in the don’t disturb mode. Both participants activated it, but did not reflect upon it during their walk. When asked it, they said that a message or notification would definitely have disturbed the experience, which made the don’t’ disturb feature make sense.

However, they would have liked to have more control over the guide. In some parts of the walk, they felt like it would have been better if they triggered the next technique when they were ready, instead of relying on the auto play of the guide. This interaction could have been enabled by pressing a button. As previously mentioned, this was something that initially was planned, but unfortunately not implemented because of technical restrictions.

In the end of the interview, one of them suggested a volume control right before the guide started would allowed her to adjust the volume to her liking. It would have made her feel more ready and focused when the guide starts.

### 5.3.7 Summary of user tests

- Overall user experience was positive, and the participants felt content afterwards.
- The qualities of mindfulness and forest bathing proved to be valuable in a restorative nature experience.
- Ture is best suited for calm, rural nature areas.
- Choice of freedom was essential in this kind of service.
- Giving the user more control over the guide could be further explored.
The don’t disturb mode was not something they reflected upon during the walk, which probably means that it serves its purpose.

5.3.8 Ture & the implicit interaction framework

The implicit interaction framework by Ju et al. (2008) was used to evaluate and analyse the service’s interactions. When starting the guide, the users interact explicitly with a conventional app that contains information about the experience and active decisions to make (chose nature area), in order to get the attention and engagement from the user. These interactions are placed in the reactive/foreground quarter of the implicit interactions framework (figure 19).

![Figure 19. Visualisation of how the users attention transitions between different interactions. Based on the implicit interactive framework (Ju et al., 2008, figure 1).]

The experience changes when the user arrives at the nature area and explicitly activates the don’t-disturb-mode and puts away her smartphone. At this stage, the smartphone (that represents the system) transitions to the proactive/background corner, where it implicitly provides the techniques and instructions through the wearable speakers (figure 19). From this point, the user’s attention should be focused on the reactive/foreground interaction with the physical surroundings (figure 19). The proactive/background quality of the system’s don’t-disturb mode prevents incoming notifications, and enables the user to maintain her attention on the primary goal of the service.

The challenge with implicit interactions is that when they don’t work as intended, they can create a lot of frustration, as learned from the second user test. The implicit nature of these interactions can create a lack of
transparency that could make it hard for the user to figure out the reason of
the unwanted behaviour.

According to Ju et al. (2008), overrides are one way of countering proactive
interactions of the system. In Ture, the only existing override is an exit-button
that ends the guide. The possibility to interact with the wearable speakers and
press stop/play and repeat could have been a better form of override.

To conclude, the service Ture used different types of implicit and explicit
interactions to direct the users attention in different stages of the experience.
As mentioned, there are definitely challenges with designing implicit
interactions, but they could be one way of countering the obtrusive effects of
technology.

6 Discussion

One goal of this thesis was to explore how interaction design, which
sometimes can be perceived as rather technology-centric, could be expanded
to include physical interactions with nature. It might be perceived as this
thesis tries to undermine technology in general, but that is not the case. The
motivation comes from trying to utilise the valuable resource that nature is,
and highlight the beneficial circumstances that we have in Sweden when it
comes to access and supply of forests. In some ways, this motivation relates
to the theory environmental generation amnesia (Kahn et al., 2009). If
technological nature replaces authentic nature more and more, it will
eventually be difficult to know what we miss, as our references has been altered.

As Saffer (2010) says, interaction designers design for interaction, the
interaction itself takes place between different entities. In this thesis, the
focus has been to design for humans interactions with nature.

In short, the desired path forward is to appreciate and care for what we have,
while we also push for new innovative creations supported by technology.

6.1 Self-evaluation

In retrospect, it could be argued that a larger portion of the project should
have been spent on the design process. The research phase is essential for any
design project, but the work could have been conducted more efficiently and
directed. The research methods could have been more carefully prepared, for
an example, in the focus group interview there could have been more
multisensory qualities presented than just images and sound. Discussing and
feeling different senses and qualities from nature could have generated more deep knowledge that was directly related to interaction design.

More focus and time on the design process could have enabled more experimentation and exploring, that could have generated more varied ideas. A more narrow research question could also have helped to focus more on how technology can be used in a nature setting, which arguably is the most unexplored part of the project in relation to the field of interaction design.

The people who participated in activities throughout this project were both male and female with an age between 23-29. They had a rather similar attitude and perspective on nature, which might not represent all young urban dwellers in Malmö. It would therefore have been wise to involve other demographic groups, such as younger people with a different ethnical background, to get more diverse and realistic results.

7 Conclusion

The aim of this thesis was to bring people to nature, to experience authentic and physical experiences, instead of simulating artificial nature qualities. Through a user centred design process, implicit interactions and multisensory interactions were used to explore new approaches to expand the novel field of interaction design in nature. The design opportunities that emerged from user research served as the foundation for a design proposal that aimed to answer the research question:

*How might we make young urban dwellers utilize and value restorative nature experiences more, with the support from an unobtrusive digital service?*

The concept of the digital forest bathing guide Ture intended to answer this question through multiple means.

First of all, in order to utilize nature experiences more, the user needs to know which nearby nature areas that exists and how to get there. Content such as maps, time table for public transport, photos and descriptive text were therefore gathered into one digital service. The design of the service had a clear nature visual identity that corresponded to local nature areas. The user tests indicated that the service was both informative and inspiring.

The concept of forest bathing was a successfully approach to make the user value restorative nature experiences more. The method focused on activating the user’s senses while viewing and interacting with the physical and authentic surroundings in a present and aware manner.
Implicit interactions were designed to make *unobtrusive* technology support the nature experience. The user heard mindful techniques through discrete wearable speakers that also allowed the user to take in the sounds from the surroundings. This worked well in a quiet forest, but was not suitable for a crowded city park.

The digital service offered to activate a don’t-disturb-mode during the nature experience, that temporarily silenced incoming traffic to the users smartphone. The project showed that implicit interactions needs to be respectfully designed and allow the user to override the systems actions, but if done correctly, they could play a valuable role.

Ture is one example of how interaction design could be used to design an *unobtrusive* digital service that takes a step back and strengthens the physical experience instead.

### 7.1 Contribution

The direct relevance of this project was the contribution to a relatively unexplored field in interaction design, which can be called unobtrusive technology in nature. However, there was also a health perspective in which interaction design could play a role in promoting outdoor recreation for a target group that could benefit from spending more time in nature. Lastly, the environment could also gain from more people associating themselves with nature, as they generally tend to care more about environmental issues than those who don’t (Schultz et al., 2004).

The users in this project were restricted to young urban dwellers to have a limited design problem, but the concept of promoting undemanding outdoor recreation with a digital service should not be restricted to any demographic group.

### 7.2 Future work

Ture was a broad service that tried to answer the research question through different means, but future work could benefit from being more specific and narrow in order to explore the design space more thoroughly. For an example, it could be worth to investigate how to balance the user’s control over the forest bathing guide, without stealing to much attention from the nature experience. As mentioned, interacting with the buttons on the wearable speakers to enable an override over the systems actions could be one possible approach.

This project has only scratched the surface on the multisensory possibilities that nature environments provides, and it could be meaningful for the field of interaction design to further explore how to use digital qualities to enhance the interaction with physical and authentic elements of the surroundings.
Fortunately, the field of HCI and interaction design in outdoor recreation is a growing field, which hopefully will make technology better adapted to nature environments.
References

Literature


### Websites


