



Walking in My Shoes: An Autoethnography of Techno-Spiritual Practices

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Figure 1: First author praying while wearing a Muse 2 EEG headband outside Heiligkreuz Church in Chur, Switzerland.

Abstract

Technology has become deeply woven into the practices of faith communities who engage in shared prayer, online worship, or meditation. Despite a growing body of research on religious/spiritual practices, the Human-Computer Interaction (HCI) community has yet to fully investigate Techno-Spirituality, especially through a first-person approach. We explored prayer experiences to understand which elements evoke such experiences from a Christian perspective. We present results from an eight-month autoethnographic study of private prayer by the first author, also a community member, while incorporating both technological (e.g., a Muse 2 electroencephalogram headband) and non-technological (e.g., religious iconography) media. We reflect on emerging practices and limitations of integrating technology during Christian prayer. This paper provides empirical insights on spiritual practices with technologies, and contributes to discourses on Techno-Spirituality in HCI.

CCS Concepts

• Human-centered computing → Empirical studies in HCI.

Keywords

techno-spirituality; Christianity; first-person methods; self-tracking; lived experience; spiritual informatics

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1 Introduction

Religion has been an integral part of many people's lives with as many as 84% of the world's population belonging to a religious group in 2015¹. Currently practiced by a little over two billion people, Christianity is the world's largest religion, and it is expected to grow to nearly three billion worshippers by 2050². It is undeniable that in today's world, technology has already deeply woven into the practices of faith communities who engage in shared prayer, online worship, or meditation in various ways. While various religions may differ in rituals, belief systems, ideologies, and institutions, they all serve to encompass and express this aspect of human experience. Even within Christianity, different denominations may differ in their practices. Religion and spirituality are, therefore, complex and multidimensional phenomena. However, mankind has never stopped exploring mysterious spiritual connections since ancient times. The definition of spirituality is constantly changing. Here, we adopt the definition of spirituality from Sinnott, a professor in the Department of Psychology at Towson University [51]: "Spirituality is one's personal relation to the sacred or transcendent, a relation that then informs other relationships and the meaning of one's own life [...] Religion [...] refers to practices and beliefs related to a particular dogma system."

Despite this large religious population—and calls by human-computer interaction (HCI) scholars urging researchers to focus on topics related to spirituality and religion [5, 21, 41, 48]—the use of technology as a medium for religious experiences has not been



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¹<https://www.pewresearch.org/religion/2012/12/18/global-religious-landscape-exec/>

²<https://www.pewforum.org/2015/04/02/religious-projections-2010-2050/>

extensively explored by the HCI community. In our research, we adopt the SPIRITED³ Collective's definition of technology, which is not always visible, it may encompass both tangible and less tangible forms (i.e., artifacts, mental activities), and where technology is controlled to support specific interactions as a means to expand people's religious and spiritual (R/S) capabilities, rather than to improve efficiency or productivity [47]. There is an increasing amount of research in HCI that explores the integration of faith, religion, and spirituality into design practices to enhance our understanding of spiritual experiences and religious communities [3, 42, 43]. However, doing research focusing on technology-mediated experiences is challenging and rare in HCI, in part due to the interdisciplinary nature of this knowledge [41]. Additionally, there is a lack of understanding of how religious values and traditional rituals may influence faith communities' technology-related decisions [40, 48]. Furthermore, religious and spiritual experiences can be highly subjective and personal, making research difficult to describe [5].

Although research on techno-spirituality has continued to grow in recent years, there remains a noticeable gap when it comes to exploring these topics from a distinctly religious perspective. How can we capture the subjective experiences of R/S practitioners? What data can be recorded to help researchers understand R/S practices? This leads to significant challenges for designers in predicting and discussing religious and spiritual experiences, and the need for careful consideration of the potential impact of these technological tools on specific practices. We see great potential in this research area, which HCI researchers should more boldly explore. To this end, and out of a natural curiosity about techno-spiritual experiences, we aim to explore the relationship between digital devices and faith-based practices, with a specific focus on individuals of Christian faith. The research questions (RQs) guiding this exploration are as follows:

- **RQ1:** How does prayer with digital devices bodily (and sensorily) impact Christian practice?
- **RQ2:** How does prayer with digital devices emotionally affect Christian practice?
- **RQ3:** How can autoethnography contribute to future HCI research in religious and spiritual practices?

Our contributions are twofold: first, we provide an in-depth reflection of the first author's bodily and emotional experiences upon integrating into Christian prayer a biometric technology—a Muse 2 electroencephalogram (EEG) headband—the practice of *Lectio Divina*⁴ with a mobile phone, and meditation with *Icons*⁵ on a laptop. Second, we extend research on techno-spirituality by applying an extensive first-person methods approach (i.e., an eight-month autoethnography). Using the Muse headband as a tool for self-understanding facilitated data collection, and in conjunction with a practitioner's reflective journals, we used affinity diagramming to analyze those collected data, providing insights into the intricate relationship between the material and spiritual realms. Given the limited existing literature on spiritual informatics in the R/S context, we aimed to fill the research gap by understanding

the spiritual development of individuals in their spiritual journey through reflection. Thus, this study not only contributes to understanding the intersection of technology and religion/spirituality, but also expands knowledge of existing work in HCI centered on Christian practices.

This paper⁶ is structured as follows. Section 2 discusses related work on techno-spirituality, Christian practices and spiritual informatics in HCI, self-tracking with Muse and autoethnography. Section 3 provides the background and research positionality for this study, followed by methodology (Section 4). Section 5 presents our key findings, followed by discussion (Section 6), and conclusions and future directions (Section 7).

2 Related work

2.1 Techno-spirituality

Anthropologist Genevieve Bell coins the term “techno-spiritual practices” to describe the utilization of technology to enhance religious activities and encounters [3]. She illustrates numerous instances where modern technologies facilitate and enrich religious experiences. Over the past 20 years, many studies in HCI have focused on the spiritual activities or religious rituals performed by believers of different religions in their daily lives [59, 61]. Recently, there has been a noticeable acceleration in the use of technology within R/S practices due to the COVID-19 pandemic (e.g., [32, 33]). Diverse religious groups and communities are increasingly turning to online platforms for religious activities and spiritual practices. At the same time, scholars began to examine the efficacy of these novel religious practices, seeking to determine their ability to meet the needs of believers and provide empirical insights [7, 28, 57]. While Buie and Blythe [5] speculated a decade ago that HCI would address more adventurous R/S topics, a recent literature review by Wolf et al. [55] shows that the number of papers has generally increased in recent years, research topics have also developed and diversified, there is still much to be explored in the design and understanding of religion and spirituality in HCI.

It is evident that within the field of HCI, practical designs have emerged for utilizing technology to coordinate spiritual communities and activities [16, 16, 22, 58, 60]. Some scholars, such as Markum and Toyama [38] argued “*not to design technology*”, and Wolf et al. [56] proposed the concept of *uncontrollability*, pointing out the difficulty of designing for technological spiritual experiences and the ambiguous religious practices in people's daily lives outside of institutionalized contexts. It is worth mentioning that within the framework of material religion research, Markum et al. [39] conducted an analysis of 44 tangible interactive artifacts from academia, art, industry, as well as religious and spiritual communities. Their analysis serves to demonstrate the significance of tangibility and embodiment in technology-mediated practices, highlighting their value and importance. Indeed, the exploration of techno-spirituality has not been ignored but has attracted more and more attention from scholars and designers, and can provide a broader understanding of different religious values.

³SPIRITED Collective: <https://spiritedhci.org>

⁴Latin for “*Divine Reading*”. This was established as a monastic practice by Benedict in the sixth century.

⁵Icons (from the Greek *eikones*) are sacred images representing the saints, Christ, and the Virgin, as well as narrative scenes.)

⁶“Walking in My Shoes” is a song by English electronic rock band Depeche Mode from their album “Songs of Faith and Devotion” (1993). The song deals with topics such as redemption, forgiveness and understanding people's mistakes. The song title here plays a double role of inviting the reader to connect to the first author's lived experiences.

2.2 Christian practices and spiritual informatics in HCI

Prior research in HCI on religious practice, particularly prayer, has spanned a variety of contexts, including but not limited to online platforms [22, 53], collective practices [16, 28], and mobile apps [44, 60]. Among these studies, there is *AltarNation* [22], which is not designed for a specific religion and adds a social presence to prayer, and *Sun dial* [60] designed specifically for Islamic believers to practice daily prayer.

In contrast, there is more research on prayer practices in the Christian tradition. For example, *The Prayer Companion* [16], designed for cloistered nuns, integrates modern technology by providing prayer topics sourced from news and social networks. *Flame of Prayers* [20] is a tangible interactive prototype reimagines traditional Catholic rituals. We see a greater focus on Christian prayer practices at the community level, the online caregiving community *CaringBridge* [53] highlights the importance of “prayer support” during health crises, underscoring the role of spirituality in caregiving. In addition, research on mobile apps designed for believers found that people use mobile apps for a variety of spiritual purposes, including prayer sharing. For instance, *Church Connect* [44] included a feature for prayer support revealing a great deal of interest in tools that can mediate asynchronous prayer support and help build church prayer communities.

Recently, designers and researchers have sought to understand the integration of technology with other religious rituals and practices, such as online worship [57] and Bible reading [28] in Christian contexts. These studies have shown that the use of technology makes religious rituals more accessible in believers’ lives, rather than being confined to a certain place and time. Thus, technology becomes a tool to assist religious practice. Technology is now widely accepted by Christian institutions and individuals. Although some pastors still encourage believers to carry a physical Bible, believers’ practices have benefited from the use of technology during church Sunday services (especially mega churches) [61], in pastoral care, and during the COVID-19 pandemic [57].

However, an interesting “gap” remains in our knowledge of the religious uses of technology: understanding how believers use digital tools to collect and reflect on personal information in order to facilitate personal spiritual progress or development, as Markum et al. [39] introduced this concept of spiritual informatics. Ibrahim et al. [25] recently studied how American Muslim women tracked their mental and physical health during Ramadan. Claisse [6] points out that tracking and making sense of personal data involves a range of life activities and critically examines two market exemplars: the Catholic eRosary⁷ bracelet and the Islamic iQibla Zikr ring⁸, both of which are designed to help people strengthen their faith in their daily lives. We respond to the call by Claisse [6] and Wolf et al. [58] for a respectful approach to contemporary technological innovations in the context of sensitive, traditional religious rituals, aiming to contribute knowledge on the often-overlooked practice of self-tracking in religious and spiritual practices, particularly from Christian perspectives.

2.3 Self-tracking with Muse

There is extensive literature around understanding and designing meditation experiences by studying brainwave data from practitioners. Some of these studies use a commercially available wearable device—the Muse headband⁹ (see Figure 3a). Other brain-trackers on the market include *Melon*¹⁰ and *EMOTIV*¹¹.

Previous research has demonstrated the effectiveness of the Muse headband in measuring event-related brain potentials and meditative states. Kosunen et al. [29] presented that Muse’s EEG sensors provide sufficient real-time data fidelity in monitoring mental states; however, they also mentioned possible conflicts with traditional mindfulness practices regarding natural breathing instead of training them. Potts et al. [46] discussed the presentation of *ZenG*—an augmented reality neurofeedback application with the Muse—and suggested that long-term studies are needed in order to determine if such an intervention will prove effective. Cochrane et al. [8] conducted a study on EEG-modulated soundscapes in walking meditation with Muse. They presented both positive and negative results of using Muse and brought out complex phenomena with practicing meditation. Daudén Roquet et al. [12] introduced *WarmMind*, an on-body interface integrating heat actuators to map meditation states, and found that continuous feedback in the Muse app helped users disengage from external stimuli.

Notably, many studies emphasize the need for longitudinal research to assess: users’ motivation levels and long-term psychological and physiological changes [63]; expanding wearable device access to non-practitioners seeking the benefits of meditation (including those with chronic stress or illness) [26]; and whether such technology can sustainably foster a positive relationship between individuals and their environment [46]. Only a few studies have discussed specific sensory experiences (e.g., audio feedback [8], thermal feedback [11]) in traditional meditation practice in HCI. Only one of these adopted a first-person approach in the study [8]. To the best of our knowledge, this study is the first in HCI to provide a first-person lived experience of using an EEG device with Christian practice in the R/S context.

3 Background and positionality

From here on, I¹² (the first author) will use the pronoun ‘I’ to convey my subjective and personal experiences of Christian prayer practice. My inspiration for this autoethnography stems from my experiences during the Covid period (2020–2022), where I underwent quarantine in various locations (Iceland, Hong Kong, Shanghai, Sichuan), confined to a room alone. During this period, I had abundant time to be alone with myself and never found it unbearable. However, I also heard from friends and family about their feelings of anxiety, unease, and inability to cope with it. This led me to reflect on the relationship between space and people, as well as the relationship between religion and technology. These encounters sparked my curiosity in solitude and prompted me to explore techno-spiritual experiences. Consequently, I started this scholarly inquiry with autoethnography.

⁹Muse headband: <http://www.choosemuse.com>.

¹⁰Melon Headband: <http://cargocollective.com/futurehealth/Melon-Headband>

¹¹EMOTIV Headset: <https://www.emotiv.com>

¹²In line with autoethnographical practice, Xiaran will tell her story in first person.

⁷eRosary: <https://erosary.clicktoprayerosary.org/en-us/index.html>

⁸iQibla Zikr Ring: <https://iqibla.com/collections/zikr-ring>

The three authors of this paper have different cultural backgrounds (Eastern and Western) and beliefs (atheist, ex-Catholic, and Protestant Christian). I will narrate my experiences as the first author, using a wearable device during my 8-month private Christian prayer journey from the perspective of an Asian, tricenarian woman, Christian, and artistic researcher. I am currently an active member in a contemporary Christian church in Finland. The second author is a design researcher specializing in interaction design, whose upbringing was more spiritual than religious. The third author identifies as a biracial (mixed Latin American) agnostic atheist man. The combination of these different backgrounds and R/S identities infuses data analysis with insights and considerations that lead to a more comprehensive understanding.

4 METHODOLOGY

4.1 Autoethnography

Over the past few years, the first-hand experiences of researchers have gained increasing recognition within the field of HCI as a credible source of knowledge [15, 23, 24, 62]. Autoethnography, in particular, is a very strong approach, as it allows the researcher to inject personal lived experience within the design and research process [13, 34, 37], hence allowing the researcher to explore complex, multi-layered connections between humans and technology that may not be captured by traditional approaches. Donna Haraway emphasizes that knowledge is derived from personal experiences and perspectives, and it is crucial to recognize their inherent biases and limitations [18]. Researchers must acknowledge the subjective role they play in knowledge creation, rather than seek detachment. Many scholars [14] in HCI pointed out that the first-person approach is not simply a retelling of personal opinions, instead, the validity and rigor can be enhanced through triangulation of data collection and analysis.

The value of subjectivity and diversity of practices conducting with first-person research has been acknowledged though many studies. Autoethnographers bring forth voices that may otherwise go unheard and insights that might be too subtle to uncover through traditional means [36]. Such an approach allows researchers to present personal narratives such as Claisse and Durrant's [7] study, which serves as a good example of exploring technology with Buddhist practices. By embedding, interpreting, and reflecting on the experience of engaging with faith communities during the COVID-19 pandemic, they contribute to the ways in which online tools are used in practice, providing a deeper understanding of how new collective experiences are formed. We believe adopting autoethnography method is well suited for the sensitive R/S context.

4.2 Defining the practice

In this section I will clarify some terms used in spiritual practices related to Christianity to help readers who may not be familiar with some of the experiences described later.

Christians have often referred to a special time set aside each day to focus on God as "Devotion." To pray in the Christian way is to do one's devotions, or acts that are devotional in nature. Self-discovery and meditation are inherent aspects of the human experience, but in the Christian tradition they are Scripture-based (*Lectio Divina*).

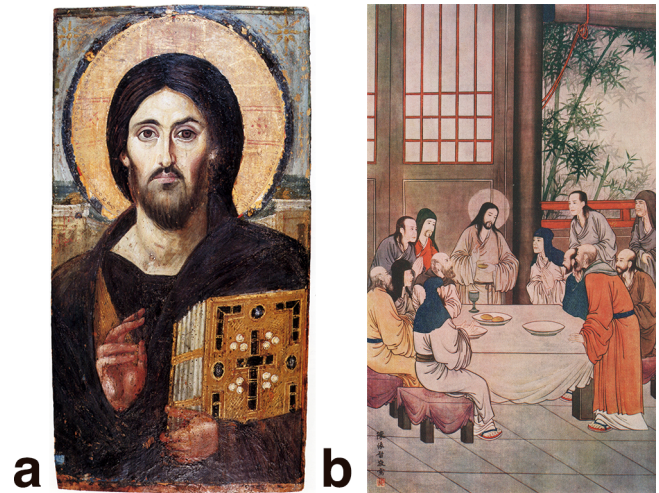


Figure 2: Icons used in meditation: a) *Christ the Pantocrator at Mt Sinai*, b) *The Last Supper* by Chen Yuandu (1938).

[52]. Pope Francis pointed out at the General Audience¹³ that “*The prayer of the Christian is first of all an encounter with the Other, with a capital “O”: the transcendent encounter with God. If an experience of prayer gives us inner peace, or self-mastery, or clarity about the path to take, these results are, so to speak, side effects of the grace of Christian prayer, which is the encounter with Jesus.*”

In this autoethnography, I always journaled my experience of practicing Christian prayer (with and without wearing a headband) after each session. Most of the prayers were performed at home, but I took the Muse device with me when I traveled, so there were three days of recorded prayers in different countries, which are reported later in Section 5.3.2. I documented my journey into prayer including meditating with *Icons* (see Figure 2a, 2b), practicing *Lectio Divina* adapted from Bishop Stephen Cottrell's instructions [1], following devotional plans on the YouVersion Bible app¹⁴, using materials offered from my church, and singing hymns. For the vast majority of my sessions, I followed the four steps of the Benedictine practice of *Lectio Divina*, a contemplative way of reading the Bible: read (*Lectio*) the Scriptures, meditate (*Meditatio*) and ponder the word of God, pray (*Oratio*) a short prayer based on a word or a phrase that speaks to me, and contemplate (*Contemplatio*) with sitting quietly to reflect deeply on the Scriptures.

4.3 Equipment, materials, and software

For this study, the Muse 2 headband was chosen to monitor brain activity through five cutaneous channel electrodes following the 10–20 international standard, which infer real-time meditation states. These active electrodes are: TP9 (left ear), TP10 (right ear), AF7 (left forehead), AF8 (right forehead) and Fpz (center of the forehead), shown in Figure 3a. The headband was paired with the Muse application (version 42.0)¹⁵, installed on an iPhone running iOS

¹³https://www.vatican.va/content/francesco/en/audiences/2021/documents/papa-francesco_20210428_udienza-generale.html

¹⁴YouVersion Bible App: <https://www.youversion.com/>

¹⁵Muse app: <https://apps.apple.com/us/app/muse-brain-health-sleep/id849841170>

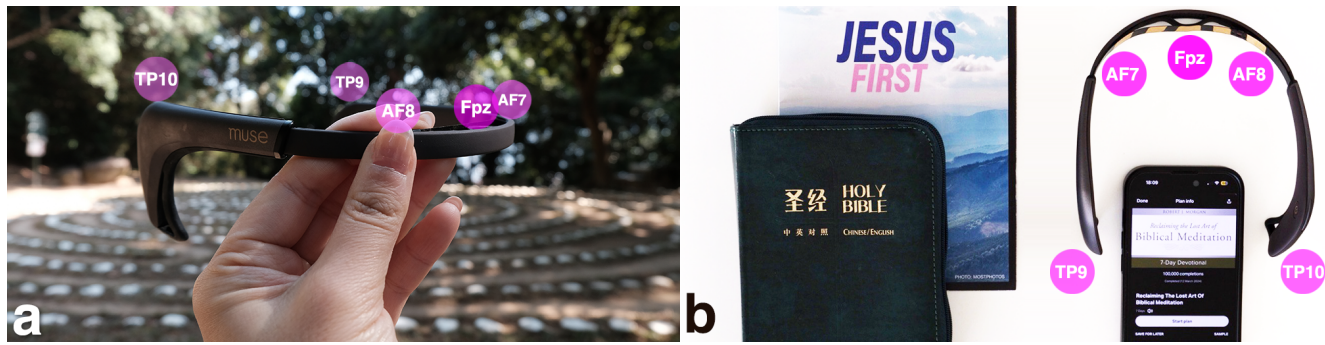


Figure 3: a) Muse 2 headband EEG sensors overview: TP9 (left ear), TP10 (right ear), AF7 (left forehead), AF8 (right forehead) and Fpz (center of the forehead) with the electrode positions, and b) materials for spiritual practice including a guide from the Church, a Bible, an example of a devotional plan on the Bible app, and a Muse headband.

17.6.1 to collect and display data during meditation. Journaling was conducted using the Notion app (version 2.44)¹⁶, both on mobile or via the Notion web platform accessed through a MacBook.

4.4 Data collection

The autoethnography began in January 2024. The data presented in this paper spans eight-months of non-consecutive days of Christian prayer practice and documentation. The primary aim is to comprehend the Christian perspective on technological intervention within Christian prayer, while also attempting to discern whether human biological indicators (e.g., brainwaves and heart rate) during this practice might provide any insights.

Data were collected in two ways: post-session report (see Figure 5a) about identified meditation states and biosignal (including heart rate data) graphs from the Muse App, and retrospective journals about my personal spiritual experiences. After each 30-minute Christian prayer practice wearing the Muse headband, I spent about 10 to 30 minutes writing a reflective journal on a mobile device or via the Notion web platform accessed through a laptop. The mobile version allows for quick entry of reflective notes after each prayer session, while the web version is for more comprehensive editing, including the addition of multimedia such as images, providing flexibility in data collection. Additional props included materials provided by my church, such as booklets designed specifically for fasting and prayer guidance, and a paper Bible that I occasionally use in prayer (see Figure 3b). The content encompasses my perceptions of using the Muse headband, reflections on the quantified data report, events in my life, and “divine encounter” moments during spiritual practice. Besides, I did not have a predetermined theme for these journals. I habitually record my thoughts and feelings in my native language and then translate them into English. This is because many of my prayers and reflections during the process are conducted in my native language. All Muse post-session reports were screen captured and stored, and the quantified data was recorded on a Google sheet, which was then shared with all digital journals for data analysis by the research team. As a result, a total of 123-day Muse reports and retrospective journal were collected.

4.5 Data analysis

Three researchers conducted an in-depth analysis of all journal entries using affinity diagramming [35]. Affinity diagrams, as a method for externalizing, understanding, and structuring large amounts of unorganized and diverse qualitative data, have been embraced and used by HCI and interaction design professionals for a variety of purposes. In this case, we followed the four stages of the affinity diagramming process: creating notes, clustering notes, walking the wall, and documentation.

Each of the three researchers independently made notes as we read through the raw data (i.e., the journal). We assigned a specific sticky note color to each researcher. Ultimately, a total of 681 handwritten notes were generated, which included handwritten text, drawings, and annotations. We then analyzed the data in a meeting room that provided a suitable space with ample wall space for us to stick our notes, a whiteboard for jotting down ideas and research questions, and enough room for the three of us to move around.

Next, we each affixed our notes onto A3-sheets of paper and placed them on the wall for easy reading (Figure 4a). On the other side of the room, we lined up white flip chart sheets of paper and secured them with masking tape. At the start of building the affinity diagram, we silently read each other’s notes and then placed them on the affinity wall. Once the team completed the first round of reading all notes, about one-third of the notes were moved from the A3 sheets to the affinity wall, forming note clusters. We then took turns explaining our ideas and the initial clusters. Throughout the process, clusters were merged, relocated, and renamed.

With the updated clusters, we proceeded to the next round of adding notes to existing clusters. Ultimately, 282 notes were filtered out, the discarded notes often consisted of duplicates, random observations, or questions that were later clarified. The remaining notes were used to complete the construction of the affinity wall (Figure 4b). In repeated discussions and dialogues, I elaborated on personal value and position, helped the other two researchers further understand my personal narrative. We then further filtered and refined the existing clusters. We reflected on the connections between the R/S practices and technology use. Our final clusters, where themes and sub-themes had been merged, are presented in the following section.

¹⁶Notion: <https://www.notion.so/>



Figure 4: a) Researchers reading affinity notes at the start. b) Final affinity diagram with note clusters on a wall.

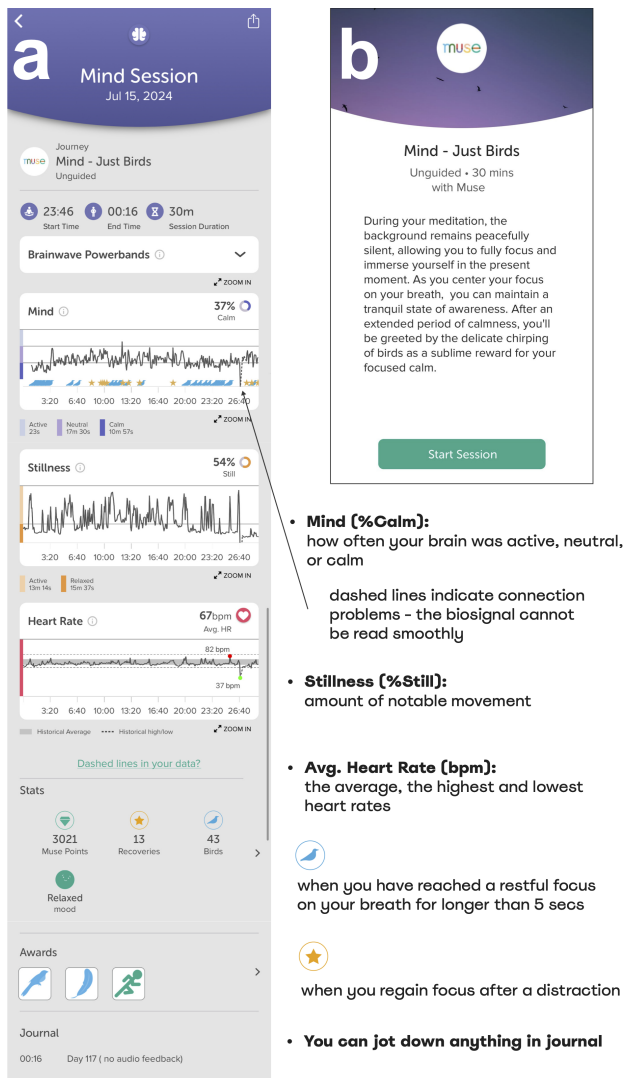


Figure 5: a) a sample report from the Muse app for each meditation session, including metrics for Mind, Stillness and Average Heart Rate, and b) a screenshot from the Muse app of a 30-min unguided meditation session.

5 RESULTS

5.1 Disruptions and strategies along the journey

5.1.1 Onboarding. For the first 20 days, I tried to familiarize myself with the different modes offered by the headband and the companion app. At first, the Christian prayer experience was more like a run-in period for the device. Poor connection with the headband sometimes left me disoriented and got in the way of the practice. Although the Muse Headband was already a wearable device that was relatively lightweight and did not cause discomfort with prolonged wear, I was not accustomed to having something on my forehead for a prayer session lasting 30 minutes, requiring a stable and tight fit around the front of my head. I encountered several times where poor contact with the headband caused the app to issue prompts, forcing me to pause my prayer midway through, re-adjust the headband, particularly the behind-the-ears sensors, until the app confirmed it had reconnected to the signal, and then refocus my attention on prayer. When I was forced to interrupt my prayer, I would feel disoriented and tense, especially when experiencing multiple cases of lost connection during meditation session:

Day 1: "I was worried about the stability of the headband at the beginning, and there were 3 reminders during the whole process that made me pause and adjust the headband." Day 8: "Initially, I had to spend a few minutes adjusting due to a poor connection, which left me feeling disoriented about my writing, and my connection to the scriptures felt weak."

5.1.2 Exploring Muse modes and other practice aids. During the initial stage, I tried different modes offered by Muse App (Muse has several pre-programmed soundscapes that include rainforest, beach, desert, city park and ambient music). The wide range of options and the ability to adjust the volume to your own preferences make it very personal. After trying all the soundscapes, I found that minimizing distractions in my Christian prayer practice was most effective for me. So from day 20 on, I decided to use a 'Just Birds' session with no other background music, only real-time audio feedback based on my brainwaves (see Figure 5b). *Day 20: "I feel like this 'Just Birds' session is quite natural, more like my previous setting for self-devotion...Compared with the previous mode accompanied by background music, the volume changing depending on the concentration will disturb my meditative state and grab my attention to identify my own state."*

In addition to using the Muse App during my Christian prayer practice, my needs also involved engaging with other materials, such as my habitual use of the YouVersion Bible app to read scriptures and daily devotional materials; sometimes I also wanted to listen to hymns to worship and praise God, so I opened Spotify to play songs a few times. The ability to use third party apps function met my needs well. Therefore, I explored using different apps and resources at the same time to enhance my experience.

I found myself gradually paying more attention to the real-time audio feedback from the Muse app. According to the app's documentation (Muse 2 Starter Guide): "You will hear and earn 'birds' when you've reached a deep, restful focus on your breath for longer than 5 seconds. Be mindful of the 'birds', but don't fixate on them as you may make them fly away."

In my case, the 'birds' produced by the Muse App was very natural and evoked images of me walking in the forest or the vibrant feeling of nature, which was very comforting. Despite this, I noticed that the 'birds' sometimes encouraged me to focus on prayer in the beginning, but then there came a time when not hearing the 'birds' made me feel a little anxious and distracted. As I wrote in Day 21: "I felt a little anxious during the process and tried to think about it to get the bird song." I was disappointed when there was insufficient feedback on my current state and doubted whether the device was working properly. Many times, I would instinctively glance at the app during prayer to make sure it was working properly. I realized that the habit of seeking feedback during my practice, regardless of the accuracy of the device's brainwave readings, will make me gradually rely on obtaining this feedback. In essence, over-reliance on the device and relying on this feedback to measure one's state greatly disrupted the flow of my spiritual practice and weakened the experience. Therefore, from day 117, I tried to turn off the volume of the 'birds' I could hear, which I called a 'silent mode'. I felt more grounded and focused, which was also confirmed by the relatively high Calmness percentage values in the following days according to the Muse post report (see Figure 6):

Day 117: "I wanted to see if I could maintain a deeper level of focus without the distraction of birds or any ambient sounds...I felt more grounded, more connected to the inner me and God! I felt that I was able to be even more immersed in the practice, focusing more on my own breathing, bodily sensations, and inner reflections."

5.1.3 New impacts of device use on practice. As I reflect on my experience, I realize the impact that using the Muse headband has had on practicing Christian prayer: from the initial constant running-in, to gradually getting used to it, finding a mode that suited a style coordinating with my own practice, and then having a smooth experience, I slowly forgot about its existence. This, however, requires one to possess some level of understanding and experience with these wearable devices, which in other words means time. In Day 85, I documented: "I've become quite proficient, with no connection hiccups. Almost immediately, I heard bird chirping."

In addition, I realized that during my spiritual practice, I would pay more attention to the body's perception and posture changes. Sometimes I needed to adjust my posture. For example, my legs would become numb after sitting cross-legged for a long time. I also had more hand movements: sometimes I put my hands together in prayer, and sometimes I relaxed my hands and opened them on my

legs. However, I found that it was easy to lose connection when bowing my head for a long time when praying or making slight body movements or singing hymns. The headband lost stability on my forehead as I wrote on Day 35: "...I sang along, but found it easy to disconnect, and poor contact behind the ears would also cause me to stop and adjust the headband." Several times, these situations forced me to stop and readjust the headband, significantly disrupting my meditation and prevented my natural posture from being as I wished. This was a tricky thing. To solve this problem, I would actively support or adjust my posture with my hands to prevent the headband from slipping off.

As part of this research project, I also consulted with church pastors, explored and tried out new techniques and prayer styles (e.g., meditating with Icons). These Christian traditions are all practiced in relative stillness and without large movements, which allowed me to do them while wearing the Muse headband. Not only that, but the way I was using multiple apps simultaneously also brought many new experiences to my usual spiritual practice. Of course, incorporating this device into my spiritual practice has brought me more than just these effects. In the following section, I will explain more about the effects the Muse headband has on the practitioner's emotions and psychological changes.

5.2 Emotional responses to technology-mediated practices

5.2.1 Difficulties in doing practice. Through analysis of reflection journals, we identified three main potentially negative feelings about the use of technology in spiritual practice: frustration and difficulty focusing, anxiety about low scores and disconnection, and confusion about understanding the quantitative data.

As I reported in the previous section, when a wearable recording tool was introduced in my spiritual practice, maintaining focus was challenging to achieve. My focus was easily distracted by multiple instances of disconnection between the app and the headband. There were times when concentration became super difficult to me. It seemed that the harder I tried to focus, the more challenging it became: Day 17: "Despite my efforts to meditate consistently, I found that my mind was quite scattered. Although I tried to focus while reading the Bible and praying, the results were unsatisfactory." In the initial stages, I also felt that time was passing particularly slowly because I was not used to a fixed time every time I went to Christian prayer. Day 88: "As I become more used to longer periods of meditation, I remember the difference between my initial experience and my old habits—especially this fixed 30-minute time-frame...I wasn't comfortable being still before God in silence." My mind was tempted to drift in the silence and sometimes I even drifted off to sleep. In addition, some physical distractions also interrupted my focus on God, such as eyelid twitching, experiencing bright, flashing lights behind my eyelid, and feeling a warm sensation on my forehead when deeply focused during prayer.

As a result, I felt varying degrees of anxiety throughout my spiritual practice. In summary, there were several triggers, including not being able to hear the real-time bird feedback from the Muse app, rushing to complete spiritual practice in a busy day, and tension between personal spiritual practice and external scholarly examination. These negative emotions have, to some extent, discouraged

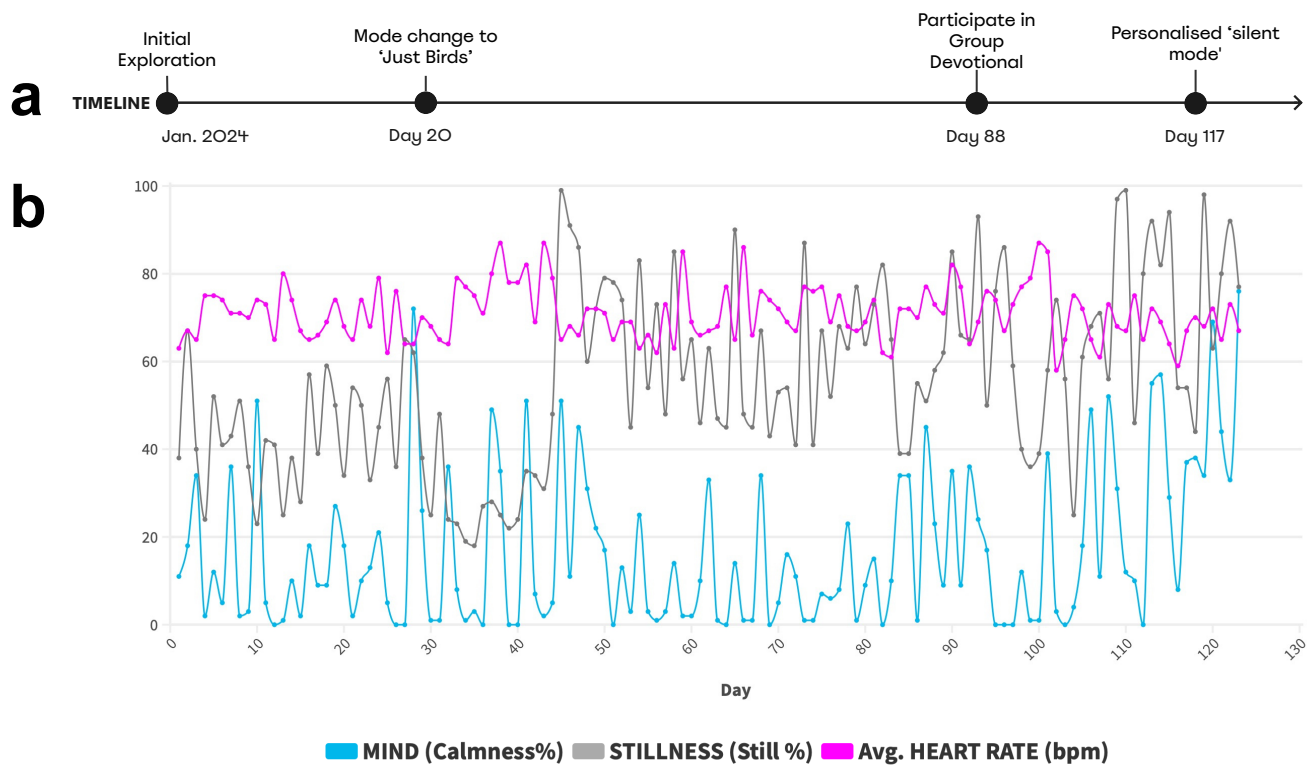


Figure 6: a) Timeline with an overview of four milestones during 123 days of Christian prayer practice spread over eight-months. b) Muse app report of the percentage of calmness (cyan) and stillness (grey), and the average heart rate per minutes (magenta) over the same period of time.

me from continuing to record my practice. I noted in Day 39: “*The headband broke (lost connection) once during the entire process, but no birdsong was heard. Okay, I admit that I was a little anxious to finish it and did not put my whole heart into it.*” When I feel anxiety emerging, I tried to make adjustments. For example, I tried to take a deep breath, intentionally adjust my focus, and remind myself that the core purpose of spiritual practice is to connect with God.

It is worth mentioning that after each session, I would read the post session report given by Muse app and try to interpret the relationship between these numbers and my experience. It is stated on the Muse app’s documentation website¹⁷: “The goal is a greater % of calm than neutral or active.” However, in my case, I discovered that a higher calmness percentage did not always correlate with a deeper spiritual experience. Similarly, I have not found any consistent patterns when it comes to average heart rate and bodily stillness.

In the early stages, I placed great emphasis on the results reported by the Muse App. I was deeply intrigued by quantified data, as it offered a new dimension of self-awareness by summarizing changes in my body’s signals overtime. However, it soon led to feelings of disheartening whenever my scores were low. There were several times when I got 0% for several consecutive days (Day 95-97), which

made me very confused. In my journal, I mentioned “*Maybe it is because the 0% score in the past few days has made me a little frustrated. Even if I know that I am not doing this for the score, it is still difficult to avoid its influence on me.*”

I acknowledge that spiritual practice is difficult to quantify, or to be classified and defined by a few numerical measurements. However, these data are not completely unrelated to my subjective experience. My experiences so far revealed that I achieved high scores in the following situations: when focusing on gratitude (31% of calm on Day 48); during uninterrupted prayer (45% of calm on Day 47); after participating in church activities (51% calm on Day 10 and 45% of calm on Day 87); when I attempted guided sessions for warm-up before meditation (72% of calm on Day 28); and later when I opted for a personalized ‘silent mode’ after Day 117 (the percentage of calmness ranged between 31% and 76%). I gradually discovered that every time I closed my eyes to pray, it was easier to get “birds” from the Muse app (see Figure 5a). Although I do not consider these quantitative results to be a complete assessment of my overall spiritual status, the connection between the data and my personal experiences is meaningful as it encourages deeper reflection on how these signals generated from my body.

5.2.2 Deepening spiritual connection. Apart from all the above negative emotions, we found many positive feelings during this

¹⁷Muse 2 Starter Guide: <https://choosemuse.com/blogs/news/muse-2-starter-guide>

practice, including relaxation and gratitude. One of the main components of all meditations is relaxation, which puts the body and mind into a pleasant and profound state of peace. Studies (e.g., [19]) also show other effects of this process include metabolic rate going down, heart rate, relaxed muscles, breathing very slowly and rhythmically, blood pressure lower than normal, and so on. I found that engaging in Christian prayer relaxes me, both mentally and physically. Even on busy days when I thought it would be hard for me to be still, I was astonished at how I enter into a stage of relaxation. I mentioned in my journal when I felt *refreshed and very relaxed* (Day 38) and *recharged and empowered* (Day 85).

Gratitude was another recurring theme in my journal. Beginning my prayers with thanksgiving to the Lord has been a habit cultivated over many years. I have expressed, feeling *grateful* (Day 42 and 57), *gratitude with tears* (Day 111) and *overflowed with gratitude and full of joy towards God* (Day 85). This has always been the second nature for me to express gratitude to God regardless of my circumstances in life, even in moments of sadness, doubt, or fear. This finding also revealed similar results to some prior studies. For example, Lambert et al. [31] reported from longitudinal studies that religious practice of prayer activated gratitude and more frequent prayer led to subsequently increased gratitude. Overall, practicing Christian prayer helped me set aside time in my daily life to focus on bible reading and contemplation, offering a sense of steadiness amidst life's hectic pace. All the positive emotions serve to motivate me to keep engaging in spirituality behavior.

5.2.3 Quieting my mind and making room. Compared to mindfulness and other more widely used forms of meditation, Christian prayer takes a different approach. Comer [10] contrasts the purpose of Buddhist meditation with Christian prayer, noting that while both involve the *emptying* of the self, the goal of Christian prayer is to make room for God to fill it. The concept of letting go of one's control thoughts while maintaining attention and a neutral emotion is challenging. As I wrote in Day 56: *"Then I followed the words that moved me and wanted to think more deeply. I let the thoughts take me where they are, which is natural and does not cause me any pressure."* I tend to define it as a state of waiting and silent concentration. It symbolizes the feeling of *emptiness* I had when I was in contemplation or when I made room to hear God's response instead of making myself think in silence.

Feeling God's presence is important to my spiritual experience. In my journal, I wrote that sometimes I would invite the Holy Spirit to open my spiritual eyes to feel God's presence when I began to pray, and ask the Lord to help me focus on God and His Word while I ponder the Bible verses in my heart, trying to catch the whispers of God in the silence instead of the "birds". This practice of remaining in God's presence in solitude had also been a great help in dealing with sad events in my life, such as facing death. When I heard that a tricenarian friend of mine passed away due to a prolonged illness, my heart was filled with sorrow that day, and I chose to relieve my emotions through my praying to God. This prayer was emotional, with many silent moments soaked in tears rather than words. I thanked God that I could share part of my life with that friend. Besides, I was relieved that this friend could be finally discharged from the tortures of the disease and prayed that my friend's soul could rest in peace in heaven.

5.3 Exploring unfamiliar practices

5.3.1 Prayer through icons. During this research period, I also tried to step out of my existing practice and gained brand new experiences, such as meditating with icons from my laptop for four days, aiming to enrich my prayer experience and engage deeply in spiritual practice. I went back to the oldest and most important icon for meditation (see Figure 2a). This practice was unfamiliar yet very interesting to me. As I scanned the details in the image and gazed into God's eyes, it felt as if he was also gazing back at me. That eye contact was indescribable. Sometimes I found myself marveling at the information I was getting from the image and then closing my eyes to re-imagine about the scene. My vision has always been focused on reading scripture and devotional material from a physical Bible or the Bible app on my phone. Therefore, looking closely at an icon for a long time (different from visiting a painting in a museum), *"I began to think and meditate in my heart on the meaning of the incarnation of Christ and its relationship to me (Day 69)." I reflect on the impact of these visual signals on people in the context of R/S and wrote on Day 70 in my journal: "...gifted people can use their gifts to create art, leaving visual traces and interacting with others. This is how I was able to see Jesus as people imagined from thousands of years ago. In those days before computers or printing technology, it must have been an unforgettable experience for believers to go to church and see Jesus on the wall!"*

5.3.2 Spiritual practice in diverse environments. I also practiced and recorded my reflections in different situations in my daily life. For example, I carried the Muse device with me when traveling, which allowed me to practice and record my spiritual practice in different countries and places. I practiced Christian prayer in different hotel rooms, which made me very sensitive to the changes in my physical environment and the soundscape. As I wrote in Day 101: *"I left the familiar little home I know well...The hotel room is a comfortable size, not too big or small. This city isn't overly loud either, very peaceful. That helped me center my focus easily."* I also practiced in a quiet environment while visiting a church building in different regions. This made me reflect on the meaning of space for a person of faith: Day 123: *"As I stepped into the space, it felt like entering a labyrinth. Unlike the ornate cathedrals adorned with stained glass, this Brutalist structure was defined by simple concrete, shadow, and geometric forms. ...As I returned to my seat and closed my eyes, I immersed myself in the tranquility of the space. I personally find this minimalist, monochromatic spaces to be more conducive to my own spiritual contemplation, allowing me to focus inward without the distractions of the material world."*

5.4 Solitary yet connected

5.4.1 Personal prayer within the collective faith. Christian prayer is inextricably linked with the faith of the community, well beyond the level of personal need and reflection. While prayer may first start with the personal intention, it opens up quickly into praise and thanksgiving and the engagement with others which is at the heart of the larger faith community's concerns. In my own spiritual journey, I have repeatedly found myself praying for families and friends, whether because they entered my mind spontaneously during prayer or because I had heard their prayer requests in daily life. *"I believe this is a touch that God has placed in my heart"*. On

day 114 I wrote, “without these people knowing, I’m praying for them. I also firmly believe that my brothers and sisters are silently praying for me at different corners from this world as well.” Even if we are in different countries and regions, we are connected in this way. This experience emphasizes how often in Christian prayer, the line between personal and communal easily dissipates, each believer adding to the collective faith in an act of prayer, bringing up not only their own needs but those of the greater world as well. In so doing, they participate in the same spiritual obligation, knowing full well that many are silently doing the same, tied by some invisible network of mutual support through faith.

5.4.2 Collective practice on a shared platform. Similar results were found in reflections on practice within the faith community, specifically, collective Bible reading plans. I started a collective Bible reading plan with some brothers and sisters in the church on day 88 of my spiritual journey. This was initiated by the group leader and we did personal devotions together every day on the same mobile app. While the activity was communal in nature, each participant engaged in the daily Bible readings and devotions independently, according to their personal routines. Each day’s Bible reading plan has a sharing section at the end, inviting individuals to post their own reflections and insights they wanted to share with the community. This was a completely spontaneous act and unplanned event. As an active member in the church, I decided to participate and combine this devotional with my research. I practiced the *Lectio Divina* reading materials based on each Bible reading plan.

Initially, this was a big motivator and we received contributions from multiple participants every day. Over time, the number of contributors and the frequency of sharing declined. Some even failed to complete their plans on time, as shown by the tracking function of the app. I personally experienced this pressure, reflecting on Day 97: “Sometimes I think that although the feeling of community can be a driving force, sometimes such a driving force can become a kind of pressure. It is like pushing me to complete a task.” I discussed this phenomenon informally with other community members in daily conversations. We agreed that this is not a mandatory task as it is important to share when inspired, there should be no guilt about falling behind or feeling compelled to compare oneself with others. I am grateful for such a faith community where we can share frankly and encourage each other, so we continue this collective practice. By Day 110, I noted in my journal: “This kind of community connection has been helpful to my personal spiritual growth and relationship with the church family.” This situation mirrors findings from previous HCI research, where users of a social Bible reading tools called *BibleCell app* [28] reported feeling like burdened by the pressure of staying on schedule. Similarly, in their paper, Kaur et al. [27] found that *SoulGarden*, an interface that visualizes users’ spiritual support network, helped to increase a sense of community and belonging. Collaborative group activities were seen to bring a competitive atmosphere and affect personal goal achievement.

6 DISCUSSION

Instead of focusing on R/S practitioners, this section aims to serve as inspiration for designers creating techno-spiritual experiences.

6.1 Becoming sensitive to the prayer environment (RQ1)

We found that incorporating digital devices (i.e., Muse headband, mobile phone for *Lectio Divina*, laptop for meditation with Icons) into R/S practices, such as Christian prayer, both enriches and complicates the experience. The first author has already adopted the YouVersion Bible app as a digital tool in daily practices, including scripture reading and daily devotions. Running other mobile apps, in this case, the YouVersion Bible App, while monitoring and recording biometric data in the Muse companion app, provides another layer of meaning to this spiritual practice and an opportunity to blend multiple technology tools into the R/S experience. However, incorporating the Muse headband into Christian practice brought challenges and difficulties to the spiritual journey.

During the initial stages, the first author mentioned that she felt considerable discomfort both from the physical presence of the headband and the need to keep the connection stable to the app. This directly impacted or restricted common Christian prayer behaviors, such as head bowing or holding hands in prayer, singing hymns, or reading scriptures aloud. This resulted in a number of interruptions wherein the first author had to stop and re-adjust for a smooth connection, which affected the continuity of practicing Christian prayer. These discomforts gradually decreased as the first author became accustomed to the device. But similarly, this initial uneasiness also led to the realization that unfamiliar technology may indeed interfere rather than smoothly integrate into R/S practice. However, we must admit that the primary purpose was not to evaluate its effectiveness as a meditation device, but to explore its potential as a recording tool that could reveal implicit knowledge generated during religious practice. Our study highlights the importance of designing devices that support R/S practices by grounding their functionality in the prayer behaviors and requests of believers (e.g., the Catholic eRosary bracelet or the Islamic iQibla Zikr ring).

Perhaps the most interesting finding from this study is that the practitioner became more sensitive to her prayer environment. This awareness was related not only to her immediate physical surroundings, but also to nearby auditory and visual stimuli that subtly affect people’s spiritual experience. Sound, as a crucial element in R/S practices, can greatly influence a person’s experience. While sound can facilitate relaxation, it also has the potential to serve as a distraction, with individuals experiencing auditory stimuli in varied ways. In the latter stages of the study, the first author turned off the sound of birds chirping to avoid being disturbed, thus achieving a better concentration experience. In contrast, the natural sound of birds outside the window helped her experience relaxation and joy. Therefore, when designing such R/S environments for practitioners, we recommend providing flexibility to make their own choices, whether it is turning off auditory feedback, or choosing a particular ambient soundscape. Empowering users with agency over their personal soundscape could improve their spiritual experience.

Visual elements also play an important role in shaping spiritual practices. The simplicity of design can be seen in the color scheme or in the minimal distractions, creating a tranquil environment that invites more contemplation or allows for a deeper focus. The first author wrote in her journal, “I soaked in the light of God, feeling serene and peaceful.” That moment transcended the physical, revealing a

sacred relationship with light. Visual cues such as light and colors can add unexpected richness to a person's spiritual experience. In Hemmert et al.'s [20] *The Flame of Prayers* study, participants were not provided with explanations for possible meanings behind the prototype's color-changing flames, which led to discussions of the liturgical meanings and subjective feelings of the colors. Turrell has expressed that *"light is not so much something that reveals, as it is itself the revelation."* He has utilized light as an inspiring art form to invite visitors on contemplative journeys within chapels, drawing parallels to the Quaker practice of silent prayer, described as *"going inside to greet the light"*¹⁸. Moreover, Kwan et al. link the scents of prayer-nuts with the church and biblical texts to facilitate museum visitors' engagement with spirituality [30]. Practitioners of Jewish mysticism also refer to ascending bodily sensations as one way to achieve divine interaction [17]. *The Miracle Machine* serves as a means of dialogue and prayer, stimulating the senses of smell, warmth, softness, and sound to relax the nervous system and establish a connection with God.

Our study further highlights that when designing physical or virtual spiritual environments, different senses such as sight (e.g., light), smell, touch, and hearing (e.g., sounds) can enhance—or weaken—a R/S experience.

6.2 Emerging emotional nuance in prayer (RQ2)

We explored if and how prayer with digital devices emotionally affects Christian practice and found different reaction types (i.e., negative, neutral, positive). Regarding negative emotions, we found that the first author was easily distracted by the disconnection between the app and the headband, which caused frustration and difficulty concentrating on prayer. In addition, she felt anxious during prayer due to the fear of potentially getting a low concentration score, and confused when trying to make sense of the quantitative data reported from the Muse app. In addition to the aforementioned negative emotions, our findings also include a neutral feeling in "the state of waiting and silent concentration" as described in section 5.2.3. As the first author became more accustomed to the use of the device, she also became more aware of the feelings in those silent prayer moments. We found positive feelings during prayer with digital devices, such as feeling relaxed, empowered, and grateful. It is worth noting that these positive emotions were not triggered by—but rather supported despite the inclusion of—digital devices.

Prior work has used the term "expression of appreciation" (EOA) to encompass acknowledgment that goes beyond the simple act of thanking someone, expressing gratitude, establishing a positive emotional connection, or recognizing the help of others who offer prayer support in an online health community [53]. Interestingly, we also discovered similar positive emotions in offline settings. The first author offered intercession¹⁹ prayer for church community members, friends, and families, and noted that other church members did the same. Therefore, in everyday life, mutual intercession prayers among practitioners also provide spiritual support and foster positive emotions among one another.

"Feelings pray, but one cannot say that prayer is only feeling. Intelligence prays, but praying is not simply an intellectual act. The body prays, but one can speak with God even having the most serious disability. Thus the entire man prays if he prays with his 'heart'." Pope Francis noted in his catechesis on prayer²⁰. Similar to the Prayer Companion [16] study where cloister nuns were touched by both positive and negative 'I feel' statements on display, the nuns pointed out that many messages seemed indulgent. However, the nuns wanted to challenge people to break free from their habitual mindsets rather than criticize them for expressing their feelings. While Christian prayer is undoubtedly emotional, people should not pray only for positive emotions. Coleman [9] talks about *spiritual consumerism*, the idea that if we *"rate the quality of our time with God based on how it makes us feel"* or *"pray and worship only if we feel like it"*, then we are caught up in consumeristic prayer. We want to clarify here that wanting to encounter God emotionally in prayer is not a bad thing, but one should not seek spiritual validation from emotions. Such prayer can limit our relationship with God to an emotional state, because He is, greater than our emotions. The first author gradually became aware of this tendency and reflected on it throughout the process of her ongoing autoethnography. The idea of how to "stand before God" [16] in prayer is more challenging to understand and put into practice, as it involves more than merely expressing thanks, praise, or intercession.

Our results also indicate that a person's mood is affected by unpredictable events in everyday life. Therefore, designers aiming to support and expand people's spiritual capabilities through technology should consider providing tailored options to choose different modes according to particular situations and preferences (e.g., Muse's different modes with or without background sounds).

6.3 Understanding R/S experiences in everyday life practice (RQ3)

By adopting the autoethnographic approach, researchers are empowered to have a first-person experience, which can reveal subtle feelings and unique insights that may otherwise be ignored [36]. Besides, this approach also fits the concept of *"lived informatics"* [49], which emphasizes that tracking and understanding data are done across a range of life activities, not always for a specific goal or to increase efficiency. Building on this idea, Markum et al. promote *"spiritual informatics"* to highlight the everyday complexities and challenges of people's lives while taking into account the R/S values that individuals find important [39]. In our case, we used autoethnographic narratives to understand how digital technology is embedded in one's lived spiritual experience.

First, we acknowledge that articulating and sharing one's lived experience in academic discussions is challenging as it requires the *practitioner-cum-researcher* [37] to engage in self-revelational writing by discussing details about themselves and sharing authentic feelings. At the same time, being a doctoral student allows the first author to become a relevant contributor through her own investigation rather than merely by being a research subject [4]. Second, the researcher's dual role as both research subject and analyst also brings a relatively subjective dimension to the planning

¹⁸<https://www.overlandpartners.com/project/the-color-inside-james-turrell-skyspace/>

¹⁹The act of praying on behalf of others, or asking a saint in heaven to pray on behalf of oneself or for others.

²⁰https://www.vatican.va/content/francesco/en/audiences/2020/documents/papa-francesco_20200513_udienza-generale.html

and evaluation of the study. Therefore, we describe the methods of this research in detail in the paper, including how the data were recorded with different tools and platforms, how the collected data were then analyzed with researchers from different backgrounds (both religious and non-religious), and how the reported findings were made more critical through discussion and reflection. Third, this exploratory nature can make broad generalizations difficult. We recognize that the current results are based on data collected over only eight months from one person. According to Bhatti [4], the participating authors' personal narratives become assets, such as their resilience, academic writing abilities, and tacit knowledge. These assets go beyond the 'data' to become the first authors' distinct strengths. We hope to bring insights into the potential impacts that individuals may encounter when incorporating self-tracking technology into their spiritual practices by telling a lived story.

Reflecting on this study, we found that this inquiry into one's spiritual journey does have its own shared dimensions. In the middle phase, the first author conducted group devotions (not initiated by her) with others from the church community, where members shared their insights on their daily devotions using the same materials provided by the same mobile app (i.e., the YouVersion Bible App). The first author also prayed privately for various friends and family members experiencing a range of life difficulties and presumed that this was the same for other private prayers from people in the faith community for one another. Our study thus underscores the reality that individual and communal spiritual practices go hand in hand; the worth of the individual spiritual formation both informs and is itself shaped through communal spiritual life.

6.4 Closing remarks from the first author

After almost a year into this journey, I continue to incorporate the aforementioned digital devices as part of my daily Christian prayer practice. In retrospect, I have found that this approach may not be ideal for me in the long run. I have thus recently begun to consider going back to my roots—my usual prayer practice—or to try something slightly different with the use of digital devices in the context of prayer. Coleman [9] reminds believers not to focus on what we do for God without being with Him. Being with God may require us to do more subtraction than addition. In the spirit of *undesigned technology* by Pierce [45] and echoing Baumer's *not to design* [2] ideas, I am considering adopting the concept of *technology removal or exclusion* by removing all digital devices from my Christian prayer to explore the potential impact it may have on my practice.

Prayer Companion [16] is a techno-spiritual design born out of a specific situation for a specific group of people. Unlike the monastery nuns, who are "*isolated from the world*," many believers are surrounded by digital devices in their daily lives. Reflecting on the spiritual formation and everyday lives of contemporary believers can help us make more thoughtful and sincere decisions, rather than designing for the sake of design, which may easily "*pave the way to hell*" despite having good intentions. As was mentioned in my journal, I participated in a weekend retreat organized by the local church for the entire congregation. The retreat included worship and teaching, encouraging community members to grow together through face-to-face interactions, and to connect with

God through personal devotion in nature. This experience was profoundly refreshing for me. Designers and researchers may find inspiration in Gary Thomas's [54] idea of "*spiritual temperament*" developed to determine how a person relates to God:

- (1) Naturalists: experiencing God in nature and the outdoors
- (2) Sensates: engaging with the sacred through sensory experiences: candles, incense, materials, and so on
- (3) Traditionalists: connecting with the Divine through ritual, symbolism, and liturgy
- (4) Ascetics: finding spiritual depth in solitude and self-denial
- (5) Activists: expressing faith by fighting injustice
- (6) Caregivers: showing spirituality by caring for those in need
- (7) Enthusiasts: celebrating God through music and dance and joyful gatherings
- (8) Contemplatives: deepening their relationship with God through quiet adoration
- (9) Intellectuals: encountering God through thought and conceptual understanding

One or more of these categories may resonate with believers at different seasons of life—as it did with me: "*There is great freedom in how we can meet with and enjoy God. This is by His design and according to His good pleasure.*"

I anticipate that more digital fasting—often likened to a detox from technology—will be adopted in the future. There are already Christian voices encouraging believers to unplug/disconnect from digital technology in order to deepen their relationship and reconnect with God. For example, Rothschild [50] proposed the practice of "*modern Sabbath observance*," by turning off their screens, closing their laptops, and putting away their smartphones for a full day every week. Apart from that, busy modern individuals in need of a spiritual awakening, might consider group-based spiritual activities such as prayer walks, Taizé meditation, or pilgrimages.

× "*If you try walking in my shoes, you'll stumble in my footsteps.*"—Martin L. Gore (Depeche Mode)

7 Conclusion

In this paper, we presented an autoethnography where the first author shared her experiences integrating digital devices in Christian prayer practice. Four themes were identified (i.e., *disruptions and strategies throughout the journey*, *emotional responses to technology-mediated practices*, *exploring unfamiliar practices*, and *solitary yet connected*). We further discussed bodily and emotional aspects of emerging techno-spiritual experiences, and reflected on the use of autoethnography as a research method to understand religious and spiritual (R/S) practices. This study contributes valuable empirical insights for investigating techno-spirituality, thus assisting HCI researchers in comprehending the real-world complexities faced by religious individuals when interacting with technology. Based on our findings, we speculate that some practitioners could consider and may benefit from *technology subtraction*—removing certain technologies—to foster deeper spiritual connections. Moving forward, we plan to conduct interviews with pastors from different countries to investigate their takes on and experiences using technology in their religious practices. With this knowledge, we aim to expand the concept of "*Spiritual Informatics*" in response to Claisse's [6] provocation to explore the concept as a design space and try

to design interactive environments that incorporate contemporary technologies. We believe that such efforts will help people discover their own faith in the digital age and shed light on the diversity of human spiritual experience.

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