
Sun Dial: Exploring Techno-Spiritual Design through a Mobile Islamic Call to Prayer Application

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Abstract

We present the design and formative evaluation of Sun Dial, an application that supports Muslims' prayer practices. We report on a study that involved identifying prayer as an activity that can be supported with technology; the development of a prototype; and a short-term evaluation of Sun Dial conducted with our local Muslim community. In addition to presenting a novel design idea, our case study contributes to the growing corpus of research examining technology and religion.

Keywords

User-centered design, religious technologies, Islam, best practices

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

In the last decade, HCI has moved out of the office, and conducted research in a variety of domains. For example, there is now a considerable knowledge about people's domestic and leisure lives—and the role of technology within those experiences. More recently, researchers have started examining how people use technology to support religious practices [3,6,7].



Figure 1: An antique Islamic astrolabe used to calculate the sun's positions.

These reports collectively argue that millions, if not billions, of people, use information and communication technologies to engage in religious experiences. One finding that emerges from these studies is that design for religious uses of technology may not be driven by the same concerns that dominate HCI research to date. Indeed, we must go beyond traditional concerns of efficiency and productivity of technology when developing systems to support religious practices. Though these are important in office settings; they are not as central when designing within the context of spirituality and faith (see [3]). However, a design question remains: what does it mean to design technologies that support religious practice?

In this paper we report on the initial phases of a larger study exploring this question through the building and evaluation of an application we call "Sun Dial." It is a mobile phone-based application that prompts Muslim's to their five daily prayer times.

Background

Interest in techno-spiritual practices [3] has emerged with the recognition that technology is used around the world to support a range of religious activities. Examples include Catholics receiving the Pope's daily thoughts via SMS, Orthodox Jews using "kosher phones," and Protestant Christians downloading hymns as ringtones [1,4]. Despite a flurry of empirical work examining how technologies are used for religious purposes [6,7] less attention has been given to how designers should design for this space.

Indeed, Genevieve Bell has urged designers "not just [to design] for secular life, but also for spiritual life, and ... to design it now!"[3]. She argues that doing so will

open new spaces for design by suggesting alternative paths for technology. In response to Bell's challenge we chose to design a technology to support Muslims' religious.

We chose Islam for the following reasons. First, despite growing interest in religion and technology Islam remains overlooked. We found this surprising given that it is widely considered one of the fastest growing faiths worldwide. Though the exact figures are debatable, there are an estimated 1.2 billion Muslims worldwide [2]. Secondly, Muslims have historically relied on technology to support their religious practices. For example, Muslims developed compasses and telescopes to determine Mecca's and the sun's locations for daily prayer (Fig. 1). Because of the faith's growth and long-term use of technology, Islam presented a wonderful opportunity for studying how to design technology in support of religious life.

A Brief Introduction to Muslims and Prayer

Muslims differ widely in terms of their traditions, schools of thought, and sects (e.g., Sunni, Shi'ite, and Sufi), but one thing that remains consistent among all is an adherence to "The Five Pillars of Worship," or the basic acts all Muslims are expected to fulfill during their lifetimes. One of these is performing ritual prayers known as *salāt* or the five daily Islamic prayers (Fig. 2). The time of these prayers varies from place to place and from day to day. The ritual begins with the *adhan*—the call to prayer—traditionally called approximately 15 minutes before time from the mosque's (*masjid*) minaret by a human or a loudspeaker. Following the call, Muslims perform ablution —washing parts of their body—and perform two to four ritual cycles called *raka'ahs* while facing the *qibla*, or Mecca's direction.

Name	Time Period
<i>Fajr</i>	Dawn to sunrise
<i>Dhuhr</i>	Noon prayer
' <i>Asr</i>	Afternoon prayer
<i>Maghrib</i>	Sunset prayer
' <i>Isha</i>	Evening prayer

Figure 2: The five daily prayer time and when they occur.

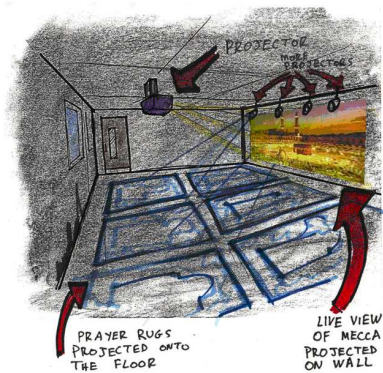


Figure 3: Projected Mosque

Each raka'ah consists of a sequence of movements that include standing, prostrating, kneeling, sitting, and reciting texts from the Qur'an. Salāt does not need to take place in a mosque; it can take place at home, work, or in an open space. Irrespective of the degree of their own conformity, most Muslims believe that regular performance of the salāt is required of them [2].

Developing Sun Dial

Our study had two phases that took place over a three month period. First, we needed to narrow our broad interest in Islam and technology to a more focused topic: Muslim prayer practice. After narrowing our focus we surveyed existing systems and read to deepen our understanding of prayer. Second, we designed and evaluated our Sun Dial application with US Muslims.

Initial Explorations, Prayer Practice, and Salāt Programs

At the project's inception prayer was not the only possibility we wanted to explore. So we began the research wanting to gain a broad understanding of Islam in order to identify possible directions for technological support. From the beginning we recognized the need to familiarize ourselves with Islamic beliefs and practices so we could speak the users' language, ask appropriate questions, and know how to conduct ourselves in mosques. To gain an understanding of our topic within our timeframe and to inform a series of design concepts we used a "rapid ethnographic approach" [5]. In addition to reviewing literature on Islam, we conducted multiple participant observations at two mosques, interviewed Muslim students, and a prominent Islamic scholar at a nearby university.

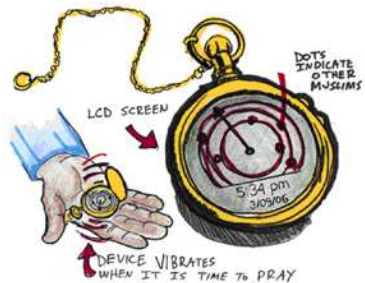


Figure 4: Digital Qibla Compass with Matchmaking System

After collecting data for four weeks we produced a series of conceptual designs. Each concept explored a different way technology could support aspects of Islamic faith. For example, we imagined a projection-based system that transforms a generic room into a space that more closely resembles a mosque (Fig. 3) and finder systems to help Muslims find others to pray with during salāt times (Fig. 4). Our designs also varied on other parameters such as literalness. For example we created a relatively metaphoric system which projected calligraphy onto walls (to emulate the decoration found in mosques) as well as an ambient, glowing orb designed to subtly remind people that it was time for prayer (Fig. 5). We produced a booklet of concept designs, and invited Muslims to provide feedback on the designs. This feedback helped eliminate many concepts for reasons including the appropriateness of technology use in a mosque, and the desire to manage Islamic identity against other identities such as student, American and so forth.

During these discussions participants were drawn, in particular, to one idea—our conceptual design for a mobile phone based system that provided prayer time information (Fig. 6). Having identified prayer as an area to further explore we surveyed similar technologies for inspiration as well as to ensure that we did not reinvent an already existing technology. Perhaps, the existing system that has received most attention is the Ilkone i800; introduced in 2004, it is described as "the first fully Islamic mobile phone" [1].

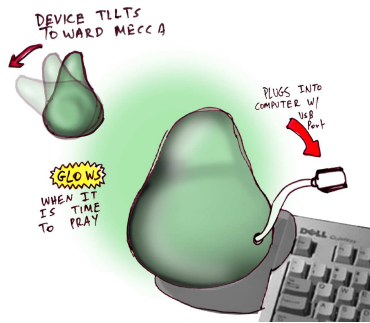


Figure 5: Ambient Prayer Orb

In addition to the Ilkone, we surveyed 11 other mobile call to prayer application. The systems' interfaces typically depict a grid showing a list of the five prayer times, rely on text and numbers, and have little in the way of graphics (e.g., Figs. 7,8). Surveying the media we also learned that these systems appear to be popular, particularly in the Middle East and Europe. Through personal communications with developers of these systems and by reviewing popular press we confirmed this popularity, and learned that the use of these applications was growing, although not in the US. This is largely due to inconsistent mobile platforms and smaller Muslim population in the US.

At the end of this data collection phase, we knew that prompting individuals to pray during salāt offered an opportunity for technology design. We also saw a means to distinguish our system from existing ones by exploring the role of graphics and audio in our interface design. Finally, we saw an opportunity to introduce this type of technology to US Muslims who have not been able to use many existing mobile phone programs.

Design and Evaluation

In the second part of this study we built and subsequently evaluated Sun Dial during a four day in situ deployment. We began this phase by gaining a more in-depth understanding of Islamic prayer by reviewing literature, observing prayer practices, and conducting interviews.

We attended four prayer sessions held on campus and conducted two focus groups with five Muslim students in each. During the focus groups we asked questions about leaving classes for prayer, the playing of the adhan in Islamic countries, among others to further our

understanding of salāt. At this point we also asked students what other systems they used to determine appropriate times for prayer (since prayer times differ slightly each day). All used printed prayer calendars obtained from their mosques, the Internet, computer software, natural indicators (e.g., the sun, sky's color), or social cues (e.g., friend and family). Further questions revealed that some Muslims preferred looking at the sun (when possible) to determine prayer times, for two reasons. First, because doing so was more inline with how the actual salāt times are determined and second, because knowing the sun's location made them more cognizant of how, as one person put it "God's greatness manifests in nature." They also talked about how difficult it was to observe these natural indicators in urban settings. Smog, bad weather, tall buildings, and being in windowless rooms all restricted their view of the sun. Finally, at the end of the focus group, we asked participants if they would be willing to use a prayer reminder application on their mobile phones.

During this phase it became clear that prayer takes place during a "window of opportunity," rather than at an exact time, a finding that would become central to our system design.

This information guided the development of our call to prayer application, Sun Dial. The initial prototype was developed using mobile processing, a Java 2 Micro Edition (J2ME) scripting interface for Java, that allows for fast development and easy integration of graphics. The application was then downloaded onto a Nokia Series 60 phone, an appealing platform because of its large screen. The interface depicts the sun, the sky, Arab text indicating the five prayer times, and a

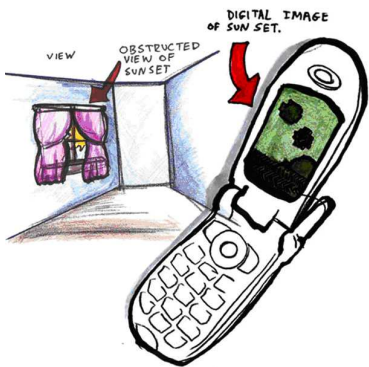


Figure 6: Mobile Sun Display



Figure 7: Athan Time, www.athantime.com



Figure 8: Pocket Prayer Times, www.pocketgear.com

silhouette of a mosque (Fig. 9). The sun passes through the sky and changes color following sunrise, day time, sunset and night, thus mimicking nature. As the sun moves closer to a prayer time the background begins to lighten. A subtle burst of light fills the screen and quickly disappears to indicate the start of a prayer time. For the prototype, we took the prayer times from a well-respected prayer time site (islamicfinder.com) and hard coded them into the phone.

Departing from existing systems, and inspired by our understanding of the “window of opportunity” for prayer, Sun Dial does not communicate precise times but instead gently suggests that prayer time approaches through the lightening backgrounds and the proximity of the sun to the text. Furthermore, we tried to keep our interface as simple as possible, and free from multiple lists and numbers. This also reflected participant’s attitudes suggesting that prayer is a time of intense concentration and should be free of distractions so that the worshipper is focused towards God.

We deployed and evaluated Sun Dial during a four day evaluation with practicing Muslims. Participants were given a Nokia Series 60 mobile phone running the application and were asked to treat the phone as their own for duration of the study. Since we wanted to understand users’ daily experiences with Sun Dial, we used a voice-mail diary technique to collect data. This involved SMSing questions to participants’ phones after the daily evening prayer, asking them to call a number, and leave a voice-mail message answering the question. Questions were designed to elicit different kinds of information that would be useful in determining users’ reactions to the application. On the

first day, we inquired into whether or not the system was functioning correctly. On the following days, we asked users to describe what happened during a specific prayer time; if the system impacted their routine prayer practices; and we requested that they describe their overall experience with the system. At the end of the study, we conducted an informal focus group with the participants to get more feedback.

We received ten voice-mail responses. Participants’ responses were transcribed and team members independently coded the transcripts looking for common themes.

Preliminary Findings

Broadly, students’ reactions to the applications were favorable. Two described “showing it off to friends,” and asked if they could put Sun Dial on their personal phones. More importantly their critique of our system supported some of our design decisions, but also pointed to changes we plan to implement in future iterations.

As we anticipated, the sun’s subtle movement towards a prayer time prompted participants that salāt was approaching. Knowing this gave them more time to prepare for prayer. All participants commented on the application’s functionality. While they found it useful during some of the daily prayer times participants reported that the system did not effectively alert them to all five prayer times. In particular, participants did not feel they were effectively alerted to fajr the early morning prayer. Because participants were not constantly observing their phones display the sun’s subtle movement and change in background color was not sufficient enough to alert them. To combat this,



Figure 9: Sun Dial interface

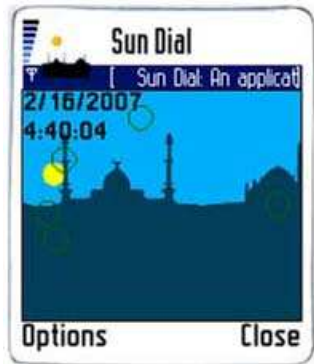


Figure 10: Revised Sun Dial interface

we added an auditory signal to complement the visual ones. All noted the interface's attractiveness and agreed it was the Sun Dial's "best feature." In addition to its simple design participants were drawn to the interface's imagery. As one participant described it:

...because of the minarets and the Islamic architecture, it is [a] reminder, especially for a lot of people in the U.S. we wish we could be in the Middle East or in a country that had more of this- 24 year old male

But attitudes towards the Arabic text were mixed. Some participants did not understand it because it was too small and/or because the user did not read Arabic. The evaluation demonstrated the feasibility and usability of our application. However, changes need to be made, the most prominent being that participants want a more robust alert.

Ongoing and Future Research

We have begun to make changes to the interface based on our early studies. We added a digital clock on the interface's upper left corner, a vibration alert, and a digitized adhan. We chose an 18 second segment of the adhan and programmed it to play 15 minutes before the start of prayer times and replaced the Arabic text with green circles (Fig. 10). These design decisions remained inline with our desire to develop an interface that communicated a window of opportunity, rather than a precise time for prayer. Accompanying these changes, we provided controls to enable or disable the vibration and audio; and made the application act as the phone's screensaver.

We plan to conduct a longer term in-situ evaluation with a larger and more diverse sample to understand

our application's wider usefulness to the American Muslim community. More broadly we hope to answer questions about designing for users' faith. For example: Can standard HCI evaluation methods be used to when evaluating techno-spiritual design?, How does using a mobile phone for religious purposes changes users' relationship with it?, and finally 'What additional factors must be taken into account when exploring users' religious practices?

Acknowledgments

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