

SoundPainter: Alleviating the Worry Adult Children Experience over their Aging in Place Parent

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1 Abstract

Aging in place seniors stay in their residence even after they begin to require more assistance in accomplishing daily tasks. Since many of aging adults would prefer to age in place rather than move to an assisted living center [1], it is important to develop software and technologies that support this model. SoundPainter is an example of software that supports aging in place. It displays evidence of activity in the household of aging parents so that adult children experience less anxiety over their loved one.

2 Introduction

The first baby boomers turned 65 in 2011. As the largest generation in United States history ages, the number of adults over age sixty-five is expected to double by 2035 [1]. This will have significant financial and social implications on our society. Traditionally, a large percentage of the aging population has been institutionalized in assisted living and nursing facilities, but surveys of the baby boomer generation have indicated that many of them would prefer to age in place, meaning that they would like to continue living in their homes even as they need more help with day-to-day tasks [1].

Oftentimes, parents who are aging in place are monitored by their adult children. This commonly involves daily phone calls or visits. According to the Special Committee that testified in front of Congress in 2003, “More than 23 million Americans are providing assistance to a family member...30 percent of the current workforce is caring for a relative” [1]. Although less costly for the government, such an arrangement often puts strain on caregivers, especially since many of them have to care for their parent in addition to working full time jobs [1]. In many cases, the anxiety experienced by adult children over not being able to be with their aging parent all the time, rather than the actual safety of their aging parent, is the main

factor that motivates the decision to remove the aging parent from their home and place them in an assisted living facility [7].

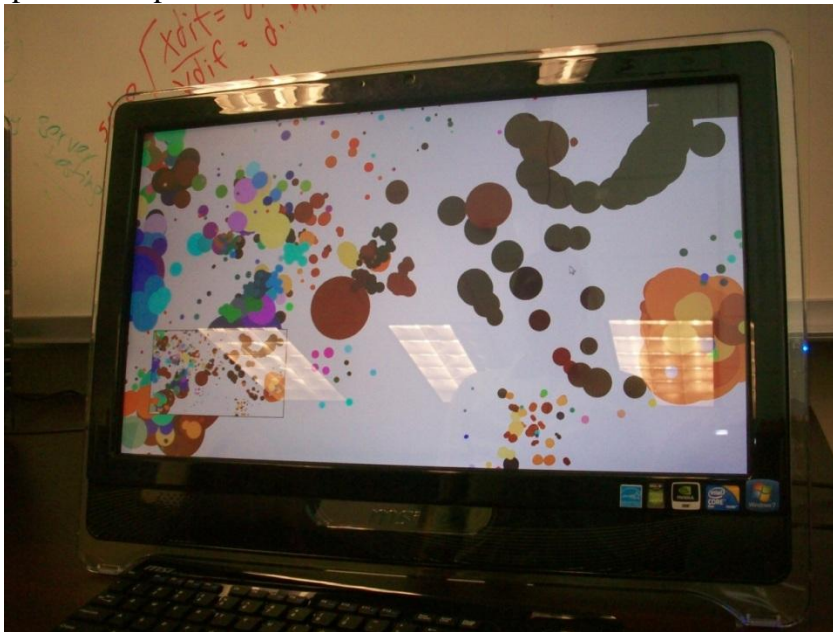
Technology that supports aging in place is meant to alleviate the amount of worry an adult child experiences over their aging parent, so that the adult child is comfortable with the idea of their parent aging in place. SoundPainter is an aging in place software designed for use on Windows touchscreen computers.

3 SoundPainter Aging In Place

SoundPainter paints a series of dots on a full screen display in response to the volume and pitch of sound input. The volume of the input determines the size of the dots and the pitch of the input determines their color. The location where the dots are displayed is random. Since dots are only painted in response to sound, the painted dots are evidence of household activity.

SoundPainter is designed to be run between two networked computers. One touchscreen is placed in the household of the aging parent and the other is placed in the household of the adult child. When SoundPainter is running in both households, the adult child can see the paint display generated from the aging parent's household and the aging parent can see the paint display generated from the adult child's household. The painted display will fade every fifteen minutes so that most recent activity is obvious. We predict that viewing evidence of activity in the aging parent's household via SoundPainter will lessen the adult child's concern for their aging parent and promote a sense of connection between the adult child and their aging

parent.



SoundPainter: There are two paint designs (one for each household). The large design takes up most of the screen while the smaller one is shown in the left-hand corner.

Although we anticipate that SoundPainter will function primarily as an ambient display, users have the option to interact with it as well. When the user touches the main display, a canvas appears on both touchscreens.

Users in each household can then draw designs on the canvas, after which the canvas design will become the main display in both households. This feature was added in hopes that it would encourage a greater sense of emotional connection between the adult child and their aging parent.

When SoundPainter is first activated by a user, the small square outlined in the right-hand corner of the device displays the design generated by that user's activity. The larger design that occupies most of the screen is generated by the touchscreen computer in the other household. Users can toggle the views so that the designs generated by are user occupy the majority of the screen by simply touching inside the small square in the right-hand corner.

When touched, a "History" button in the right-hand corner of the device reveals a series of history screenshots. The screenshots are displayed around a clock face according to the hour at which the screenshot was taken. This allows the user to see the representation of an entire day's activity at a glance. This way, if the adult child has been at work all day, they can return home and look at the history in order to see whether any activity was detected in their aging parent's household throughout the day.

The main purpose of displaying history screenshots is to help adult children become more aware of their aging parent's daily routine. Together, they "summarize" a day in the aging parent's household. Having knowledge of the aging parent's daily routine is useful because a sudden departure from routine could be an indicator that something is wrong. By regularly viewing the history screenshots, the adult child can



gain a sense for what is normal and abnormal activity.

For example, if the screenshots taken from the adult parent's touchscreen are typically blank between 10 pm and 6

This display appears when the "History" button is touched.

am but the history screenshot taken at 7 am always displays evidence of sound activity, the adult child can conclude that their adult parent usually gets out of bed and starts moving around the house between 6 am and 7 am. Once the adult child grows accustomed to the routine of their aging parent, then every time the adult child sees evidence of activity at 7 am, they are reassured that their loved one is well. As a result, they worry less about them. However, if one morning, the adult child sees no evidence of activity in their aging parent's household and it's already 11 am, they would recognize this as a departure from the normal routine of the aging parent. This, in turn, would prompt them to call their aging parent to verify that they are okay.

SoundPainter doesn't record video or audio, which is fairly unusual for a monitoring tool. The paint display is generated from immediate sound input only. There is also no way to trace back to see what audio prompted the formation of a certain paint design, since the location of the dots is random and there is no way to know for sure what dots appeared in what order. This protects the privacy of SoundPainter users.

4 Discussion and Related Works

A number of publications have examined the traits that make aging-in-place technologies useful. Important factors to consider when designing technologies for older people are functionality, cost, privacy, trust, and acceptance [2]. Of these factors, privacy, trust and acceptance are especially important. Older people don't like being videotaped and they don't like being monitored [3]. There is no point in designing a technology to help older adults if the very people for whom the technology is designed are unwilling to have it in their home. However, devices that involve some form of monitoring, but are designed with reciprocity in mind, are more likely to be accepted [3]. In other words, if both parties are monitoring each other, the device is more likely to be accepted than if only one party is monitoring the other.

In terms of functionality, SoundPainter is easy to use. Since SoundPainter serves mainly as an ambient device, there is no need for users to interact at all with the device unless they want to view history screenshots, draw a design, or toggle between minimizing and maximizing the paint designs generated by their household versus the designs of the other household. Cost is an issue, since touchscreens are expensive, but it's a one-time expense. As stated previously, SoundPainter records neither audio nor video, which should alleviate most concerns over privacy. In addition, it was designed so that the adult child and the aging parent will be monitoring each other's activity. We expect that aging parents will accept the presence of SoundPainter in their homes because they know they will have access to just as much information

about the residents in their adult children's household as the residents in their adult children's household will have about them.

There are a few devices similar to SoundPainter in function and design. The most similar is MarkerClock, a face clock that has been modified to include information about household activity via a motion detector [4]. Like SoundPainter, each MarkerClock is networked with another MarkerClock, and both MarkerClocks send and display the same information. The information from the motion detector is displayed as a "colored trace in a concentric ring" [4]. This is similar to SoundPainter's history screenshots, which are displayed around a clock according to the time they were taken. Users can interact with each other using their choice of three symbols, whereas SoundPainter users can interact with each other by drawing on their screens. A significant difference is that MarkerClock was designed to be used by an older person and one of their peers, instead of an older person and their adult child. In addition, SoundPainter could be considered artwork and the interactive drawing feature promotes creativity, which could lessen the stigma of it being a monitoring device and increase its chances of acceptance. MarkerClock, on the other hand, is purely a monitoring tool.

Digital family portraits are another example of an aging in place technology [5]. Like SoundPainter, this technology is intended for use by an aging parent and adult child. Each day, information about the daily tasks of the aging parent and the participants in the adult child's household are collected, and a new digital portrait is uploaded online. Symbols on the customized frame of each digitalized portrait provide clues about the activities the person did that day and the general level of activity they engaged in. Whereas digital family portraits are useful for prompting conversation between the aging parent and those in the adult child's household [5], they cannot be as useful as SoundPainter is in providing information about how closely the aging parent adheres to their daily routine, which is arguably a better indicator of health. For example, when reporting on their daily activity, the aging parent is more likely to mention that they took a walk outside for fifteen minutes and mention nothing about the fact that they didn't make dinner that night because they were not hungry. SoundPainter, however, would have recorded an absence of activity during the time window that the aging parent usually makes dinner, which could then alert the adult child to a departure from daily routine. Also, if one day the aging parent takes their walk later than usual because they slept in until noon that would also not be indicated on a digital portrait, even though such a departure from routine could indicate that the aging parent wasn't feeling well enough to get up at their normal time.

When evaluating ambient displays, researchers have often found that interviewing users while the study is active can influence their perception and treatment of the display [6]. A key observation was that the “opinions and behaviors reported in the interviews did not match what was captured during actual use” [6]. When designing our user study, we will take this into account. The program logs user interaction with the device, such as when the history is viewed, when a screen shot is enlarged, and when the drawing canvas is activated, but there will be no way for us to know how often the user looks at the device except by asking the user.

5 Conclusion

SoundPainter is a unique device in that it can function as artwork and convey a record of the daily activity in an aging parent’s household. It does all this without invading the privacy of the aging parent.

This project is not yet complete. A user study will be carried out to evaluate whether or not SoundPainter alleviates the concern many adult children feel for their adult parent that is living alone.

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