Bridging the Digital Divide One Tweet at a Time: Twitter-Enabled Devices for Family Communication

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Abstract
We present two devices designed to facilitate information transfer and communication between family members, particularly older adults and their younger relatives. Central to both devices is their use of Twitter to send updates and messages to relatives and friends. In this paper, we report on the design of the system and share results from preliminary focus groups.

Keywords
Twitter, aging, distance, intergenerational, communication

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

General Terms
Design, Experimentation, Human Factors

Introduction
Staying connected in today's society is especially important, and sometimes challenging, for older adults, given the growing technological advancements in the field of communication. As numerous studies have shown, there are a wide range of needs and desires when it comes to communication devices for families. While many younger people are quickly adapting to life immersed in technology, some older adults are hesitant about new technology. In order to bridge this gap, we present two devices designed to improve intergenerational communication using Twitter.

Related Work

People are not the only ones using Twitter [14] these days. One attractive aspect of Twitter is the ease with which sensors can be programmed to interface with it in order to send "human-free" tweets. Many developers and hobbyists are utilizing Twitter to allow their devices the capability of updating their status. Examples of this trend include a washing machine that posts Twitter updates on its status [1] moisture detection sensors that tweet when it's time to water your plants [3], and an alert system that lets fetuses send tweet in utero via an interface that senses their kicks [7]. Many of these devices are made possible by the Twitter API, or Application Programming Interface [13]. This feature, along with plenty of open source code libraries, makes programming devices to work with Twitter relatively simple. A device can also be programmed to send an email through SMTP (simple mail transfer protocol). Twitter can then be updated with the emailed content through the use of an "email to tweet" program such as Twittermail [15].

These simple devices could be used by older adults to provide information on things such as their well being to concerned relatives and friends. Bypassing the traditional home computer, easy-to-use Twitter-enabled devices can allow users to send digital messages without need for a keyboard interface. Additionally, as a user can set their Twitter preferences such that they are alerted by text message when someone they are following tweets, a Twitter-enabled device can make sending a text message to a relative or friend as simple as pushing a button.

There is a large body of work in the field of devices to facilitate long distance communication between families [9,10,11,12]. Similarly, there have been studies and commercial products which allowed for sensor monitoring of the homes of older adults [2,4,5,8]. We have not come across any Twitter-enabled devices designed specifically for older adults. However, Twitter has many advantages over other means of communication for this purpose. It is a method that many people are familiar with, free to use, and easy to set up. This makes it an attractive application to integrate into homemade, low-cost devices that can be prototyped and modified quickly.

Design

To explore the possibility of using Twitter for communication among families, we used anecdotal stories from colleagues and friends as a starting point. Numerous people mentioned being concerned about whether their older relative was remembering to eat regularly, or take their medicine, or to take regular baths. Another concern that we heard was worrying about calling an older, or ill, relative when they were sleeping. Based on these stories, the "Twitter Fridge" and "Family Pager" were designed.

Twitter Fridge

The "Twitter Fridge" is a utility notification device that works by sending a tweet every time a sensor is actuated. Such an alert sensor could be configured to work with virtually any door, window, fixture, or appliance. This particular version was designed with a contact sensor, well suited for sensing when a door (such as one on a refrigerator or cabinet) is opened (Figure 1).

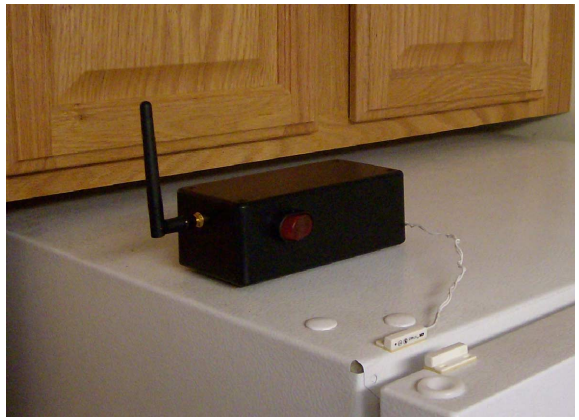

Figure 1. The "Twitter Fridge"

In the "Twitter Fridge" scenario, a message is sent whenever the refrigerator door is opened. Family and friends who follow the Twitter feed for the fridge would then be able to see the times at which the refrigerator is opened (Figure 2). After reviewing the number of times during the day that the refrigerator was opened (figure 3), one can make assumptions that the older adult is remembering to eat regularly. By changing the type of sensor, this notification device could also be installed on a bathtub. Here, it would provide information such as when the faucet was turned on and when it was turned off. If the faucet were left on for an extended amount of time, family and friends would have that information and act accordingly.

It should be noted that there are a number of existing home monitoring systems with more comprehensive sensor coverage (often including a refrigerator sensor), such as the HealthSense eNeighbor system [6], many of which have nurse staffed call centers monitoring anomalies or help calls. The devices presented here are in no way as comprehensive as such systems, but rather present the possibility for a low cost, independent approach to monitoring. The "Twitter Fridge" as an alternative for low- risk situations where a single sensor sending alerts directly to the family members would provide enough information to alleviate the fears of both parties.

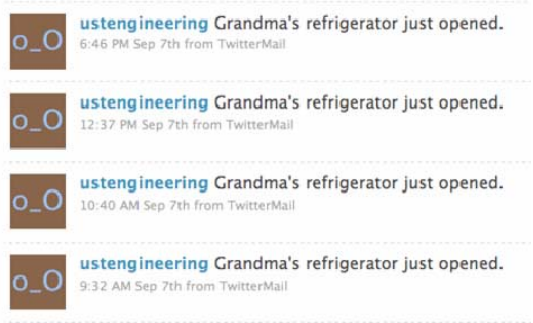

Figure 2. Screenshot of the "Twitter Fridge" prototype's Twitter page

We intend "Twitter Fridge," and similar devices, for use in applications where a family member not receiving a tweet would be a sign that they should try to contact their monitored relative. Thus, in a situation where the power source or the sensor itself fails, the lack of tweets would imply that the monitored individual is not opening the refrigerator, which would likely lead family members to check in on the individual.

Family Pager

The second device we designed (figure 3) was one that is capable of sending a simple message with the push of a button. It would allow older adults to contact others in a simple and efficient way. The message would be in the form of a Twitter update, email, or text message making it easily accessible to relatives who prefer digital notification. The initial concept for this device was one that had a single button, which would glow when pressed. The process of turning the device on would send a tweet announcing that the user was awake and interested (or up to) receiving calls or visits. At times when the user did not wish to be interrupted, such as when they were taken a nap, the button could be pressed again, turning the light on.

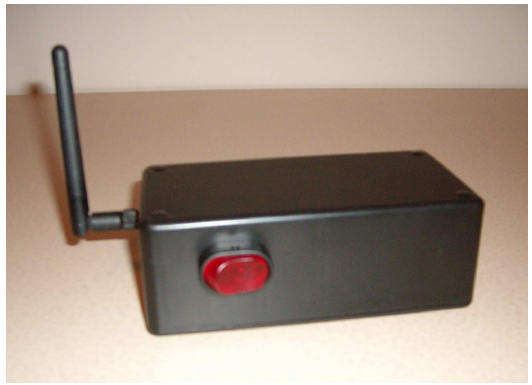

Figure 3. (a) Prototype Personal Notification Device

It is our intention that the message the device sends could be personalized such that it could send a tweet

such as "Grandma is thinking about you! She would love it if you would give her a phone call!" In such personal applications, we envision that the Twitter stream for this device would be locked with only desired recipients being given access. This is an option that is already built into Twitter, and thus would be easy to incorporate. This message would be sent when the older adult pressed a button.

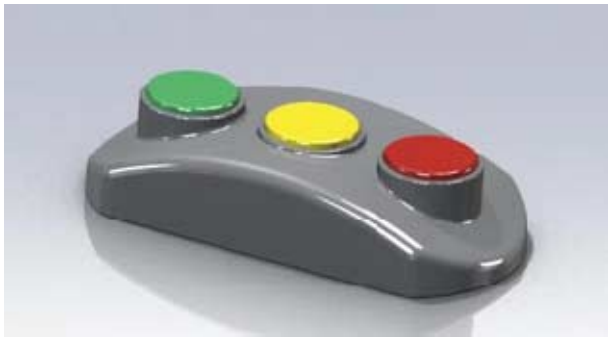

Figure 3. (b) Proposed Personal Notification Device

FEEDBACK

Three focus groups were conducted to get feedback on the devices described above. A total of 11 adults between the ages of 53 and 85 participated. It should be noted that 7 of the participants were relatives of the second author, and thus she was not present at the focus groups. Participants were not paid, but were given a university baseball cap as a token of appreciation.

Each focus group lasted approximately 45 minutes. The facilitator began be asking the participants a few questions about the types of communication devices they currently use. He then presented the two prototype devices and demonstrated how each worked. Participants were then asked questions intended to elicit their opinions of the prototype devices and possible modifications that could be made to them.

Current Devices and Methods

Among our focus groups we noted some resistance to communication methods that are generally becoming accepted as common:

"I completely resist cell phones. I will not get one." (84 year old female)

"I don't text. I've never tried texting, but I can't imagine doing it." (60-year-old male)

Comments such as these imply that devices such as the Family Pager could allow a way for non-texting relatives to interact with relatives who use that as a primary form of communication. A grandparent might use the Family Pager to send, via Twitter, a text message to a grandchild saying hello and asking them to call when they have a chance.

Comparisons and Contrasts with Existing Devices

Similarities between the Family Pager and existing medical alert systems were discussed. One participant liked the idea that the personal notification device was designed to contact.

"One of the issues with these med-alert devices is that people are kind of intimidated to use them because they don't want to bother people. They don't want to call in the army to rescue them and so they won't use it!" (60-year-old male)

"This kind of thing [the Family Pager], too, is almost less threatening than this little thing around your neck... This seems like a much better alternative, in between, when you know that someone is aging but they're not quite ready to accept the fact." (63-year-old female)

Daily Check-In

Two participants commented that they had family members that called to check in every day, and proposed that the Family Pager could serve this function:

"My mom calls me every morning to tell me she made it through the night." (53-year-old female)
"My brother calls me every day just to say, "I'm alive.

And something like this would be useful for that purpose." (60-year-old male)

While it is easy to imagine a button that could be pressed every day to alert family members that you are okay, the researchers wondered if such a device would result in less direct communication between families. Before replacing a daily phone call between brothers (or mother and daughter) with a button push and automated message, we would encourage further research into the social implications of such a device.

Another participant saw the potential of this device to send affection to loved ones:

"You could have hit on a real product here in the sense that people want to telegraph their affection whether it's a grandmother to her grandson, whether it's a wife to her husband. If you could press a button and tell someone that you love them you could have a winner!" (60-year-old male)

Such a device would be reminiscent of some existing devices, however, using Twitter as the communication method for these devices is quite powerful. As the KickBee example illustrates, Twitter is a wonderful medium for non-users of technologies such as Twitter or email to connect with friends and relatives for whom this is a preferred medium. One could customize the "Family Pager" to send a message of "I just want you to know I love you" whenever the button is pressed. While this does not dictate any required action on the part of the receiver, it could be attractive for a grandparent who knows that their grandchildren are avid texters. This would give them a way to participate in the activity of texting with a substantially smaller investment to learning a new technology.

Simplicity Versus Versatility

An initial goal of this project was to create as simple a device as possible that would still include sending useful information, in keeping with recommendations such as those by Fisk, with regards to ease of use for new technologies. Thus the binary approach to the Family Pager was created. This was appreciated by some participants:

"One thing that I do like about it is that it's simple. For people learning how to use it there's not too much that they have to learn to use." (70-year-old female)

"It's simple, it's compact, it's light." (75-year-old male)

Other participants, however, were frustrated by the lack of options offered by the Family Pager:

"And something like this perhaps you could have different states of immediacy. Maybe not just one button, but a yellow, a green, and a red that a person at the start of the day could press the green and say 'everything's cool, I'm doing fine.' If it's a yellow, maybe there's some kind of minor problem. They don't want to necessarily have someone come over right away but just indicate that they could use a little help. The red would be, come over immediately and it would go to their immediate family rather than go out to the police… (60-year-old male)

"It's basically just a two state device but not many people would have such a dedicated use for it. It would have to be something where you could set up to put out a variety of messages." (60-year-old male)

Other Concerns and Comments

Focus group participants seemed to enjoy the idea of being able to control the message being sent. There seemed to be more interest in the active communication method, as opposed to the passive Twitter Fridge. While both devices are capable methods of informing friends and family of an older adult's well being, we feel that the Twitter Fridge may be a slightly less personal means of conveying that information.

Participants in our focus groups also had concerns about WiFi as a means of connecting older adults. Many older adults that would potentially use these two devices would likely not have access to wireless internet. When redesigning the devices we will also look at using other wireless networks, such as cellular.

Use of Feedback

We used the feedback from these focus groups to redesign the devices. It became obvious that new designs will have to be application specific. One scenario is that an older adult would check in with a family member each day by pressing either a green, yellow, or red button, indicating their general well being. Another scenario is when a grandparent presses a button that sends a text message to his or her grandchild. Both of these applications use the same basic technology, but the layout and design of the device would need to be different to accommodate either situation.

CONCLUSIONS AND FUTURE WORK

To conclude, we presented two devices aimed at bridging the communication gap between older adults and their younger contacts. We believe that the Twitter Fridge is a versatile device that could give peace of mind to family and friends of older adults. We see the Family Pager as a simple communication device that could promote better communication between family members using various methods of communication. A grandson receiving a text message from his elderly grandmother would be encouraged to call her and visit.

The two devices we have presented need further development in order to best serve the needs of older adults. However, we have demonstrated that Twitter-based devices can be used by older adults to communicate with friends and family. This leads to better overall communication for families in a growingly tech-savvy society.

ACKNOWLEDGMENTS

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