

Connecting Families by Sharing the Minutiae of their Lives

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ABSTRACT

Recent studies have shown that in distributed families keeping in touch is essential; this calls for technologies that can connect family members and bring them closer virtually. There are several social networking technologies online, but they are seldom designed for family connectedness and do not cater for the needs of computer-novice relatives. We present *Near Dear*, an application that brings online tools to an ambient display at home. The ambient display makes it easy for computer-novices to update and access online networking tools. We also conducted a user trial and evaluation of this system which indicated that the developed system is convenient and intuitive.

INTRODUCTION

Presence is important in work groups, social networks and especially families. People often want to know what their family is doing and reciprocate [2]. When members are geographically distributed, presence and connectedness become important as well as challenging. Parents and children want to be reassured of each others' wellbeing.

Keeping in touch within families is a challenge because different age groups have different preference and proficiency with the technologies available for connectedness [4]. Computer literate members of the family are more likely to use the Internet, often accessing social networking sites such as Facebook, MySpace and micro-blogging websites such as Twitter, and Jaiku. These are usually the younger members. Figure 1 shows the breakdown of users of a popular micro-blogging website, called Twitter (described in the next section). It is evident from this graph that Twitter has many users between the ages of eighteen and forty four. Comparatively, there are few users above the age of forty four that use this social networking site. (Please note that throughout the paper we have used the words 'parents' and 'children' as metaphors for not-so-tech-savvy and tech-savvy members respectively for convenience.)

There is a gap in the information flow of this existing system of using popular websites to keep-in-touch. Updates sent by children to a website are not transmitted to parents, owing to the fact that they can be accessed only through a computer. Parents do not update their status on the Internet because it is a cumbersome pro-

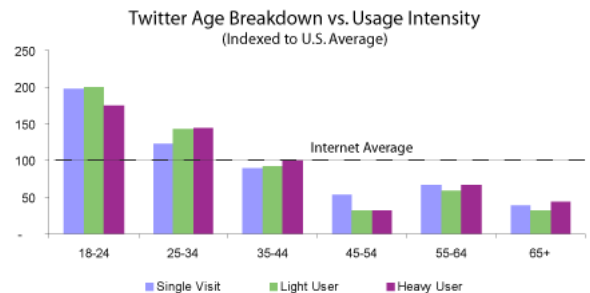


Figure 1. Age Vs Twitter Usage taken from <http://tinyurl.com/6bborp>

cess for someone who does not have ready access to a computer or is not proficient with technology. With domestic ambient devices that display updates and make it easy to update presence, this gap can be bridged.

RELATED WORK

Ambient Devices

An ambient device is a device that blends in with its surroundings. According to Weiser, ambient devices bring out the true potential of technology due to their distinctive features. They are unobtrusive and very easy to use; users can get information at-a-glance [9]. They make use of important surfaces at home that are extensively used to broadcast information, such as refrigerator doors and kitchen counter tops [8]. Since most devices look like familiar household objects – a clock or a photo frame, they are non-intimidating for computer-novices. The Whereabouts Clock, developed by Microsoft and Digital Photo Frame are two such devices. Both have had great success in the commercial market and user trials.

The Whereabouts clock is a device that provides information about the location of family members. The locations are broadly classified as 'home', 'work', 'school' and 'elsewhere'. User trials done by Microsoft show positive feedback on this technology. They show that the Whereabouts Clock gives members of the family reassurance by showing them what they already know. It helps co-ordination which is essential in a family to make decisions and plan day-to-day activities. For in-

stance, in one family, the wife put the kettle on everyday when she saw her husband leave work. The clock also ensures connectedness and togetherness among the members [2].

The Digital Photo Frame is another ambient device that has been very popular among all age groups. Over a million digital photo frames were sold in the UK alone in 2007 [5]. This device has an LCD screen that display digital photographs. The newer versions connect to the Internet and display online content and text files as well. According to the New York Times, this device is for grandmothers of the near future to display a nearly infinite number of photographs [7].

Chumby

Chumby is an ambient device manufactured by Chumby Industries, Inc¹. It is an aesthetically pleasing ambient device that looks like a clock-radio built into a small bean bag. It can access web content with the help of flash movies.



Figure 2. Chumby has an accelerometer, a touchscreen and uses Wi-fi to connect to the Internet.

We chose Chumby for this project not just because of its pleasant and non-intimidating appearance, but also because it is very developer-friendly. Chumby Industries has released a comprehensive API; developers can also upload and share their applications for free on the Chumby website². Chumby has the potential to be what the user wants it to be [3].

Micro-blogging

Micro-blogging is a technique that enables people to update what they are currently doing as short 140 character messages. There are several websites for Micro-blogging, such as Jaiku, Twitter, Facebook, MySpace and many more. Users update their status as an answer to 'What are you doing now?'

For this project, we chose Twitter, a popular micro-blogging website, in which users submit Tweets (status updates). Users can 'follow' friends which means that they subscribe to their friends' status feed. Thus, each

¹Official website: www.chumby.com

²www.chumby.com

user can be following other users and is followed by other friends [6]. Users get their friends' updates as a feed called 'friends' timeline'.

Twitter has over 2 million users around the world³. It is popular among work groups where people need to keep each other informed about their minutiae. NASA's Mars Phoenix⁴ and United States presidential candidate Barack Obama use Twitter to micro-blog⁵.

There are several third-party applications that make Twitter easy to update. TwitterFox is a Firefox plug-in that appears as a small icon on the browser; through this we can easily send and receive Twitter updates. Other applications include Twhirl, Moodblast, and widgets on iPhone, Chumby, Blackberry etc. Tweeter is an application on Chumby that displays the friends timeline of a user. It is because of these applications, and because updates can be sent through SMSes, that Twitter is so widely used and extremely popular. Ninety percent of the traffic Twitter gets is comprised of API calls⁶!

DESIGN

Twitter is currently mostly used by people of a certain age-group (Figure 1)The main idea of Near Dear is to make this website easy to access and update among all age-groups. This is carried out in two steps. The first step makes it easy for 'parents' to update their status on Twitter effortlessly. The second step enables 'parents' to see Twitter updates of their family easily on an ambient display.

Parents' Updates to Children

Computer literates in the family, or 'children', are those that have easy access to a computer. They are the people who have a computer on their desk at work, or college students with a laptop. For them updating Twitter is an easy task; they would use third party applications, such as TwitterFox for easy updating while using their computers. They would also use mobile phones to send text messages to Twitter.

On the other hand, not-so-tech-savvy members, or 'parents', are the ones that do not have access to a computer very often. They could be elderly people who have never used a computer, or just busy stay-at-home parents who do not find time to access a computer several times a day. For them, updating their status on a computer is a cumbersome task. They need a quick and easy way to send updates.

The Near Dear widget is deployed as an application for

³2,317,224 users; Figures as of 08.08.08 on <http://twitdir.com/>. This is the number of public profiles only. The actual number of users would be much higher

⁴Mars Phoenix's feed: <http://twitter.com/MarsPhoenix>

⁵Barack Obama's feed: <http://twitter.com/BarackObama>

⁶quoted by Zygmuntowicz on <http://blogs.zdnet.com/BTL/?p=8878>

Chumby that enables effortless Twittering. It senses the orientation of the Chumby and updates Twitter accordingly. All the user has to do is interact with their Chumby and confirm the status update by hitting an OK button (Figure 3).

The Near Dear widget uses the accelerometer in Chumby to recognize four orientations- east, west, south, and shake (Figure 3). Each orientation has a message corresponding to it, which is visible on the screen on that orientation. For example, turning the Chumby upside down could show an option 'Feeling Low'. The user then presses the OK button at the bottom of the touch screen, and that message is updated to Twitter. On shaking, a menu of three messages shows up, and the user can select one of the messages to submit as an update.

The user can also press the 'custom update' option on the shake menu to send an update different from the predefined options. On hitting the 'custom update' option, a keypad is displayed. The user can enter the new message and either hit OK to update Twitter or Cancel to navigate to the friends' feed screen (Figure 4).

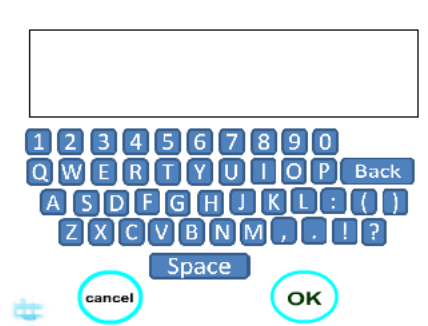


Figure 4. Keypad on the Near Dear widget.

All the options displayed on each orientation are fully customizable using a configuration widget (Figure 5) on the Chumby website⁷. The user customizes the widget by entering his/her Twitter username, password and messages for each orientation once in the beginning. These can be modified anytime.

Children's updates to Parents

Bringing children's updates to parents faces the same challenge- parents do not have access to a computer all the time. As illustrated in Figure 6, the Near Dear widget shows updates of all the user's friends on Twitter. This screen shows up when the user is not interacting with the Chumby. The widget fetches information about the updates every two minutes from Twitter.

DEVELOPING AND EXTENDING THE DESIGN

⁷Widgets on a channel can be customized here: <http://www.chumby.com/widgets/channels>

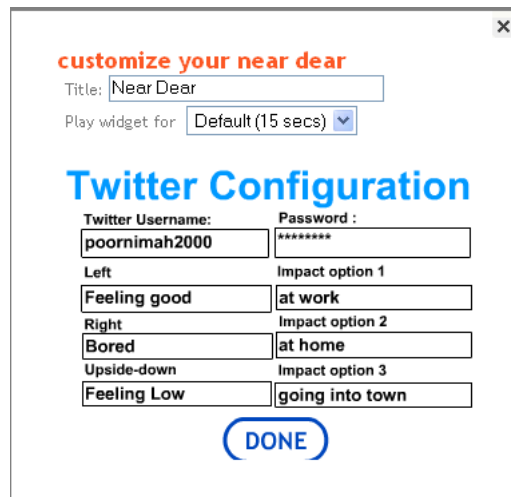


Figure 5. Configuration interface for Near Dear on the Chumby website

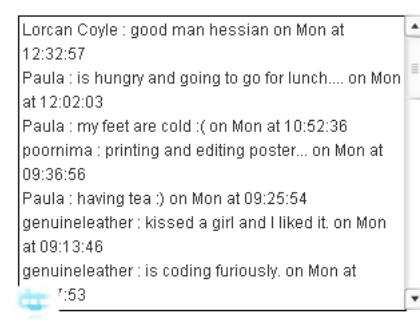


Figure 6. Screen shot of friends timeline on the Near Dear widget

Although the initial interface made it easier to update the user's status, we decided to investigate the possibility of Twittering while the user is not near a Chumby. We used Bluetooth sensors located in various places in our building to get location and time information. A program intelligently manipulates this information and updates Twitter.

The Bluetooth sensors we used are a part of another project called Basadaeir. Mobile phones can be registered on the project's website⁸. When a mobile phone is tracked by a sensor, the information is sent to their servers.

Location and time information gathered by Basadaeir is used by a program to determine the user's activity. The program defined certain rules that evaluate the location and time to predict the user's activity. For example, if a phone is tracked in the social area in the building at around noon, the user's Twitter status can be updated to 'out for lunch.' But, if the phone is tracked in the same area at some other time, the update could be 'taking a break.'

⁸<http://basadaeir.ucd.ie/>

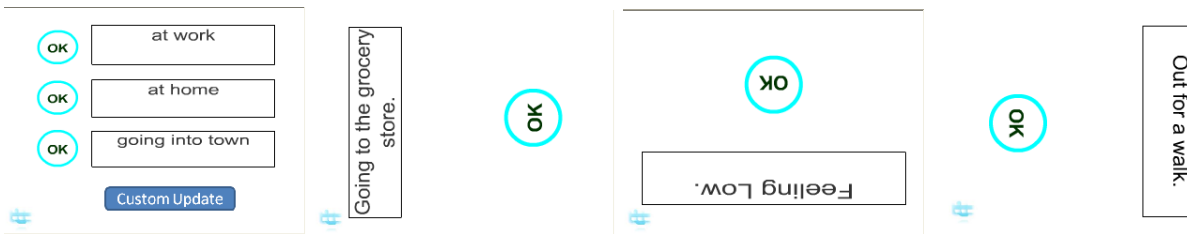


Figure 3. Screen-shots of various Chumby orientations. l-r (shake, west, south, east.)

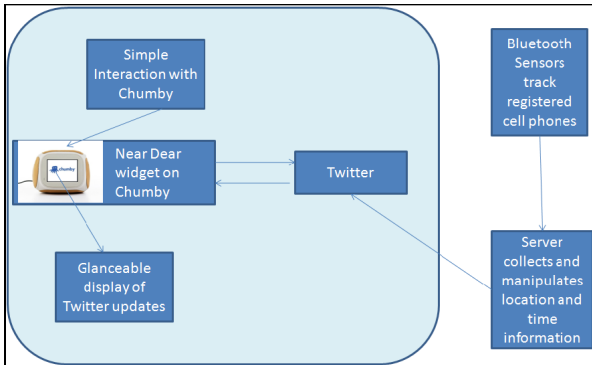


Figure 7. Flowchart outlining the Near Dear Project

This program also looks for keywords in the previous Twitter update to avoid redundancies. For example, if a user updates Twitter to ‘at work’ through the Chumby widget, and then his/her phone is located at work, the Twitter status will not be updated again to ‘arrived at work’ or anything similar.

ASSESSMENT

The Chumby widget will be a useful device for parents because of the ease with which they can keep in touch with their children and at the same time feel the ‘presence’ of their children by sharing each other’s minutiae. This will be especially useful for people with a static daily routine. A small number of options in the Near Dear widget will be sufficient for them. For example, an elderly person’s activities might include going for a walk in the morning, taking a nap in the afternoon, going for a game of bridge in the evening, going shopping etc. For this person, all the daily activities can be various options in the Near Dear widget. Before the start of every activity, he/she has to turn the Chumby and hit OK. This will update their status. By seeing that they are following their routine, their friends and family know that they are well.

If the options available on orientations seem inadequate, ‘parents’ can send a custom update by using the keypad. It is a task that takes more time. The keys on the keypad are small and might seem inconvenient for some.

Since Chumby looks like an alarm clock, it is placed at a conspicuous place at home. So, users can just glance

at the screen to see their friends and family’s updates. It will not demand much time or attention.

Bluetooth sensors are useful for tracking activities when the person is away from home. Sensors can be placed in the local grocery store, the common area of an apartment complex and other places that are often visited by the parents. This way the children can know the whereabouts and hence the well-being of their parents.

Noise Filter

Initially, it was observed that too many updates were sent every hour to Twitter. These updates were mostly redundancies or accidental updates. Care has been taken to filter out noise as much as possible. The confirmation button on the widget ensures that Twitter is not updated due to moving the device accidentally. The program that updates Twitter using the data from Bluetooth sensors also checks for keywords in the previous update to avoid repetition of updates.

Privacy

The Whereabouts Clock developed by Microsoft is similar to this project because both systems automatically send location information and messages to an ambient device at home. In a system like this the issue of privacy becomes significant. Are people comfortable with sharing their location information? Is the device intrusion of privacy? These are a few questions that might come up.

Field trials performed by Microsoft on the Whereabout Clock show that people are comfortable with sharing information about their activity and location with their family. They say that knowing this information is central to co-ordinating activities among members and is essential for the smooth functioning of daily activities in a family. They also mention that this device gives them reassurance by telling them what they already know [2].

This project shows that the ‘parents’ are following a routine that the ‘children’ already know about. It reassures them that by following their routine, their family is safe and healthy. The children’s updates are there on the web for their friends and family to see. This project makes it easier for ‘parents’ to access those updates.

User Survey

To understand the usability, convenience and disadvantages of the system, we did a preliminary survey of seven users in a close work group. Each user used the widget on Chumby for about an hour and filled out a user survey. The users included students and lecturers from the computer science and engineering department at UCD.

After making improvements in the system based on the user survey, we released the widget publicly on Chumby's website. Chumby users all over the world are able to download it to their Chumbies. They are able to give feedback in terms of ratings (out of five stars) and user comments. This feedback will contribute to the user study of a larger user base⁹.

In order to get more feedback, we plan on starting a Facebook group to advertise the widget. The users we get on this group will be sent out surveys, similar to the ones we used for our preliminary study, via e-mails. We hope to get feedback from a diverse group of users in terms of age and proficiency with technology.

DISCUSSION

Users felt that the system was easy to work with and configure. They liked the user interface; they thought that it was clean and uncluttered. Most users also liked the fact that it easily updates Twitter and shows their friends' timeline. They thought that it was a useful tool for Twittering. Three of the seven users said that they would give a Chumby with the Near Dear widget to their grandma for Christmas.

The confirmation button received ambiguous reviews. Two users felt that it was a great way to avoid accidental Tweets while one thought that it was unnecessary.

Three out of seven users thought that the number of options were limited and it would be great to have a keyboard show up to send custom tweets¹⁰. They were also not happy when the Twitter API returned nothing or when Twitter feed took a while before it displayed their updated status.

On an average, the user rated it 'good' for being intuitive, 'good' for convenience, and 'OK' for being a handy device to see friends' updates. Three users thought that the widget was 'excellent' for intuitiveness¹¹.

We received feedback from one user from the Chumby website. The user felt that it was a good widget and found the keypad useful; the user gave it a 5 out of 5 rating¹².

⁹A survey for Chumby users on Near Dear's website: <http://neardear.org/take-a-survey/>

¹⁰The user study was done before the keypad was added. The keypad was added based on their feedback.

¹¹For more details on the user study and results please visit <http://neardear.org/survey-results/>

¹²For more and updated details about the user feedback, visit www.neardear.org/

Table 1. User Responses to the Near Dear widget on Chumby

"Very Intuitive, did not require any previous knowledge of how to use Chumby."
"It was easy to use and quick to set up."
"The user interface was clean and uncluttered; it was always clear what to do next."

LIMITATIONS OF THE SYSTEM

This system has some limitations, most of which were observed from the user feedback. The system uses Twitter because of its popularity. But, Twitter has issues supporting the traffic. It does not always update quickly, and sometimes returns irrelevant or no information. Twitter servers are down quite often [1]; since, our application fetches information from Twitter, it fails to retrieve data during their downtime.

The Chumby widget makes about 30 API calls per hour to Twitter. The Bluetooth sensor program makes an API call every time a sensor tracks the user's phone. The allowed number of API calls for Twitter is 70 per hour¹³. If the user has other third party applications like Moodblast, or Twhirl that make API calls as well, the user exceeds the allowed number of API calls, disabling the widget to make any more API calls; this means that it can neither show the latest timeline, nor send status updates for about an hour.

Despite its shortcomings, we chose Twitter because of its large user base. According to www.compete.com, Twitter is visited about 17 million times every month as opposed to its competitor Jaiku which is visited about 100 thousand times¹⁴. Twitter users stay loyal to it in spite of its inadequacies. Active social networker Zena Weist says, "With Twitter, the utility I get [both personally and professionally] goes well beyond the pain of its stability issues" [1].

The system used to locate mobile phones using Bluetooth sensors had certain limitations too. The scope of keyword manipulation was limited. For example, there could be several variations to saying 'out for lunch.' It is impossible to check for all those variations, and thus a standard message 'lunch in the cafeteria' will be updated every time the phone is tracked in the cafeteria.

CONCLUSIONS

Members of a family have different degrees of familiarity and comfort with using technology. While some members of the family do not have access to a computer very often and are not familiar with micro-blogging, for others Internet is the main medium for keeping-in-touch. Near Dear bridges this gap by using Chumby, which sits

¹³Official Twitter API Documentation: <http://groups.google.com/group/twitter-development-talk/web/api-documentation>

¹⁴as retrieved on 08-11-2008 from <http://tinyurl.com/6rmh2s>

in an accessible place at home and makes microblogging easy and convenient for computer-novices. Our user study shows that the Near Dear widget is intuitive and serves the purpose of making Twittering more convenient.

FUTURE WORK

This project can be extended to having several in-home sensors that give information about the activity of the owner. Such sensors at home would be particularly useful for the safety of elderly people who live independently. Pressure pads at doors and on chairs can give information about their whereabouts inside the home. There can be sensors in AC ducts to detect movement by analyzing differential air flow. The system can also be integrated with the safety alarm system at home to send alerts to family members in case of emergencies.

To make the information more meaningful and easy to visualize for the user, the Twitter messages on the Near Dear widget can be shown on Google maps¹⁵ along with the locations of family members. This way the user can get information at-a-glance.

There are also several upgrades that can be made to the Chumby widget. The widget could beep when a new Tweet is received. Pictures of friends could be displayed to enhance presence.

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Many thanks to Chumby Industries for providing platform to make my project possible and having a fantastic Wiki to ease hacking into their device. Thanks to all the people who have put sample code and projects online for developing widgets; the code has been indispensable for our application.

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¹⁵<http://www.maps.google.com>