Twitterspace: A Co-developed Display using Twitter to Enhance Community Awareness

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ABSTRACT
We describe the use of an ambient display called *Twitterspace* for promoting awareness of events and member activities within our community centers. Content for the display pulls from the social networking platform Twitter. *Tweets*, which are the recent posts from community members, move across large screens placed in public rooms. Through the concept of *community-at-a-glance*, we use these tweets to encourage enhanced community awareness and engagement. Although we are only in the beginning stages of our implementation, we have already seen changes in the way people behave with respect to their participation on Twitter. We have seen a surge of posting activity and a rise in the general awareness about the members of the community including remembering birthdays, having mini-conversations, and tracking which members are going to what events. With this participatory design project, we hope to further support general community awareness and allow members within our community to take ownership of the display both virtually and at their physical locations.

Keywords
Ambient displays, community awareness, evocative objects, informative art, social networking

INTRODUCTION
Web 2.0 has brought about a revolution in the way we relate to content online. Online social communities such as Flickr and Second Life are built on the principle of user-generated content. Without this form of community participation, the functionality of these sites would be lacking. The developers of platforms such as these further respond to the high levels of community participation by opening their APIs to functional and aesthetic improvements by the community. Open APIs also allow communities to provide management and maintenance of their own user experience, with third-party developers often serving as support for the experience of others. This newfound *ownership* in the community brings with it a sense of power, responsibility, and cohesion existing in the interactions of these members, especially among those who have prior face-to-face relationships [13].

Twitter is one such Web 2.0 application recently gaining in popularity. As a *microblogging* website, Twitter encourages people to post *tweets*, which are status messages composed of simple text with a strict limit of 140 characters. Tweets answer the basic question, "What are you currently doing?" Twitter subscribers can opt to publish in a private state granting access only to selected individuals to view their posts. However, the vast majority of subscribers (estimated between 85-90% of total Twitter membership [12]) leave their postings open to public scrutiny. Facilitating the popularity of the service is the wide variety of community-built interfaces made possible by Twitter's open API. These clients allow users to easily publish new content from web-based clients, stand-alone applications, automated scripts, and even cell phones. Some of these interfaces have afforded users opportunities to examine and utilize their own postings in context of a broader community, leading them to modify their own behaviors within Twitter and in how they conduct themselves in the physical world.

This notion of microblogging and community aggregation inspired us to develop *Twitterspace*, which is a public display of tweets published by members of our local community. Twitterspace provides *community-at-a-glance* allowing individuals to quickly get a sense for the overall activity within a community both through the content of people's tweets and the tweeting behavior itself depicted visually on the screen. Members of the community are able to participate in, interpret, and co-design the experience by following a central Twitter account and through constant interaction with the designers iterating and evolving Twitterspace. We are conceptualizing Twitterspace as an evocative object that engages multiple meanings as described in the critical technical practice tradition of Sengers and Gaver [2006] as well as others. Evocative objects are meant to intentionally leave interfaces with a sense of ambiguity in their operation so that users can establish their own

idiosyncratic modes of interaction rather than relying on a top-down representation.

We are looking at Twitterspace as a way to blend participation in the virtual space of Twitter with the physical community centers of our school. We wish to do this through a co-evolution of interaction within the technology, membership, and shared spaces. We feel that this design has become participatory in the sense that is shaped both by changes that we the developers make as well as changes in the use of the display by our Informatics community.

Public Displays and Community

The HCI community has long looked at ways of linking visual presentation and community engagement in less task-based ways. For instance, the Hello.Wall project [7] consists of a pattern of lights embedded in a wall that interacts with the members of the space. People engage with the lights to communicate with various distributed teams. The physical spaces are blended through the medium of these lights. The use of abstract patterns to encourage reflection was also the main theme in the development of *informative art* [8]. These informative art projects used abstract representations to visualize information such as email traffic, email content, and website traffic for an office center. These displays depart from typically fast, task-based displays and move towards slower, reflective displays integrating with the larger work and social environment [6].

Others have looked at similar mechanisms to encourage community interaction. Bohlen and Mateas [3] created an abstract display to emphasize interactions that do not revolve around functional tasks. They created a plant situated in an office and designed to monitor ambient sound and light, as well as the content of the office emails. These factors influenced the height and bloom of a robotic flower in the office. Finally, Zhao and Stasko created screen savers [14] that connected people together by displaying images from their community members' web pages meant to be observable at a glance.

All of these displays and devices represent member activity in some way. They de-emphasize or eliminate a task-based engagement, while supporting a more reflective awareness of the community through activity in and around the device or display.

A Platform for Participation

Twitter provides us with a platform for this level of community interaction. This form of communication is the equivalent of saying “What’s up?” as you pass someone in the hall when you have no intention of finding out what is actually “up”[4]. Blogger Leisa Reichelt described Twitter as *ambient intimacy*, or “being able to keep in touch with people with a level of regularity and intimacy [9].” These qualities constitute the core of the Twitterspace design.

Owing to three root influences—Instant Relay Chat, status messages, and mobile phones—Twitter embodies participatory awareness. It does so by extending an existing culture of user-dictated norms and by attempting to facilitate new valuation of the service through third-party development of related tools. An important connection can be illustrated using status messages as exemplars of the participatory design currently experienced in our Twitterspace project.

Proliferating instant messaging clients spawned a creative sub-culture around custom status messages. An individual user could enter the text for a message to be displayed after a period of inactivity, or by explicitly selecting the dormant “away” state. Originally intended simply as a mechanism of awareness to communicate who was available to chat, away messages quickly became increasingly expressive. Messages evolved from “Not at my desk” to more specific descriptions and personalized descriptions to reflect a current state of mind or activity.

The technical construction of the status message, however, is not sufficient to explain its widespread adoption. Use created its value. Status messages required user participation as *both* authors and readers. It required active community participation to sustain their growth.

Twitter, which is a beneficiary of such user-generated designs, is now a thriving community of both members and developers thanks to an early decision to open the API [2]. The company engineered several ways for members to post and receive the short messages published into the information stream including through the Twitter web site, instant messaging integration, or by texting from a cell phone. Members elect to follow the tweets of other members, but that relationship does not need to be reciprocated. Twitter boasts 941,977 confirmed public accounts, growing by over 1000 new members daily since its launch a year ago and is expected to surpass one million members in spring 2008 [12].

DEVELOPING TWITTERSPACE

Our goal in developing Twitterspace is to subtly augment communal space by providing a casual layer of information regarding the current happenings in the local community. Working from the concept of *community-at-a-glance*, we created our display to provide a sensation of sitting in a town square and watching people as they go about their daily activities. In this metaphor, one could focus on some activity (e.g., reading a book or having a conversation with friends), but still be able to observe fragments of causal activities and conversations of fellow community members.

To apply this "town square" metaphor within our implementation, we intentionally broke some of the common rules in information visualization. For instance, there are situations in our visualization when several of the elements on the screen are occluded and text can become dark or blurred such that it is unreadable. This suits our application of the metaphor well since a person sitting in a town square would not be able to see all the people at once or hear each conversation equally at all

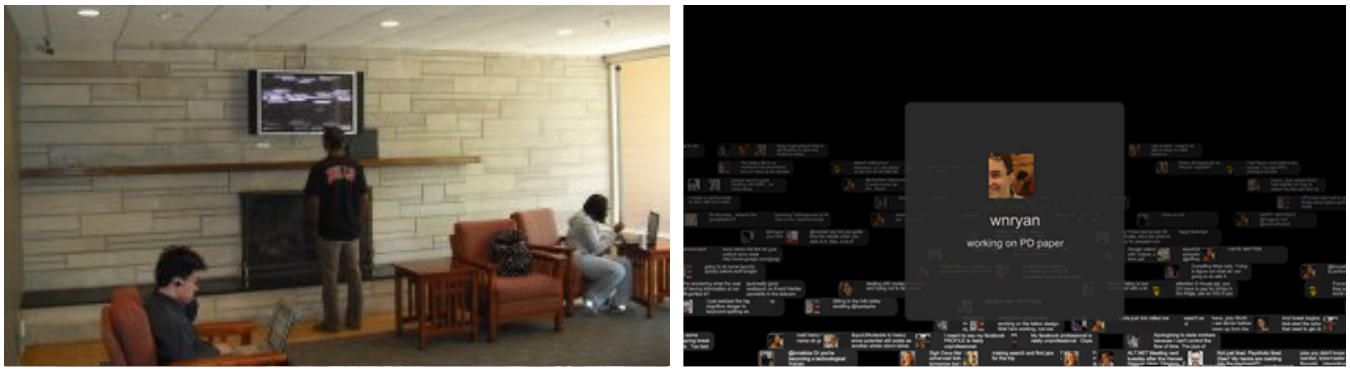

Figure 1. On the left, is a photo of the display in a community center. On the right, is a screenshot of the display as a new message pops up.

times. Rather than an overall snapshot of information, our visualization displays a real-time *stream* of activity within a given community. Also, while the detailed content can be easily captured in some instances, detail is not this visualization's primary goal.

To collect the tweets that drive our visualization, we started by creating an account with Twitter named "informatics," as the account that represents the school of Informatics's community, including students, faculty, staff, and alumni. Due to the viral nature of Twitter, particularly in our department, it was unnecessary to make any sort of formal announcement about our creation of this account. People found their way to the informatics account by word-of-mouth, and by noticing the account listed on their friend's profiles. This account was created several weeks before our actual deployment of the Twitterspace visualization.

Figure 1 shows a sample of the Twitterspace display. The display is designed by setting each tweet in motion horizontally based on the location that it came from to separate local and non-local tweets. Tweets are placed vertically according to the time at which they were posted with the top being 1:00 am and the bottom being midnight. When a new tweet is posted by a member, we display a special popup (right, in figure 1) and make a pop noise to draw people's attention subtly to the change.

We display only the 100 most recent tweets with the most recent tweets based on current community activity being the brightest and the least recent ones being the darkest. This change is meant to draw people's attention to recent activity. We also make changes based on how stale a tweet is. For this, we alter the size, blurriness, and rate of movement based on how many hours ago it was posted.

We placed three displays showing this visualization on our campus: at a "Design House" shared by graduate students of the Informatics program, in the Informatics building lobby, and in a lounge in the Computer Science building. Our school is made up of a traditional computer science program as well as an informatics program. Due to the distance and the relative lack of interaction between computer science and informatics students, there has been a gap in the community as a result of this. We selected these locations in the hopes that we could bridge that gap.

Expectations for Behavioral Change

A University of Maryland study published in 2007 captured 1,348,543 tweets from 76,177 members over a two-month period. The researchers analyzed the content and network structure of their sample. One of the outcomes was the identification of four common user intentions for the use of Twitter [1]: *Daily Chatter*, *Conversations*, *Sharing Information,* and*Reporting News*. This attempt to categorize authors through analysis is a first step toward understanding why people compose and consume tweets. Upon further observation, we can easily identify a wider range of motivations.

People use Twitter in many ways. Conference goers have used Twitter to post updates on speakers and interactions in the back channel of on-site social networking. It has also proven to be an effective alert system disseminating both compassion and information during natural disasters [11]. Other uses include requests for information, political campaigning, polls, games, social support, and as an outlet for creative expression. We have already seen our Twitterspace display used for sharing birthday wishes, carrying on short conversations, commenting on speakers and classes, commenting on reading materials and much more. We can only expect that as people interact with this display more, other patterns will emerge also.

Locking the Information Stream in Place

There are experiential changes that occur when transforming Twitter content from a personal desktop or website into a physical public space. With Twitter, members have control over who contributes content to their *personal information stream*. There is a functional distinction between *following* (the inclusion of content authored by another member) and *follower* (a person who includes your content in their information stream). While any given post may be read and shared by many others within the same social circles, the composition of a specific member's stream is likely to be unique and experienced privately from a personal device.

Through Twitterspace's designated account, we change the nature of the content from personal to communal experience. Not only will other Twitter members see the exact composition of a given information stream, but so will non-members who frequent the physical location.

Marketer Ed Dale refers to the personal nature of tweet-to-tweet contact as *side-by-side communication*, a way to reach consumers without raising their defenses [5]. The selective nature of a person's information stream increases the relevance, and, therefore, potentially the acceptance of the messages being disseminated in this fashion. Although a *place information stream* does not permit each reader to apply that content filter, the benefit of side-by-side communication is likely still present. People experiencing Twitterspace may be more inclined to trust and respond to displayed content.

The communal nature of the display has subtle yet profound implications for how authors publish their tweets as well as how readers respond. In some cases, this response will materialize in the form of another tweet, but it can also manifest as a face-to-face conversation about the viewed content.

Our expectation is that the presence of Twitterspace in locations around the scattered facilities within our school will result in changed behavior both in terms of Twitter usage and community awareness. We plan to evaluate this design by considering how people talk about the display and how it changes their behavior. We plan to evaluate the change in members' awareness of community activities as a result of the display, how members who see the display understand what it means, and how the content of tweets changes when the display is active from when it is not. These evaluations will give members an opportunity to affect Twitterspace's design.

CONCLUSION

Twitter provides an opportunity for community participants to control their own experience. Each user can arrange their virtual space as they see fit, compose the content of their own posts, include content of others they choose to follow, and engage at whatever level of participation they desire. Twitterspace is our attempt to open the benefits of this experience to a wider audience, including those who are not currently active members of Twitter. Our goal of *community-at-a-glance* is met through this technology by blending the virtual space of Twitter with our physical community centers.

These experiments have given us great insight into the way in which behavior can be manipulated by using such displays. We have already experienced members of our community using this display to share personal updates, jokes, opinions about current community events, requests for help, and more. We expect this behavior to continue over the existence of the display. Moving forward we look to study the exact ways in which we have improved (or otherwise) our community using Twitterspace.

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