Demo Abstract: Transforming the Social Networking Experience with Sensing Presence from Mobile Phones

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1. INTRODUCTION

Social networking sites such as Facebook and MySpace connect millions of people worldwide through a range of features including fairly static profile information, such as job history and likes/dislikes, and more dynamic content like what people are doing and how people are feeling at various points throughout the day. This dynamic content is updated manually and represented using plain text (e.g., "Meeting new friends at the gym"). While this sort of input provides the ultimate flexibility, the requirement for manual input places a barrier between a person's dynamic status and its representation on a users profile page. As a result, the minutiae that provide texture to our daily lives is filtered from a person's online self, and as a result friends are less connected.

The CenceMe system [5] transparently makes useful inferences from data gathered from sensors embedded in mobile phones, and exports the resulting "sensing presence" to social network applications. CenceMe fills the gap left between manual status updates by automatically updating activity and location presence information to a person's social network profile page. The system currently supports Symbian-based Nokia phones and the Apple iPhone, and integrates with Facebook profiles.

2. DESIGN

The CenceMe system infers "facts" of various types (e.g., activity, social setting), which collectively compose the *sensing presence* of a person, an enhancement over conventional, largely textual forms of presence information often used in IM clients (e.g., "I am away"). CenceMe allows a user to: (i) automatically export enriched forms of presence information to members of her social network (e.g., publish status messages in Facebook), and (ii) support historical analysis of his activity (e.g., how often did I go to the gym this week?).

CenceMe users install a sensing client on their phone that pipes data sampled from the available sensors on the phone through classifiers [4] to produce facts about the user. Facts are buffered locally on the phone and opportunistically transmitted (e.g., via EDGE, WiFi) to CenceMe backend servers. Backend classifiers draw cross-user inferences and inferences requiring more facts than are currently available on the phone. Ultimately, facts stored in the backend servers are made available (filtered for privacy) via a standard CenceMe API supporting synchronous and subscription retrieval to applications such as web portals (e.g., Facebook, the CenceMe portal) and VOIP clients like Skype. CenceMe facts can also be used to animate avatars in virtual worlds like SecondLife [6] [7].

(a) CenceMe Apple iPhone client. (b) CenceMe Nokia N95 client.

Figure 1:

3. PROTOTYPE

We have built two versions of a prototype CenceMe system, one for Symbian-based smart phones that include JVM support (e.g., Nokia N95, N80) and the other for the Apple iPhone. The software architecture of the Symbian/Java-based sensing client comprises a sensing daemon that runs in the background so as to minimally intrude on the normal user experience of the phone. The daemon is split into modules written in C++ and Java to maintain portability where possible while addressing limitations of the JVM system APIs. Fact bundles based on accelerometer, microphone, GPS, and Bluetooth samples are pushed to the back-

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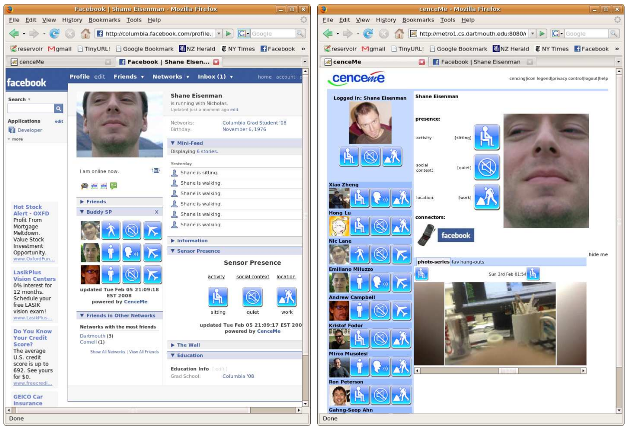

(a) Facebook with CenceMe (b) CenceMe portal

Figure 2:

Figure 3: Our prototype key ring sensor attachment provides a GPS receiver and a 3-axis accelerometer.

end servers via XMLRPC calls over either WiFi or GPRS. A web-service-based API is offered from the backend servers to external systems. We have built: (i) a number of CenceMe widgets for Facebook (see Figure 2(a)), (ii) a web portal that offers a broader and deeper user experience than the widgets alone can provide (see Figure 2(b)), and a display client that allow a user to check the sensing presence of herself and her friends from her phone (see Figure 1(b)). For cell phones without the suite of sensors found on high-end models, we have developed a CenceMe key ring attachment which provides the CenceMe daemon on the phone Bluetooth access to GPS and a 3-axis accelerometer when the phone itself does not have the sensor embedded (see Figure 3).

For the iPhone-based system, limitations in access to the operating system led us to adapt our architecture. On the iPhone, the sensing client and local display GUI is implemented in Objective C. Apple has restricted access such that user processes can not run in the background, meaning either the CenceMe client is the focus application or no sensing/classification/uploading can occur. Therefore, rather than designing for transparency to the user, we designed a rich yet strealined GUI to engage the user, thereby keeping the application in focus as long as possible to facilitate increased sensing, inference and uploading of the fact bundles (over WiFi or EDGE). Figure 1(a) shows the buddy status page of this GUI, where the sensing presence is shown in terms of activity and location. By default the user sees this presence as a list of buddy names and associated iconized presence, but may also choose to view this presence mapped to the physical location of the buddy. The iPhone client allows a user to customize the icon used to represent location and add a customized text string associated with the icon. As with the Symbian/Java-based sensing client, sensing presence is uploaded from the phone and redirected to a CenceMe widget on the user's Facebook profile page. The iPhone version of CenceMe is currently available for free download on Apple's App Store. Visit `http://www.cenceme.org` for more information.

We plan to expand our current focus on consumer-driven social networking, and apply CenceMe technology to public health initiatives, domain specific sensing (e.g., skiing [2], cycling [3]) and supporting logistics and production line efficiency in the commercial setting.

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