
SocialMe: Enabling Individuals To Understand & Manage Their Social Selves

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Abstract

Social health and wellness, or one's ability to interact with others, has long been found to be positively correlated with overall physical and mental well-being [11]. However, there is a general lack of tools to help individuals gain a better understanding of their unique social behaviors and patterns. We introduce SocialMe, a socially-aware mobile phone application that uses body data and sensing methods to enable users to understand and manage their social selves. Preliminary studies showed that users saw a variety of benefits in being able to quantify and visualize their own social interactions. SocialMe is an effort to help individuals attain social health and, consequently, improve overall personal wellness.

Author Keywords

Social health; social behavior; socially-aware; voice biometrics; dynamic information visualizations; social interactions; social goals; work/life balance

ACM Classification Keywords

H.5.2 Information interfaces and presentation: User Interfaces – Graphical user interfaces, User-centered design; H.5.5 – Sound and music computing: Signal analysis, synthesis, and processing; H.3.5 – Online Information Services: Data Sharing;

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Introduction

Social health and wellness involves creating meaningful relationships, using effective communication skills, and maintaining social support networks [14]. Research has shown that good social health is strongly tied with overall physical and mental well-being [2][3][4][11]. However, while the positive impact of social health on well-being and life satisfaction has been proven, there is great opportunity for creating tools to help individuals improve and maintain their social health.

SocialMe is a socially-aware mobile phone application that enables users to both understand and manage their social selves. Through the collection of various body data (voice biometrics, sound sensing, speech features, geophysical location) via mobile phones' built-in sensors (microphone, GPS), SocialMe allows users to accumulate a wide array of rich, contextual data regarding their everyday social interactions to draw high-level conclusions about their social behaviors and patterns. SocialMe presents this data through dynamic information visualizations and meaningful summaries, uses goal-driven design to facilitate behavior change, and machine-learning techniques to personalize users' experiences. In helping users gain deeper insights into their social selves, SocialMe is a tool to help individuals attain social health and improve overall personal wellness.

In what follows, we discuss the iterative process we adopted to design this tool, including a diary study, interviews, prototyping and usability testing.

Previous Work: Social Sensing

In recent years, several socially-aware computing platforms have been developed to measure different facets of social contexts. The "Friends and Family" study deployed a pervasive computing system within a residential community to study the social behaviors of the population; the Sensible Orb helps groups measure conversation dominance; and the Sociometer is a

wearable device designed to track various aspects of the wearer's social interactions by utilizing audio and position sensors [1][5][12].

Past research and systems have focused largely on tracking individual social behavior from a collective perspective (understanding social networks, cooperative work, group behaviors, etc.) — not on how individuals might themselves analyze, assess, and make changes in their own social behaviors. The idea of how social sensing might benefit individuals remains open for further exploration.

Diary Study and Interviews

In order to effectively present individuals with beneficial data regarding their social behaviors and patterns, it was imperative to first gain a clear understanding of how individuals typically typify and reflect upon their social interactions. A diary study and interview-based investigation were designed to gather insights into these questions.

We asked ten participants to manually log their social interactions over a period of 24 hours. The prompt of the diary study was purposefully left open to participants' interpretations: the instructions did not specify what types of information to note down or in what form the log should manifest. Allowing participants to determine what information was meaningful for them, as well as how that information was represented, gave us more accurate and unbiased representations of participants' mental models (Figure 1).

From interviews of the participants following the diary study, we learned that there exists a gap between people's perceived and actual social interactions. Some participants revealed they were taken aback by "how social I actually am." Others wondered out loud, "Am I a morning person?" We also discovered that different people held vastly different schemas when it came to organizing their interactions — for instance, some

"For me, order of importance in any social interaction is Person > Topic > Frequency"

- PARTICIPANT 1

"For me, the location of my conversations is as important as who I talked with."

- PARTICIPANT 5

Figure 1: Quotes from the diary study suggesting participants' mental models surrounding their social interactions.

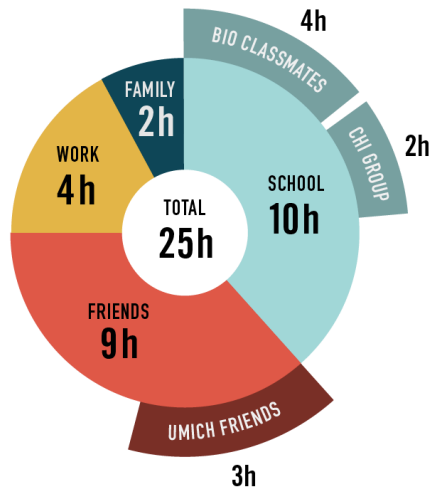


Figure 2: Information visualization showing the breakdown of a user's time as split between different social groups over the period of a week.

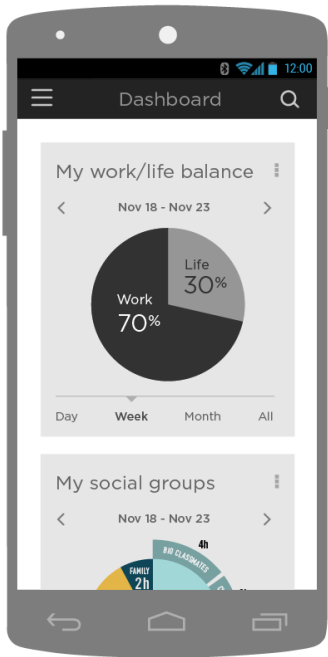


Figure 3: SocialMe's Dashboard with different visualizations placed neatly onto separate cards, which allows users to customize their interfaces by rearranging, adding or dismissing cards as they deem fit.

indicated that the location where each conversation took place was of utmost importance, while others disregarded it entirely. Furthermore, the primary way participants defined "social interactions" were those that occurred face-to-face, in the same physical space, as others. Finally, when it came to reflecting upon their social behaviors, most were interested in seeing "bigger picture" trends (over the period of at least one week) versus finer grained details.

Our Solution: SocialMe

Design Requirements To Be Addressed

Based upon our research findings, we determined a number of design requirements to be addressed. SocialMe should present accurate, yet easy to understand, information regarding users' face-to-face interactions in ways consistent with users' mental models. However, since these mental models vary from person to person, SocialMe should not impose the same representations of information upon all users, and should instead allow users to choose what types of information they deem meaningful. Additionally, the information presented should accommodate for users' desires to view broader behavioral patterns. Once users gain a clearer understanding of their current social behaviors, it is natural to deduce that some may want to make certain adjustments to those behaviors — SocialMe should support such inclinations.

Finally, privacy is an important issue in mobile sensing technologies. We recognize that people are sensitive about the capture of personal data — especially audio and vocal data — and how that data might be used. Therefore, SocialMe should take into consideration the protection of users' privacy and also convince users that their privacy is indeed being safeguarded.

System Overview

To gather accurate information about a user's social interactions, SocialMe leverages several types of body data: voice biometrics, speech processing, sound

sensing, and geophysical location. Voice biometrics serves two important purposes: speaker recognition (i.e., obtaining ground truth regarding who users are conversing with) and social interaction feature extraction [13]. Through speech processing, vocal data will be used to determine certain social interaction signals, such as interest, engagement, excitement, frequency and duration of communication [5][12]. Pervasive sound sensing allows for the recognition of meaningful sound events in the everyday lives of users to glean relevant situational information [10]. This audio data, combined with geophysical location, allows SocialMe to infer contextual factors about users' social interactions, thus painting realistic pictures of users' social behaviors.

To make the collected data understandable to the average user, SocialMe starts out with several default information visualizations, including work/life balance and a breakdown of time as split between social groups (Figure 2). These default visualizations were determined from overarching trends identified from the diary study, and show data accumulated over a one week period so users may see an overview of their social patterns. In addition, SocialMe utilizes a flexible, card-based system: each information visualization is organized neatly onto individual cards (Figure 3). Users may rearrange, add or dismiss cards as they deem fit, thereby customizing their interfaces to show information they see as relevant. Over time, the system will use machine-learning techniques, based on users' preferences and habits, to understand what types of information are important to each user, infer correct contextual factors surrounding users' social interactions, and automatically adjust to reflect that knowledge.

To further help users understand their social selves, SocialMe supports the concept of social comparison. According to social psychologist Leon Festinger, there exists, in all humans, a drive to evaluate oneself against other individuals or groups of individuals. This



figure 4: Graph showing a comparison of the total hours a user spent socializing over the period of a week compared with other university of Michigan undergraduate students.

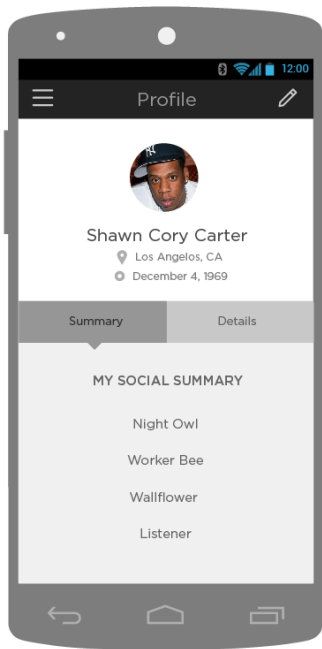


Figure 5: A summary of a user's social behaviors according to data collected over time.

drive for evaluation, in turn, affects behavior [6]. Therefore, to help users evaluate their behaviors, SocialMe provides a platform where they may compare certain aspects of their social behaviors against similar others within the SocialMe community (Figure 4). If users indeed decide to change their behaviors, SocialMe includes goal setting features so users may monitor progress and track changes over time.

With regards to privacy, people are particularly sensitive about the capture of audio information [8]. Thus, SocialMe never processes the content of the speech and does not store raw audio data, except during speaker recognition enrollment and initial feature extraction. After enrollment and extraction, only features are retained and raw audio is discarded [10]. During enrollment, a short snippet of raw audio is recorded to allow the user to identify the speaker [13]. Here, the audio is garbled to make the content unintelligible, but the identity of the speaker is maintained [9]. To further protect users' privacy, SocialMe runs locally on a user's mobile phone with minimal interaction with external servers [8]. In the case of social comparison, any user data used for creating comparisons requires users' explicit permission and will also be anonymized. To assure users that their privacy is protected, SocialMe employs a number of privacy messages during the onboarding process as well as when speaker enrollment is first initiated.

Graphical User Interface

SocialMe is a mobile phone application, which features five main sections: Dashboard, Profile, Social Comparison, Goals, and People. The Dashboard displays an aggregation of cards that users deem most important, including various visualizations, goals, and comparisons. The Profile contains a "social summary" — an at-a-glance synopsis regarding a user's unique social behaviors (e.g., times of day users' socialize the most and users' conversational talking vs. listening ratio) (Figure 5). Social Comparison allows users to compare their social behaviors against similar others

(e.g., total time a user spends socializing compared with her classmates), and Goals is where users may create socially-oriented goals (e.g., talk to Mom three times a week). The People section allows users to manage and organize their social circles so that SocialMe may accurately reflect those relationships.

Technical Implementation

SocialMe, as a mobile phone application, uses the phone's existing, built-in microphone and GPS sensors. Recent polls show that an all-time high of over 56% of the US population now own smartphones [7]. By taking advantage of existing technologies that users already own, SocialMe avoids burdening users with an additional device, keeps costs low, and is scalable to large audiences. Furthermore, the microphone is an inexpensive, ubiquitous sensor capable of capturing meaningful audio data and making powerful inferences about human activity [10]. Even though the microphone is subject to certain limitations dependent on the phone's context (e.g., sounds are muffled if the phone is in a back pocket), information taken from an audio stream degrades more gracefully than most other sensors — useful information may still be derived from diminished audio data [10].

Usability Evaluation

We tested the flow of the graphical user interface, ease of task completion, and overall comprehension of the system with six participants of varying smartphone experience using a medium fidelity interactive prototype (Figure 6). Screen-recording software was used to document the audio and video from each session. Users were given background scenarios and asked to perform four major tasks, such as interpreting information visualizations and setting a goal. A short interview followed each session to gain feedback about the concept of the system.

Overall, the flow of the interface was intuitive and task completion was easy. We discovered that the application was flexible enough to cater to a wide range



figure 6: Conducting a usability test with a medium fidelity, interactive prototype run on an Android phone.

"The app will be really useful to me. I am not very social — this application will help me to interact more and manage my work/life balance."
- PARTICIPANT 2

figure 7: User insight gathered from usability testing of SocialMe.

of audiences — mapping successfully onto the requirement drawn earlier that the system should accommodate different users' unique mental models and schemas.

However, the majority of users had some difficulty perceiving SocialMe as a private, personal application. Certain language and labeling choices caused users to liken SocialMe with existing social media networks, which involve public forums and the sharing of personal data. For instance, one user said, "[SocialMe's] 'Profile' looks like the profile on Facebook." Furthermore, the inherent nature of SocialMe led users to believe that it was a literal "social" tool. Users expected SocialMe to allow the sharing of select information with others, either within a SocialMe community or via other social media channels.

We plan to address the above issues by revising the language and information architecture used throughout the SocialMe to shift users' perceptions of the application from a public, community-based system to a more private, personal informatics framework. We also plan on investigating more specifically where users expect the ability to share certain information and enabling those features.

Despite desires to share personal data collected by SocialMe, participants felt that the metrics and visualizations presented in the application would be very valuable. One user said, "The app will be really useful to me. I am not very social — this application will help me to interact more and manage my work/life balance." Another user was interested in his speaking versus listening ratio, and said, "I can see the benefits of using SocialMe to keep track of that." In short, while social use of the tool offered motivation, the participants saw considerable utility in gaining a deeper understanding of their social behaviors.

Discussion

The proposed system, SocialMe, holds many benefits for individuals towards improving overall social health and wellness, as confirmed by our diary study and usability evaluations. There were, however, certain limitations to the investigation and evaluation of our design.

First, the number of participants in each of our diary studies, interviews, and usability evaluations were limited to ten or less. Since it is difficult to represent the entire population based on these constrained samples, we understand that our investigations might not fully represent the range of experiences users might have with SocialMe. Second, even though all interviews were conducted following a standard protocol, all information collected through interviews is innately prone to bias because of the interviewer's perspective and the interviewees' interpretation of the questions.

Conclusion

In this paper, we proposed SocialMe, a socially-aware mobile phone application which enables users to understand and manage their social selves. A preliminary diary study showed that people are largely unaware of their everyday social interactions. By leveraging a combination of body data and sensing methods to collect rich, contextual data regarding users' everyday social interactions, SocialMe successfully increases users' self-awareness regarding their own social behaviors and patterns through the use of information visualizations and summations. SocialMe supports behavior change through goal setting, takes advantage of existing sensors and mobile technologies, is scalable to large audiences, and can be implemented easily at low cost. Through the use of SocialMe, we hope to encourage individuals to actively attain social health and, consequently, improve overall personal wellness.

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