Socially-aware Phone Call (SPCall) App

This Socially-aware Phone Call (SPCall) application has been designed and implemented as a part of Ashad Kabir's PhD research project, under supervision of Professor Jun Han, Dr. Alan Colman and Dr. Jian Yu, at the Faculty of Information and Communication Technologies (ICT), Swinburne University of Technology (SUT). The team collaborates with IT industries, and is comprised of academics with expertise in mobile technology, human-computer interaction (HCI), adaptive systems, and service-oriented computing.

Ashad Kabir received his MSc in computer science from the Pusan National University (PNU), South Korea. Mr. Kabir has more than five years experience in developing mobile applications in different platforms such as J2EE, Windows mobile and Android. Jun Han received his Ph.D. in Computer Science from the University of Queensland in 1992. Since July 2003, he has been Professor of Software Engineering in the Faculty of ICT at SUT. Alan Colman is a Lecturer at the Faculty of ICT, SUT. He received a PhD and Master of IT in HCI from the same university. Jian Yu is a Lecturer at SUT.

Please describe your app concept. What is it? What does it do? How does it do it? Who will use it?

This SPCall application reduces interruptions by allowing the caller to know the current status (situation) of the intended callee (i.e., call receiver) to decide a suitable time to call. On the other hand, the application also allows the callee to filter incoming phone calls based on his/her predefined preferences. The callee can specify call filtering preferences based on his/her social context information (SCI) (e.g., relationship with the caller, current status). The filtering actions could be ring, vibrate, reject, reject and send status at a certain granularity level. The application uses online social networking applications (OSNs) (e.g., Facebook, LinkedIn) and Google Calendar (it is also possible to incorporate other information sources) to collect users' current status and relationships information with other persons and stores it into an ontology-based knowledge base (KB). This KB is designed to store any type of social relationships (including family, friend and work related relationships), social roles and status information, which also can be extended to incorporate other types of SCI information. Thus, the users do not need to specify their SCI, particularly relationships, manually.

The KB infers abstract and rich SCI and allows users to specify their call filtering preferences more intuitively. For example, a user specifies his/her call filtering preference as: "If my status is meeting or seminar and a call comes family, the action is to reject and forward my status at granularity level 2 (Busy)". This condition will be applied to all family members such as father, mother, wife, and so on, and for all types of seminar or meeting (e.g., group meeting, project meeting), as these semantics are already captured in the family and current status ontologies of the KB.

The SPCall application is comprised of two parts: (1) a social context information management system (SCIMS) - running on a web server - accumulates, stores and manages users' SCI and provides a query interface for applications to access that information, (2) a client application - running on a mobile device - stores user's filtering preferences and interacts with the SCIMS to collect the owner's as well as other persons' SCI.

SCIMS (for details please see our CAiSE2012 paper) collects users' relationships information from OSNs and current status information from the users' schedule in Google Calendar and status updates in different OSNs. We have implemented adapters (social sensors) to acquire and integrate information from such different sources. To store and manage information, we have implemented an ontology based KB. We provide a reasoning technique that allows one to specify rules to derive more rich and abstract SCI (e.g., Best friend, Family). Furthermore, to ensure users' privacy on accessing their SCI, we allow users to specify access control rules, i.e., in which situation who can access what information in which granularity level.

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What problem (big or small) does your app solve?

We witness how often people are interrupted by incoming phone calls which not only disturb the user but also his/her surrounding people. Mobile phone interruptions have sparked problems that have already been studied extensively, they are many in number and can be serious in nature (e.g., they cause car accidents). Meanwhile, the burden of managing social norms and patterns implied by mobile phone usage is left to the user. For instance, when one is in a meeting, he/she must remember to switch the phone to silent and decide whether to pick up any incoming call. Many of these interruptions could be avoided or adequately managed, only if the caller could be informed of the current status of the intended callee. For example, if the caller could be informed that the callee is in a meeting, she might decide to call at a better time, thus avoiding or reducing harmful interruptions and possible socially embarrassing situations. On the other hand, the static nature of mobile phone configuration (e.g., reject all incoming phone calls while in a meeting) may lead to communication gaps and socially embarrassing situations. For example, one may not want to miss any incoming call from his/her elderly mother staying at home alone, even though he/she is in a meeting.

The SPCall application is a way to minimize mobile phone interruptions that are mostly caused by (1) unawareness of each other (caller and called person) current status/situation and (2) a lack of support to allow users to specify their dynamic filtering preferences over incoming phone calls. By observing how interruptions are currently handled by users, we might (at least partially) automate interruption management. Recently some studies have tried to identify factors that influence the users in making choices about phone call filtering and status sharing, and actions that currently are performed by users to filter calls and to share or disclose information about their status. Users' social context, in particular relationships and status/activity have shown to have strong social underpinnings in managing interruptions. Thus, we have considered those factors in designing and implementing SPCall application to minimize interruptions.

Who is going to use your app and why? Please describe the market need for your app.

Mobile phones have the obvious benefit of at the moment communication. Irrespective of time and place, we can expect a phone to ring. But a ringing phone at an inopportune moment can be very disruptive to the current task or social situation. In a survey of 100 senior executives, it was reported that undesirable interruptions constitute 28% of the knowledge worker’s day, which translates to 28 billion wasted hours for companies in the United States alone. It results in a loss of 700 billion dollars per year, considering an average labor rate of $25 per hour for information workers [Bureau of labor statistics, http://www.bls.gov]. Studies have also found that undesired disruption causes interrupted users to take up to 30% longer to complete and commit up to twice the number of errors. Judge Robert Restaino jailed 46 people when a mobile phone rang in his New York courtroom and no one would admit responsibility (http://news.cnet.com/8301-10784_3-9824710-7.html). Thus, the SPCall application will be useful for most people, particularly executives, academic and admin staff, teachers, students, participants of meetings, seminars or conferences, and so on.

A number of interruption management applications, in particular call filtering and profile management applications such as Tasker [http://tasker.dinglisch.net/], Locale [http://www.twofortyfouram.com/] (being the prime examples), can be found in the Android market. The distinctive features of our SPCall application compared to those existing applications are: (1) The SPCall application takes into account relationship information in filtering incoming phone calls and (2) It considers both the caller and call receiver’s perspectives to reduce phone call interruptions.

How will your customer use your app? Describe how they will interact with the app and describe the user interface. (Please upload any supporting screenshots below.)

At the very beginning, a user needs to sign up to the social context information management system (SCIMS) which will collect his/her social context information (e.g., connected persons' profiles with phone numbers,
relationships, status update, and so on) from different OSNs (e.g., Facebook) and Google Calendar by following an authentication protocol (e.g., OAuth 2.0) and will develop a knowledge-base (KB). Persons’ phone number also can be acquired from the user’s mobile phone contact list. A web based graphical user interface will be provided to the user to sign up, configure SCIMS (e.g., information acquisition update frequency), manually insert social context information into KB and specify his/her privacy preferences (i.e., which situation who can access what information in which granularity level) regarding access of social context information by other users.

![Login screen and call filter preference editor](image)

Fig. 1. (a) Login screen, (b) call filter preference editor

After that the user needs to download and install the SPCall mobile app. When the user will open the app for the first time it will ask for SCIMS user name and password for login (see Fig. 1(a)). Now using the application, the user can check other persons’ (those have accounts in SCIMS) status to decide suitable time to call. For filtering incoming phone calls, the user needs to specify his/her call filtering preferences in the application (see Fig. 1(b)). For each incoming call, before it starts ringing, this application will fetch necessary information from the SCIMS (running on server), will check user’s filtering preferences and take decision. To provide the call filtering functionality without using mobile internet, through application user can download a local copy of his/her social context information knowledge base to the mobile.

**How will your app make money?**

The mobile phone has become a necessity in our daily life. A University of Michigan study shows that 83% people think mobile phones make life easier and they choose it over the Internet. According to an estimate by the International Telecommunication Union, mobile cellular subscriptions worldwide would reach approximately 5.9 billion by the end of 2011. Just in the first quarter of 2012, approximately 81.06 million android devices have sold. Another report says that the number of smart phone users is expected to exceed one billion worldwide by 2014. With an explosive growth of mobile phone users, the need to make its use less disruptive and the popularity of mobile phone applications, we believe that the SPCall application has a bright perspective and a huge amount of profit can be made from it.
What is the stage of development for your app? Is a prototype available?

So far, we have developed a prototype of the client application for android devices and a server system for managing users' SCI. We have tested meeting and seminar scenarios during a month. We observe that the application acts well in its real-time constraint, i.e., the application is able to acquire information from SCIMS and make decision before the call is forwarded to the voice-mail of the callee. We have also evaluated the performance of SCIMS using real data from Facebook, LinkedIn, Twitter and Google Calendar.