

User Situation-Aware Mobile Communication Method

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Abstract. Communicating information through electrical mobile devices solely relies on static functions provided by the mobile devices. For example, when a caller uses the call function on a mobile device, the other caller at the receiving side has only two static functions to execute namely reject or answer. Under most of communication environment, the caller does not recognize the receiver's current context. In this paper, we propose SCS (Situation-aware based on Communication Service) platform to provide an appropriate method to express useful information based on user context like speak-able, read-able, gesture-able situations through mobile devices. In addition, the proposed method enables automatic configuration of personal preference and device attributes and living environment conditions reflecting current situation awareness [1].

Keywords: Situation-aware · Communication service · Mobile device · User context

1 Introduction

SCS is originally envisioned as a unique and seamless way to upgrade the traditional communication experience into something more collaborative and contextual for users (Fig. 1).

With speech or activity recognition capabilities, it has since grown into something far more flexible, enabling rich terminal to terminal communications for traditional usage scenarios like a user is talking to a friend, sending message, or sharing multimedia files. In any of these scenarios, SCS provides users better communication experience with friends, family or business. Since SCS provides peer-to-peer standpoint, it can expand into various service scenarios [2] that share context during a phone call.

In Sect. 2, various sources of situational awareness are defined and applications are explained in detail. In Sect. 3, system structure and features of server and client will be described in order to implement these functions. Section 4 discusses the conclusions of this paper and what the future development directions of SCS are.

2 Definitions and Applications

Various contexts are essential factors in order to establish appropriate communication services. Thus, SCS (Situation-aware based Communication Service) platform is to effectively integrate new services to get the goal with developed skills through the

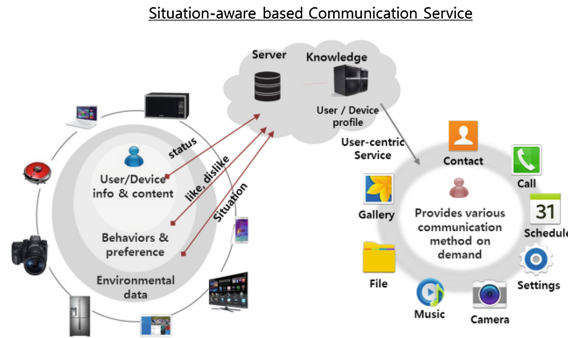


Fig. 1. Conceptual view of SCS

study of existing technologies based on the concept of Fig. 1. Furthermore, it was designed from the beginning with the market-oriented and practical service objectives.

2.1 Environmental Information

A mobile device can extract environment information through various sensors [3]. It can gather not only location-based information, but also user activities [4]. Thus, user environment information is a key factor to construct effective communication path. Upon activating a communication, different situations require particular ways of proceeding the communication. For example, a library requires quiet user activities and intended communication still must work well even though in a concert hall with full of noises. Financial or private information must not be leaked to others during a communication in public. In addition, communication should not disturb users too much while driving or jogging.

2.2 Pattern and History of User

Some context can be extracted through pattern and history of a user. Even though people are under the same environment, because user pattern and history are different for each person, situations can be differently interpreted. To infer a particular user situation for the context-aware communication, it is very important to extract and understand user pattern and history. For this, intelligent modeling must be needed to collaborate with a variety of user information like pattern and history.

2.3 Semantic Based

If there is insufficient information about user environment, the information directly extracted from user speech and conversation can also be a significant factor to provide situations based communication. If the solutions that recognize voice and text in a mobile device are collaborated with voice call and messaging, it can understand the

subject and intention of conversation [5]. Thus, a valid communication path or an appropriate service can be efficiently provided.

3 System Architecture

The prime objective of this system architecture is to provide a user-situation friendly communication. The first step is to understand comprehensive context information. Second, it is to find a suitable communication channel based on user and device profile. Final step is to suggest or translate the method for user-friendly communication. SCS is designed with 2 core parts Client and Server. Client is gathering environmental information and providing services to a user and Server is a suitable communication channels. Figure 2 describes the modules within the two parts. The roles of these modules are as followings.

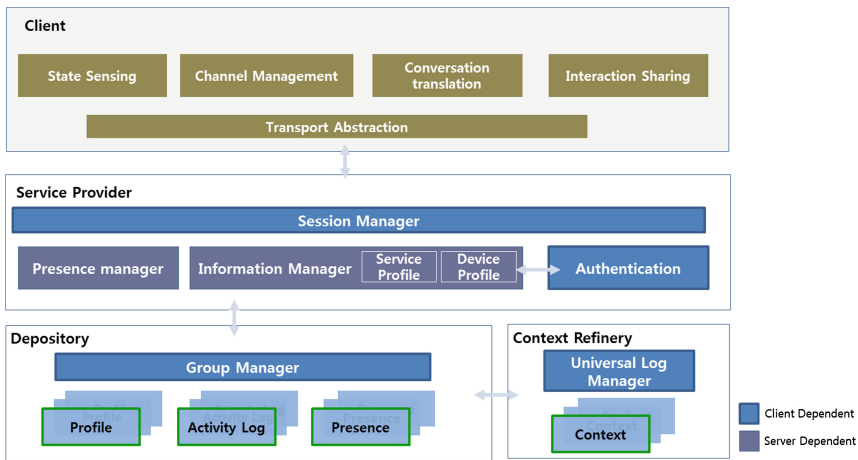


Fig. 2. SCS architecture diagram

Server composes Session Manager, Presence Manager, Information Manager, Group Manager and Universal Log Manager. Session Manager is a broker function which relays transmission between client and server. Information Manager manages profiles of service and device based on a user. Presence Manager provides real-time communication channel information and action status of a user based on profiles. Group Manager has some functions which collaborate with activity logs, profiles and presence. In addition, it infers the relation and actions for a valid communication in advance. Universal Log Manager stores and manages history and context based on user actions. After communication is terminated, all data which occur in all modules are moved to Universal Log Manager.

Client composes State Sensing, Channel Manager, Conversation translation, Interaction Sharing and transport abstraction. State Sensing detects all events occurring out of a device. Channel Manager provides communication channels based on contexts

of a user. Conversation Translation has some functions. For instance, there are converting of dialog mode and inter-working with external modules such as voice recognition and language translation. Interaction Sharing processes real-time sharing of user actions and information happening in a mobile. Transport abstraction is an independent abstraction layer from physical connectivity and supports APIs to access to Session Manager in Server.

Figure 3 shows the flow of information updated. When user communication status is idle, devices send updated information to the server periodically for better service reliability. Updated information is stored to the depository by Group Manager and extracted context from the information is managed by Universal Log Manager. The gathered information creates contexts as below Fig. 4.

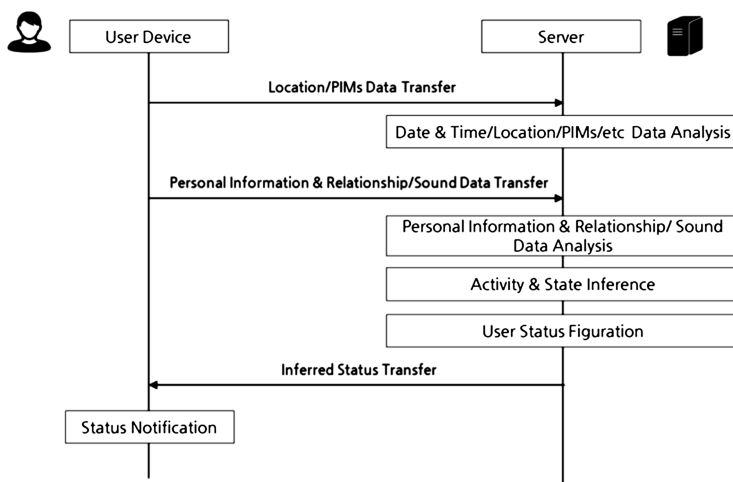


Fig. 3. Sensed data update sequence diagram



Fig. 4. Categorized 5 W form context

The Fig. 5 below shows the communication service sequence of SCS. In communication process, the server collects communication method candidates and provides the clients with the most proper one of them. Since this platform which reflects user preferences and purposes recommends or presets communication methods based on user action status or environments, users don't get disrupted even during communication.

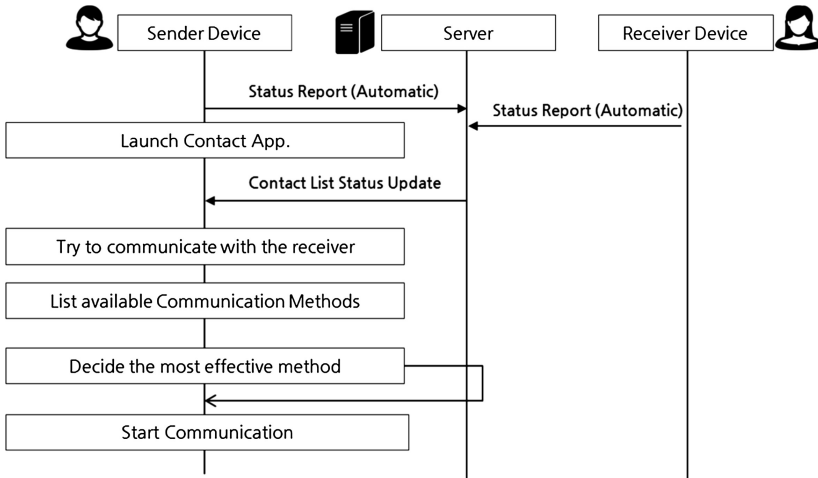


Fig. 5. Communication method decision sequence diagram

4 Conclusion

In the past, when a user uses communication functions, contextual information could not be used. As sensing technology is being improved and useful context information can be collected, experience level of user communication can be enhanced by using these features. Our design methodology is focused on delivering value to UX designers and developers. Users and application developers know what they want to do, but technology makes it too hard for them to make use of it naturally and easily. Thus, SCS platform already concretes useful or attractive features and solves problems in today's use of mobile device technology. As a result, it helps developers implement various communication service concepts based on situation-aware interactions. Ultimately, new and creative experiences can be provided to users through SCS platform. Furthermore, it can open a new market for communication-enabled services that is compellingly more attractive than anything other vendors can offer.

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