

Community-based Harmonious Media Space for a Group of Users

C.Shin, H.Yoon, J.Han, U.Rashid and W.Woo

Abstract—In this paper, we propose a community-based harmonious media space for multiple users realizing ubiquitous virtual reality (U-VR). Although lots of work have been tried to develop smart spaces, they lack efficient management of media spaces for multi users. In order to overcome the problem, the proposed space enables the users to initiate community based on context and decide the level of personal information. It also detects and resolves service conflicts among the different users. Finally, mobile devices allow the users to control service and participate in the services of the communities. We expect that the proposed media space plays a vital role in building harmonious media services for a group of users in U-VR.

Index Terms—Context-awareness, community computing, conflict resolution, information disclosure, mobile interaction.

I. INTRODUCTION

SMART spaces are shared work spaces of multiple users, where various services are pervasive and cooperating for the users. MusicFX, an arbitrator, automatically selects music stations by merging users' preferences for a group in a fitness center [1]. mavHome, an intelligent home environment, controls a set of devices in a home by automatically adjusting the equilibrium level of service based on users' location [2]. ubiHome, an ubiComp-enabled living room for future home environments, deals with multi residents by recommending and mediating their preferred media items [3]. However, the applications in such spaces are targeted for the specific purpose and therefore they have limitations when they are applied to another smart space. In addition, there is no privacy concern, even though they are supposed to deal with a group of users. Furthermore, it is difficult to manage and configure service environments because lots of services are pervasive in the smart space.

In order to overcome the limitation of the previous, we propose a community-based harmonious media space for a group of users. The space builds user-centric community by exploiting context and social relationship among the services and their owners. It also disseminates user's private information to services and other users nearby users and situation. It also deals with conflicts when multi-users are involved in the same services. In the following sections, we

describe community-based media space for a group of users.

II. COMMUNITY-BASED HARMONIOUS MEDIA SPACE

The community-based harmonious space is a media space allowing a group of users to share services and space based on community. The users in such space create their community to utilize the space dynamically composed of a set of services related to the users. Therefore, the space is composed of community management, personal information disclosure, conflict management and mobile user assistants. Figure 1 shows an example scenario illustrating the community-based media space.

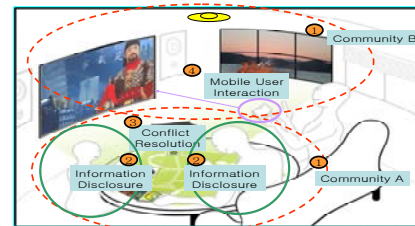


Figure 1. An example scenario of Community-based harmonious media space

As shown in Figure 1, at first, the users initiate their own communities based on smart objects in the space. Based on the community, the information discloser decides an appropriate level of disclosure for interacting environmental services and other users.

A. User Centric Community Management

The user centric community is a collaborative virtual work space consisting of users, services and contents. It dynamically configures the work space according to changes of user's interest to efficiently utilize resources in the smart space. The community is divided into two layers according to members of community: user-service and user-contents community. In the case of user-service community, the services relevant to users' interest are collected and make a harmonious space by resolve conflict among the services. The user-contents community consists of contents relevant to users' interest and recommends communities' preferred contents to the users.

In order to create the user-centric community, the community management builds a social network by classifying the members such as users, services and contents. Based on the social network, it creates communication channels among the members. The community management also dynamically

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reconfigures the established community by exploiting context when user's interest is changed. As a result, the community is updated with the newly created social network.

B. Personal Information Disclosure

Personal information disclosure is about selectivity disseminating user's private information according nearby users and services. Personal information is classified into two types: static and dynamic information. The static information includes user profile, preferences, health states, etc. The dynamic information includes location and activity in a space.

In order to disclose the personal information, it utilizes two-way handshakes between a recipient and disclosure. The recipient is the entity which request private information from other entity and the disclosure is the entity which manages information. The recipient delivers a query as a context to the disclosure to obtain personal information and the disclosure determines personal information based on the recipient profile.

C. Conflict Management

Conflict management is a coordination mechanism allowing the users to share the applications in the space efficiently. In smart space, conflict is divided into three types according to services and their relationship. In case of type 1 conflict, a service is shared by multiple users and has several choices for conflict resolution. In case of type 2 conflict, a service is related to other services and has only two choices as a resource. In case of type 3 conflict, a service is related to other services and has several strategies for resolving it.

In order to detect the service conflict, the management exploits service profile such as precondition, effect, required resources and parameters which characterize the services. It then resolves the conflict harmoniously by selecting a strategy giving the highest satisfaction to the users.

D. Mobile User Assistant

Mobile user assistants provide the users with an intuitive and scalable way to interact with the smart objects and their services. For the purpose, the assistants consist of service discovery, service selection and user interface. The service discovery gathers services from user community. The service selection decides an appropriate service among the collected services according to users' situation and interaction. The interface provides the users with an interaction metaphor according to the selected services. The interface also recommends when service conflict occurs in the services.

III. ARCHITECTURE FOR SUPPORTING COMMUNITY-BASED HARMONIOUS SMART SERVICE

In order to develop a community-based harmonious media space, we adopt unified context-aware application (UCAM) which supports a general framework to build context-based applications [4]. Especially, we exploit ubi-UCAM and wear-UCAM inherited from the UCAM [5][6]. The ubi-UCAM is a context-aware application model for ubiquitous computing environments and is applied to environmental services deployed on smart object. Community and conflict

management components exist in the ubi-UCAM. The wear-UCAM is context-aware application model for wearable computing environments and is applied mobile user assistant. Community management, information disclosure and mobile assistant components are placed in wear-UCAM. Figure 2 shows an implementation of community-based harmonious media space.



Figure 2. An implementation of the community-based harmonious media space

As shown in Figure 2, the users manage their private information with mobile devices and try to create his community while moving around in a smart space. They decide an appropriate level of disclosure based on the community and disseminate his profile to interact with smart objects and their services. The ubiTV application mediates conflicts among the users through mobile devices and the share display when they are accessing the same services.

IV. CONCLUSION

In this paper, we proposed a community-based harmonious media space for a group of users. The space supports dynamic reconfigurable community based on user context. It also supports selectively sharing of personal information and resolves possible conflict among users by exploiting nearby users and situation. Furthermore, it provides the users with an intuitive and scalable interface for interacting with smart objects and their services. Therefore, we expect that the proposed smart space play a vital role in supporting efficiently sharing of the smart space and applications.

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