ubiTV Scenario for a Family in Smart Home*

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ABSTRACT
In this paper, we show an ubiTV scenario for a family in smart home environments. The ubiTV is a context-based TV application for multiple users. It has an architecture that recommends the proper menu (services or contents) to resolve service or user conflictions. It also provides personalized services to multiple users by exploiting ubi-UCAM 2.0. Additionally, it controls display devices by adapting a user's attention based on the user's direction.

Keywords
Context-awareness, Service Recommendation, Service/User Confliction, Multi-user support

1. INTRODUCTION
The ubiTV is a context-based TV application for multiple users in smart home environments. It centers round on a family and leisure. It is the efficient multi-media service to increase communications between members of a family. It also provides various services, (TV program, movie, music, internet, etc.) and gives information (weather, stocks, etc.) for harmony of a family.

The ubiTV provides personalized services to residents by obtaining context inputs from heterogeneous sensors in ubiHome, which is smart home environment. Many sensors and context-based application services have been embedded in ubiHome. The context is created by various kind of sensors in 5W1H (Who, What, Where, When, How and Why) form. To integrate and manage user-centric contexts in ubiTV, we applied ubi-UCAM 2.0 [1]. As shown in Figure 10, various kinds of sensors such as ubiKey [2], Couch sensor, IR sensor, USB camera, web camera, PDA [3], space sensor [4], ubiFloor [5], ubiTrack [6] RF tag etc. are deployed in ubiHome, the smart home test-bed at GIST U-VR Lab. Each sensor individually is linked to a PC and acts as a smart sensor with inherent processing, networking, and sensing abilities.

The ubiTV scenario is a guideline that expresses expected experiences of residents in smart home. Developer can analyze the experiences of residents in smart home in advance through this scenario. Thus, it is necessary to an analytical procedure of a scenario which decides how residents experience services, in all smart home services.

In this paper, we propose the ubiTV Scenario for a Family in Smart Home. The ubiTV has an architecture that recommends the proper menu (services or contents) to resolve service or user conflictions. It also provides personalized services to multiple users by exploiting ubi-UCAM 2.0. Additionally, it controls display devices by adapting a user's attention based on the user's direction. The ubiTV scenario is the foundation that achieves a happy life by providing the ubiTV service to multiple residents in smart home.

2. ubiTV
The ubiTV provides personalized services to residents by integrating and managing contexts obtained from heterogeneous sensors.

2.1 Design Approach
The proposed ubiTV is designed to be the technology to harmonize between members of a family by exploiting various home services. It can strengthen the ties between members of a family, because it provides services for all members. To increase the ties, ubiTV should technically support experiences through the relationship between residents. Thus, ubiTV recommends the service for a peaceful family. Recommendation is divided as Service Recommendation and Contents Recommendation. Service Recommendation selects the service with highest priority based on residents' preferences among various home services, when conflict between residents is occurred. TV, gallery, game, taxes service are its examples. Contents Recommendation selects the content after resolving the confliction, when residents want to use the same content in one service. For instances, when conflict is occurred between two residents in a TV service, the ubiTV recommends the contents, such as news, animation and drama to them.

2.2 Scenario
The ubiTV scenario is tested among 3 users in ubiHome [3]. Figure 1 shows ubiHome test-bed with various sensors. The scenario is composed of a viewpoint of the first person (a son) and a viewpoint of the third person (narrator). A son explains the story of ubiHome life and a narrator explains our system operation. Figure 2 shows the flash animation for the simulation test of our scenario. Total scenario is organized as 4 scenes. Each scene shows the usage of the ubiTV service by exploiting ubi-UCAM 2.0 [1]. Table 1 shows 5W1H contexts in our scenario.

Figure 1: ubiHome test-bed with various sensors
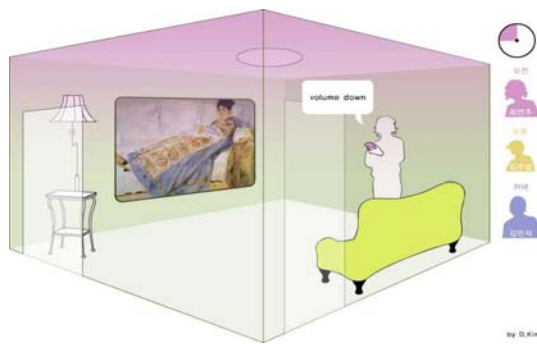
Figure 2: The simulation test of our scenario.

Table 1. 5W1H Contexts in ubiTV scenario

5W1H Context	Description
Who	a father (age 37), a mother (age 34), a son (age 7)
What	services or contents
Where	a living room (ubiHome)
When	in the morning/afternoon/evening, at night
How	a resident's behavior or movement
Why	a resident's attention or intention

2.3 Technical support

The ubiTV is based on ubi-UCAM 2.0, a unified context-aware application model for ubiquitous computing environments [1]. Thus, ubiTV executes the proper service that a resident wants by obtaining context inputs. Figure 3 represents a resident's attention based on the user's orientation. The orientation can be calculated in ubiTrack [6]. Therefore, MR Window can show the weather information to the resident. The following is the implemented technologies in ubiTV on each scene.

- Scene1: Context-aware framework (ubi-UCAM 2.0), History-based personalized services, User's feedback, User's Preference management, Location based service.

- Scene 2: Service Recommendation, Control service, Different recommendation menu according to the given situation

- Scene 3: A user's attention, Display device control, Automatic setting of function level (light service), Dimmer control
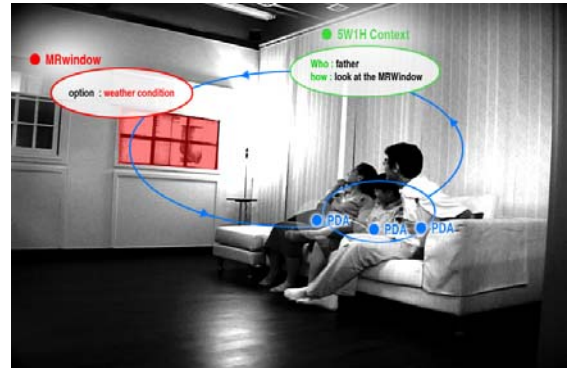
- Scene 4: Contents Recommandation, Context Inference

Figure 3: A user's attention on MR Window (display device).

3. Discussion

The ubiTV scenario will establish a base for intelligent services. Moreover, this scenario will prepare a chance that constitutes richness of human's mentality by ubicomp-enabling technologies. Thus, it is an important role in increasing the ties between members of a family. In near future, we will experiment the situation which resolves the confliction of a family in case of various daily works and then will test the usability that our recommendation method is proper to all residents.

4. ACKNOWLEDGMENTS

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