

vrFlora: Reactive Multimedia Contents in Smart Home Environments*

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ABSTRACT

We present vrFlora which shows adaptive responses suitable for a user's situation. It perceives the user's context through ubiTrack detecting the user's profile, location and orientation, and ubiFlowerpot sensing the user's manipulation with a physical flowerpot. In addition, it adaptively analyzes the context according to its own characteristics, and then displays customized multimedia contents. In order to allow users to experience vrFlora in home, we implemented vrFlora in our test-bed, called ubiHome. Accordingly, the proposed system demonstrates potentialities of reactive media contents, which autonomously show adaptive responses according to the user's context, in smart home environments.

Keywords

Reactive Multimedia Contents, Personalized Interaction, Context-awareness, Smart Home Environments

INTRODUCTION

With ubiquitous computing paradigm, computing has been pervasive into our daily life. Moreover, many researchers have studied on context-aware applications which offer services suitable for a user's situation [1]. Especially, the Adaptive House [5], EasyLiving [7] and AwareHome [2] show how context can be used in home environments. However, they simply offer proper services according to context. That is, they do not consider reactions of application which differently analyze the context according to its characteristics, and reflect the analysis to offering functions.

In order to overcome the limitations, the proposed vrFlora shows adaptive reactions according to its characteristics. It analyzes user's context, e.g., the user's profile, location, manipulation, etc. Then, it applies the analysis to contents and shows multimedia contents suitable for the situation.

SYSTEM OVERVIEW

To allow users to naturally interact with the proposed system, as shown in Fig.1, we installed three components, i.e., ubiTrack, ubiFlowerpot and vrFlora, in ubiHome, a test-bed of home appliances for ubiquitous computing environments [8]. ubiTrack perceives who a user is and where the user is located. ubiFlowerpot provides the user with intuitive interfaces for interacting with vrFlora. The vrFlora displays multimedia contents through a specific display device, called MRWindow, like an ordinary window in home.

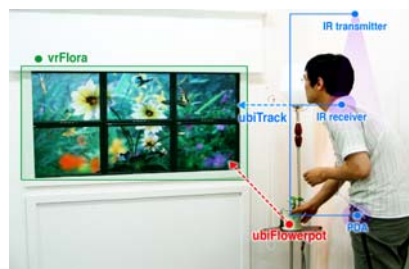


Fig.1 Set-up in ubiHome

ubiTrack generates preliminary context containing a user's profile, location and orientation in the ubiHome[3][4]. As shown in Fig. 2(a), a user puts two IR receivers on his/her both shoulders. Then, it detects the user's location and orientation by exploiting IDs transmitted from IR transmitters, as shown in Fig. 2(b), which are installed on the ceiling. In addition, it also extracts the user's profile, such as gender, status, age, etc, from the user's own PDA.

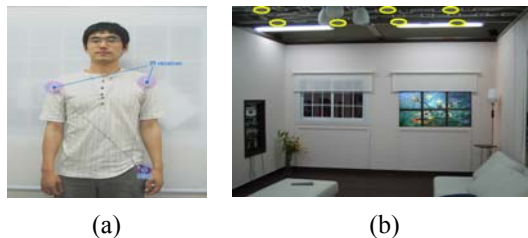


Fig. 2 ubiTrack (a) IR Receivers and PDA (b) IR Transmitters installed on the ceiling

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ubiFlowerpot makes a user interact with vrFlora through real plants in daily life. As shown in Fig. 3, it detects the user's touch by exploiting sensors attached to leaves of the plants. Then it transmits sensed signal to the host through a RF transmitter. Finally, the host generates preliminary context containing a user's manipulation and the degree.



Fig. 3 ubiFlowerpot

vrFlora is aware of a user's situation, and then shows personalized reactions suitable for the user's preference. It is based on vr-UCAM2.0 (A Unified Context-aware Application Model for Virtual Environments) [6]. It perceives user's context, e.g., the user's profile, location, orientation, manipulation, etc, by exploiting preliminary contexts generated from ubiTrack and ubiFlowerpot. It adaptively analyzes the context according to its own characteristics, and then shows different contents according to the analysis.

Fig. 4 describes an example of the reactions. We assume a family of three; i.e., father, mother and a child. If any user gets near to MRWindow, the vrFlora supposes the user is interested in vrFlora, and then enlarges displayed contents. If a father touches leaves of ubiFlowerpot, as shown in Fig. 4(a), the vrFlora grows and comes into blossom by interpreting the father's manipulation as nourishment. On the other hand, if a child manipulates ubiFlowerpot, as shown in Fig. 4 (b), it displays adaptive contents, which exhibits butterflies fluttering from flowers to flowers, by applying propensities of the child for playing with his/her friends. Therefore, the vrFlora provides a user with life-like impressions by adaptively interpreting the users' situation and reacting according to its own properties.



(a) Reaction for a father : before(left), after (right)



(b) Reaction for a child ; before (left), after(right)

Fig. 4 Reactions of vrFlora

SUMMARY AND FUTURE WORKS

We present vrFlora which autonomously reacts by exploiting the users' profile, location, orientation and control information in smart home environments. It offers personalized interactions by showing different responses suitable for a user's situation. Furthermore, it makes life-like impression on the user through autonomous changes of vrFlora according to context. For the future works, we plan to make vrFlora show various adaptive reactions by reflecting more environmental context of home environments e.g., temperature, humidity and so on.

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