A Unified Personal Web Assistant System

Applied to Information Appliance Control

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ABSTRACT

The remote control in many universal information appliances nowadays is operated through Mobile or Web Communications. For relaxing the access constraints in enjoying information appliance services, we established an unified personal web assistant (**UPWA**) to remotely control and access information appliance services across Internet, wireless network, and telephone network. UPWA provides a unified access to the information appliance service control by integrating the access facilities used in wireless application protocol (WAP), public switched telephone network (PSTN), Mobile, and Web system platforms to save the system cost of maintenance. Because of the access constraints released, users can flexibly use personal computers (PC), telephone sets, or WAP handheld devices to access information appliance services anytime anywhere they like.

 Keyword: unified , Information appliance , PSTN , WAP

1、INTRODUCTION

The Internet provides a convenient communication environment. Employing the Internet, people started to communicate with each other by sending e-mail, chatting box, instead of writing letters. Lots of services are supported to improve human life, e.g., room and ticket reservations, e-ordering/transactions, e-learning, network banking, games, human care, information appliance, entertainment , etc. Besides the versatile services the Internet provides, personal communication systems on wireless network getting popular and cheaper can offer the facilities for people to communicate with each other among geographically different places anytime and anywhere, and to enjoy personalized services. On the other hand, people at offices or

homes often use telephones to communicate each other, which becomes our daily activity.

By integrating the communication services and technologies across Internet, wireless network, and telephone network platforms as a whole into the proposed system (a web-based and unified personal web assistant, **UPWA**), we provide users the access control to information appliance(IA) services across the Internet, wireless network, and telephone networks connecting Wireless Application Protocol (WAP) phones, Personal Computers (PC), telephone sets, and mobile phones. Employing UPWA, users can get the same services across the Internet, wireless network, and telephone network. In this way, UPWA can provide information appliance control service to all kinds of users in these three networks and just maintains one system rather than three systems to save the system development and maintenance cost.

In the rest of this paper, Section 2 addresses some related works, Section 3 depicts the proposed system architecture of UPWA, Section 4 describes the proposed system functions and work flows, and finally Section 5 concludes this work.

2、 Related Work

In the recent years, plenty of technologies have appeared to deal with 'Smart' Homes and Offices, e.g., Berkeley Ninja Project [1], the Portolano project [2] from the University of Washington, Stanford's Interactive Workspaces Project [3], and Berkeley's Document-based Framework for Internet Application Control [4].

Ninja Project[1] is a scalable Internet services architecture. Its goal is to enable a menagerie of Internet-based services that are interoperable and immediately accessible across the spectrum of user devices ranging from PCs and workstations to cell phones and Personal Digital Assistants(PDA).

Centaurus [6] is able to support services on any platforms, they can communication with each other through Service Manger via socket connection. The clients, who request the services, can setup a client application to communicate with Communication Management through socket connections and then request the Service Management for some services.

Ninja just supplies a Web-based Service, but Centaurus is able to support

services supply on any platform. Before connecting to Centaurus, it has to install some application enable the client to connect to Centaurus Communication. Unlike the Centaurus, UPWA clients don't need a client application to access to the services.

UPWA Agent is just like an interpreter, it can identify which of services requested to our system and gives the correspond user the most suitable access channel to access the services. Both the Centaurus and UPWA are aimed at supplying several communication platforms to get the services, while UPWA is more economic and flexible for more uses to access the system services.

The most important difference between UPWA system and other system is the process, in which clients connect to server for accessing services only using one communication channel (internet). IF the PC is out of order, all services will be out of work. Instead of PC, we have two dedicated communication devices (telephone set and WAP phone set) to connect to our system services. UPWA will still alive unless all of the provided access ways are invalid to perform.

3、SYSTEM ARCHITECTURE

Unified Personal Web Assistant (**UPWA**) supplies information appliance control by using three kinds of communication devices, i.e, PC, WAP and telephony including mobile phone and telephone. Employ if these communication devices, users can connect to UPWA system and access the services. In Figure 1, the UPWA Agent is the core of UPWA function to receive the IA control requests and then returning the response. UPWA Agent is composed of several components processor ,i.e, Telephony Interface Processor(TIP)、Text to Speech (TTS)、Network Interface Processor(NIP) and WWW server. TIP is the interface to receive the requests from telephone and mobile phone system. TTS, UPWA can transform the response message into speech and send the transformed speech to telephone users. After using a PC to connect UPWA computer users can communicate with NIP to ask for some requests and response. UPWA Agent makes it possible that users utilize telephone、WAP and PC to connect to UPWA and to access the same UPWA services. As depicted in Figure 1 , UPWA interconnects phones、PSTN、AGENT、ISAPI、ASP、DB、ODBC ,and so on. As a whole, and thus integrating three networks services into one system for achieving across network communication and control. Therefore, we now focus on UPWA Agent for the detailed.

The major task of UPWA Agent is to receive the requests from mobile、phone、PC And WAP, to identify the sort of accesses, to transform the request into valid information then to send the information to ASP program to handle request, to store the result carried out into database, and finally to reply users with the response message. In other words, UPWA Agent is just like a gateway, it connects various communication systems into one system and supplies message transformation. Employing UPWA Agent with different formats, i.e, in speech, WML, HTML etc, can be inter-transformed and transported to phone, PC, or WAP users. Users utilizing mobile or phone sets connect to UPWA can send their requests via PSTN to UPWA Agent. According to the provision of different network accesses, there are two categories in uses access: (i) Internet-based access and (ii) Public switched Telephone Network-based (PSTN) access.
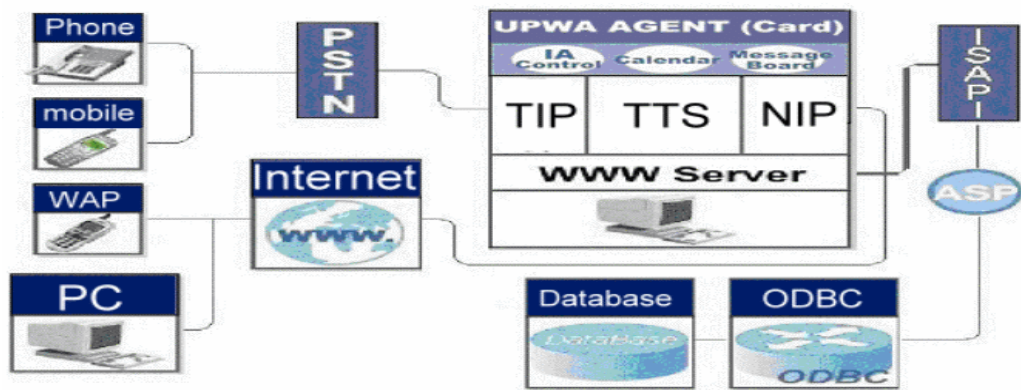

Figure 1. The architecture of UPWA

In the case of Internet-based access as depicted in Figure 2, users employing WAP devices or personal computers can connect to UPWA via Internet and NIP. After connecting to UPWA, users can reach to the default WML or HTML pages and have their service requests by issuing some hyperlinks. After issuing the hyperlinks, UPWA invokes the corresponding active server page via ISAPI, which retrieves the response data from Database through Open Data Base Connectivity (ODBC) interface. The response data will be further encapsulated into the corresponding WML or HTML pages to be returned to users via NIP.

In the case of PSTN-based access, users applying a telephone set or cellular phone can connect to UPWA via PSTN and TIP. After connecting to UPWA, users can

listen to speech sentences that are transformed from the default page. For example, "IF you want turn on air conditioner 1, please dial 1"; "If you want to turn on air condition 2, please dial 2", " If you want to go to next page, please dial 9"; the sentences in speech will be deliver to user sites. After listening to the speech, users can press the key"1" on the keypad of telephone or cellular phone to really turn on the air conditioner 1. That is, every keystroke will invoke the corresponding active server page via ISAPI, which retrieves the response data from Database through ODBC. Using Text-to-Speech(TTS), the response data will be further transformed into the corresponding speech sentences returned to users via TIP.
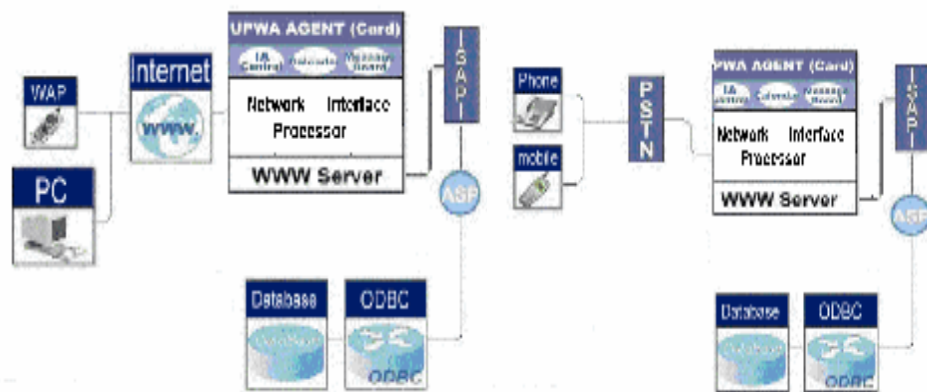
Figure 2.   Internet-based access to UPWA   Figure2. PSTN-based access to UPWA

4、Information Appliance Control

We have made an IA controller that is a control box (hardware) to control the power switches of electric appliances. IA controller functions like a programmable power switch that can receive power switch commands to switch on/off information appliances connected by RS232 communications. As illustrated in Figure 4, IA controller is connected to UPWA with RS232 port. According to the user-customized time schedule, UPWA interprets those time events specified on the time schedule into a series of power switch commands to activate or switch off a group of information appliances. Users can customize a sequence of timed events into a time schedule that is intended to be carried out.
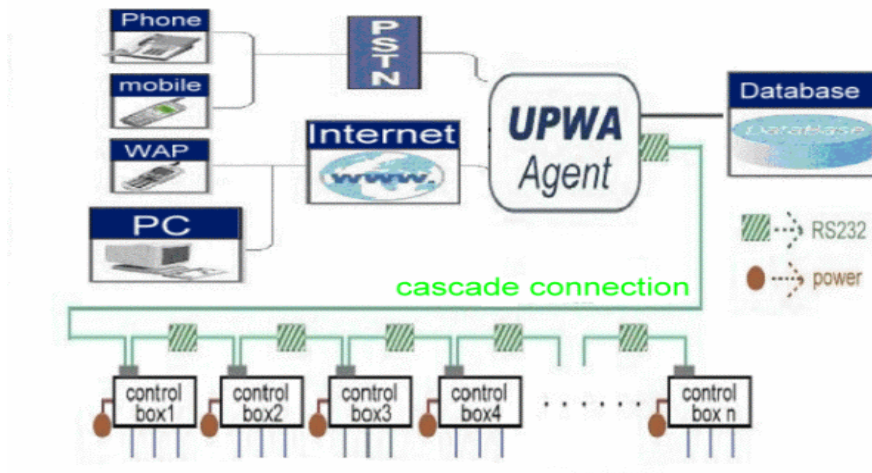
Figure 4. IA controller with RS232

4.1 IA Control

Users could operate PC、WAP mobile、phone to send their commands which either turns on or turns off the information appliances remotely. In other words, users connected to UPWA Agent, it will tell ASP program to deal with the command requests then send the related command to the IA controller through RS232 port. Finally ASP program will finish the IA operation and sent the result to database in order to know the IA present status.

Now we only had one IA controller in our systems. One controller can just operate three appliances. If we want to control the more and more electric appliances, we can cascade lots of IA controller instead of creating a new hardware. Not only cascading the controller but also parallel   connecting it, we can make the best choice to bring an optimum results.

There are two categories in IA switching control: (i) time-based IA switching and (ii) member-based IA switching. In the case of member-based IA switching, the user has two kinds of method : individual or group. Individual means the user wanting to operate his specific IA device. If the user wants turning on / off some of the IA products at the same time, it could set the product to be a group and excute the same action (turn on / turn off).

In the case of time-based switching, UPWA supplies two IA time controls. If the user wants switch IA immediately, he chooses the wanted IA name, and sets the time-bar to be that item named "now". On the other hand, the user wants the IA to be

turned on/off on a routine time, ex: users want turn on the air conditioning at 3:00 on Friday, he only to choose the wanted time item (ex: 16:00) on the time-bar.

According to the review described above, the user could totally have four methods for controlling the IA products: Instant-Individual control, Instant-Group control, routine-Individual control and routine-Group control. By using these control methods, users can customize the IA devices, and trun on/off one(or more) IA device in specific time.

5、System Usage

If the user forget the air condition before he leaved home, and he want to turn off the mechine. He could uses PC to connect to our system and click on the item "Uni-Control" to goin the Individual control page.On Figure. 4 , he chooses the air condition and the time (ex: now) at first. Then , he clicks on the button "submit" to finish the action.
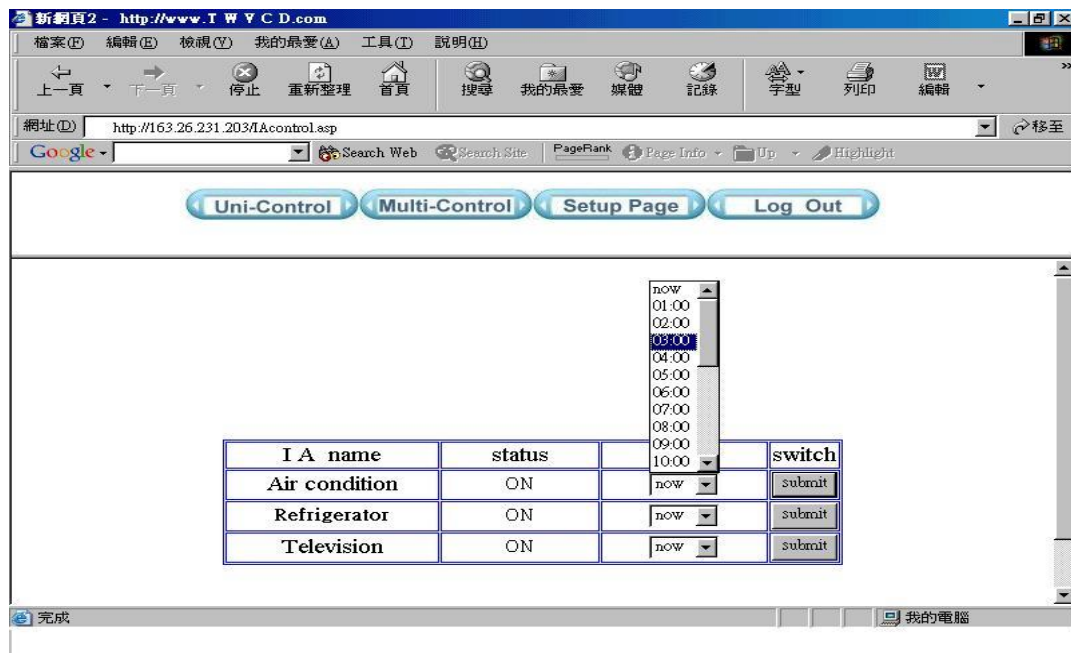

Figure 4.   Individual-Instant control and Individual-routine control by Web

The user could also turn off the air condition by using mobile. It is easy to finish the work. Just to follow the steps discipted on Figure.5. He listens to the speak and press the key step by step. At first, he key in his ID number for verification. Secondly, If he want only operate one IA device,he could choose 1. Then, The system will describe the status of all IA products and will ask him to choose the IA

product he will want to operate. Thirdly, after choosing the correct IA device, he will set up the on/off time. Ex: he wants to switch on the air condition at 11:00 AM, he will press the keypad "11" to finish the work. Finally, the system will repeat the status of all IA devices. After finishing all job, the user can press "#" to leave the system.

Welcome to our UPWA system , please input your ID number for verification
importing   84609957
correct ID number ,
wants for Indivisual IA control press 1, wants for group IA control press 2, press # to Log out
pressd 1
The electric fan will be switched ON at 13:00 , The Television will be switched ON at 16:00
control Refrigerator press 1, control Television press 2 , ..., press # to back
pressed 2
Switch right now press 0, Switch at 1:00 press 1, ..., Switch at 24:00 press 24, press # to back
pressed 10
The Refrigerator is ON, The Television is OFF , The electric fan is OFF
The electric fan will be switched ON at 13:00 , The Television will be switched ON at 10:00
control Refrigerator press 1, control Television press 2 , ..., press # to back
pressed #
wants for Indivisual IA control press 1, wants for group IA control press 2, press # to Log out
pressd #

Thank you for using our UPWA system. Bye Bye

Figure.5 Individual-Instant control and Individual-routine control by phone

If the user wants to operate a group of IA products, he will enter the follow pages describe on Figure 6 and Figure 7. The steps are similar to the steps describe above. There is a view will deserve to be mentioned, user should choose his wanted IA products to create a IA group on the setup data page before operating the IA group.
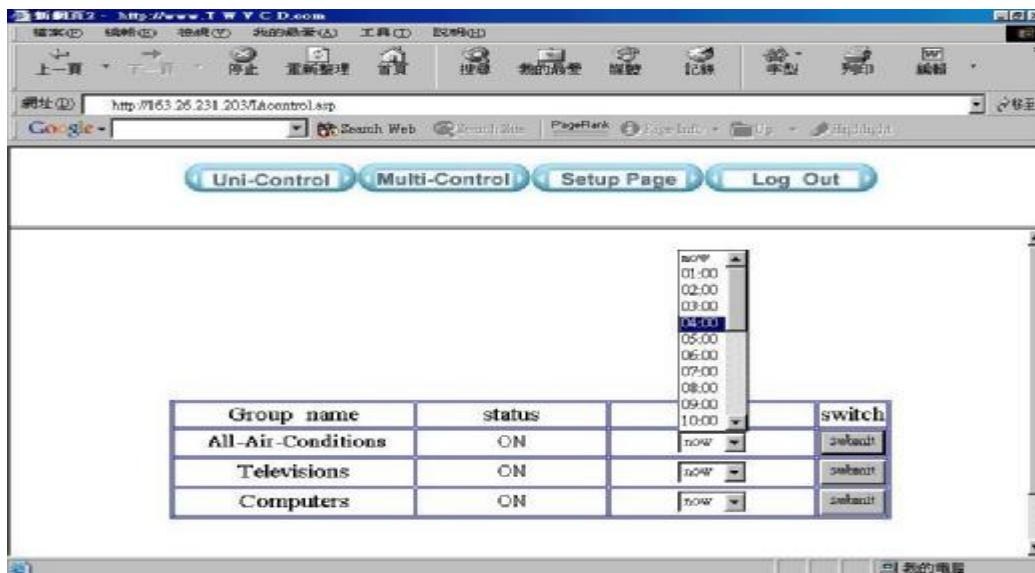

Figure.6 Group-Instand control and Group-routine control by Web

Figure 7 . Group-Instand control and Group-routine control by Phone

6、Conclusion

In order to get the same information and services as UPWA system supply on the Internet. We integrated WAP、Mobile、phone into Web-based UPWA system. It also supply the same services on a unified communication platform access PSTN and Internet have one IA control service in our UPWA system, we are planning to add the e-mail service. We have implemented four kinds of IA control services:

We can extend the appliance to Home Network Applications in the future.

Acknowledgements

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