An Integration Platform for Developing Digital Life Applications

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Abstract:
This paper describes how we develop a digital life service system by integrating developed separately applications. A lot of Internet appliances are implemented and integrated to evaluate this integration platform. Users can control these appliances by a web browser. We integrated seamlessly these appliances as a whole on the web platform.

A home gateway is used as the integration platform. A GPRS modem and a Bluetooth module are connected to the home gateway. The home gateway can thus communicate with all the appliances through the Bluetooth module, and provide a way to approach each appliance from Internet. For each appliance there is a corresponding CGI program to provide as the user interface. Users of the appliance can control each appliance through the web browser. Users can access the appliance through Internet at any place and any time. The GPRS modem can send SMS to user when there are any emergency events.

Keywords: Home Gateway, Digital Life, Information Appliance

1. Introduction:
Most people have experiences of using the web browser to surf the Internet. If the web browser can be used to control the electric appliances such as an electric fan, an air-conditioner, a microwave oven, the light system of a room, that we used in daily lives, we can get a more comfortable live. We call these electric appliances which can be access by web the Internet appliances.

Increasing availability of Internet drives the demand for Internet appliances. Users expected to control home appliances and electric devices through Internet. They may get the service of these appliances from any where and any time. This trend will push the digital-life era to come early.

Today the web browser has embedded in TV. TV has the function of computer and becoming a Internet surfing tool. Also PDA, VoIP phone, or smart mobile phone have function of surfing Internet. Electric appliances to be controlled by the web browser can be access from any where and any time.

2. System overview

Fig.1 presents an overview of the architecture of the integrated system. There are many information appliances (6. in Fig) integrated in the platform through a Bluetooth wireless network. Users may access each appliance through a web browser from outside/inside the home. As Internet is ubiquitous, it is possible for user to control all the appliances from any places all over the world.

The System consisted of a home gateway (4. in Fig) and some Internet appliances. The home gateway is also the integration platform where application programs of the Internet appliance are run and integrated. We integrate these applications by providing a home page as the portal of all the applications. User access to the portal page can be directed to the application they want to control.

Fig. 1 System overview of the Integrated Internet appliances

A home gateway is used as the integration platform. A GPRS modem and a Bluetooth module are connected to the home gateway. The home gateway can thus communicate with these appliances through the Bluetooth module.

For each appliance there are CGI programs to provide web page as the graphic user interface. Users of the appliance can control the appliance through the web browser. Users can access the appliance through Internet at any place and any time. No other extra software is need to access the services of an appliance.

3 Internet Appliances
We have implemented a home security appliance, some Internet electric appliances, and a RFID medical box. When we implemented these appliances, each appliance has a web server for easy the development.
After developing each appliance, we migrate the control CGI and web pages to the home gateway. What we need to do is put an icon and a link to the home page of the integrating appliance.

### 3.1 Home security appliance

There are lots of facilities in our home which may cause security fault. We need sensors to detect these faults, such as gas loss, fire, thief invasion. These faults may distribute over a home. There will be lots of lines to connect these sensors. If wireless network can be adopted, it will largely reduce the efforts of installing a home security system.

**Fig. 2** System architecture of a home security system

Fig. 2 shows the security appliance is controlled by a microcomputer (2.). The home gateway (5.) is a Linux embedded system. It not only a gateway but also a web server. The microcomputer not only senses all the sensors (1.) of the system, but also communication with the home gateway through Bluetooth module(3.). If there is any emergency event, it will send message to the gateway. After getting the event message, home gateway sends SMS through GPRS modem(6.) and sends email through Internet.

**Fig. 3** A fire SMS when fire event is detected.

Fig. 3 shows that the master get the fire SMS. Fig 4 shows that the master can get the status of the house through a web browser.

**Fig. 4** Home page of the Internet home security system

### 3.2 Internet electric appliances

Fig. 5 shows 3 internet electric appliances are integrated through a home gateway. Users can control all the electric appliances through Internet.

**Fig. 5** System architecture of Internet appliances

**Fig. 6** Home page of the Internet refrigerator appliance

Fig. 6 shows a web page is the control interface for user to get status of a refrigerator. Users can also get temperature and set temperature through the page.

### 4. Conclusions:

The integration platform uses a home gateway to provide service of controlling electric appliances through Internet. User needs just to remember only one IP or a domain name of the home gateway. Each appliance communicates with the home gateway through Bluetooth to form a internal network. Users may use a Bluetooth enabled remote controller to control all the electric appliances.

Web browsers provide fully graphic user interface of the Internet appliances. No matter what level a person adopts computer and no matter how old a person is, it is easy for him to control system through GUI. With the web browsers and Internet, the system is ubiquitous.

In the integrated system, all appliances are seamlessly integrated by just putting all web page together and getting a link from portal page to the control pages of these appliances.