



A dream...

The universal remote console

by Gottfried Zimmermann and Gregg Vanderheiden

Imagine you are on business travel, checking into a hotel in a foreign city.

You enter the room and the air conditioning automatically sets to your preferred daytime room temperature. The TV displays a welcome screen. You pull out your smart phone and use it to switch to your favorite news channel.

Even though all products and systems in the room are new to you, you feel a familiarity because your smart phone is showing the same interface that you use for your home appliances.

As this is your own personalized interface, the controls are shown in your native language, so you don't have to decipher the labels on the systems in the room which may be in a language foreign to you.

And it gets even better. While you wait for the news to start, with a few touches on your smart phone, you program the TV to wake you up with your favourite song at 6 a.m. the next morn-

ing. No fussing around with complicated and unknown alarm clocks. You can take your personal user interface wherever you go.

And think about elders, some of whom would like a much simpler interface than that offered to the general public. They would no longer have to learn how to use a new interface each time a device has to be replaced or when they are traveling or visiting family.

...come true

This ideal scenario – with its vision of a personal controller or universal remote console (URC) that can be used with products at home, work and in public systems – is just an example of what “intelligent” environments and pluggable user interfaces should be able to do for you in the future. A dream that may be realized sooner than you think.

You can take your personal user interface wherever you go.

Technology enabling wireless connectivity and networked computing is already available, providing methods for seamless discovery, controlling and eventing.

But at the moment, user interfaces still have to be authored separately for each controller platform. Furthermore, many existing interfaces are neither intuitive nor easy to understand for many users.

What is needed is a standardized, versatile user interface description for products. A kind of “user interface socket” to which any personal device or “URC” can connect to discover, access and control a product.

A solid user interface description alone could support diverse URC technologies – including direct manipulation techniques via desktop computers and personal digital assistants (PDAs), or voice recognition and natural language technologies used by PDAs and wearable computers. Such an approach could also enable older products to be controlled with new user interface technologies (e.g. natural language processing).

Designed for all

Developing product interfaces that are both advanced enough to satisfy the needs of experts, while remaining simple for other users is not an easy task.

This can be partly handled through settings in the product. But beyond this, a mechanism would be needed to allow users to plug-in or connect alternate interfaces that better meet their needs and conventions. This would allow users to carry an interface that works for them across products. This can be especially important for

URC vs. the traditional universal remote

URC (universal remote console) standards enable a number of functions that go beyond the current universal remote control mechanisms.

Product display information – The URC remote console is capable of knowing and displaying the complete state of a product thanks to its bi-directional communication.

User notifications – Users can be notified about important events, such as when an oven reaches a selected temperature, or a microwave completes its operation.

Network neutral – URC standards do not assume a particular network or protocol. The technology could work equally well over LAN, wireless Ethernet (WiFi), Bluetooth, HomePlug, etc. It could even be possible to enable communication through household wiring, so that simply plugging an appliance into a power socket is enough to connect it to the network.

Modality independence – The URC standards allow for all media and modalities. The same URC could present a verbal interface to a person while driving, yet present a visual interface to the same person when in a noisy environment.

Use whatever control device is handy – Users can control a product with whatever device is handy, such as programming their DVD or VCR player from their desktop computer upstairs to record a show they are missing.

Highly customized user interfaces – In addition to allowing URCs to build a user interface on the fly, device (target) manufacturers could also provide specialized, carefully crafted user interfaces with a particular look and feel. For instance, a custom interface that works on any iPhone or Windows Mobile. They could provide a user interface in Flash or Silverlight. Or, they could offer a highly functional interface that only ran on their proprietary remote control, while still providing the basic information needed so the product can be controlled from any generic URC compatible device.

Dynamically upgradeable – Users that have access to the Internet could upgrade to improved interfaces developed by the target's manufacturer.

Multi-language – Although there may only be place for one set of labels on the front of a product, the URC standard makes it very easy for manufacturers to provide labels in many languages. Alternatively, network resources can be used to call up translations into languages not supported by the target device itself.

Allows (real) natural language and intelligent controllers /agents – The standard supports the provision of additional context, status and local and remote semantic information to support multiple levels of natural language and intelligent controllers. It would be possible, for instance, to “converse” with the controller as if it were a person who the user is asking to operate a device.



the elderly, who have trouble learning new interfaces each time they encounter a different version of the same device.

Interoperability is critical to realizing the vision of personalized and pluggable user interfaces for electronic devices and services. An International Standard on pluggable user interfaces has a key role to play here.

Such a standard would facilitate user interfaces that adapt or can be adapted to a user's personal needs and preferences. It would allow interfaces that are easy to use and that employ various modalities for input and output. And it would enable special user interfaces provided by third parties for specific user groups such as children, older persons or persons with disabilities.

With this in mind, subcommittee SC 35, *User interfaces* of ISO/IEC JTC1, *Information technology*, published a new multi-part International Standard in 2008

promoting the interoperability of URCs interfaces, ISO/IEC 24752, *Information technology – User interfaces – Universal remote console*.

The basics

The goal of URC technology is to allow any device or service to be accessed and manipulated by any controller. Users can then select a user interface that fits their needs and preferences, using input and output modalities, and interaction mechanisms that they are familiar with and work well with them.

Interoperability is critical to enable personalized and pluggable user interfaces.

In the following, we refer to the devices and services that are to be controlled as *targets*, and to the controller devices and their user interfaces as URCs.

To enable URCs to control a target without any prior knowledge of each other some “common understandings” need to be in place.

The first part of ISO/IEC 24752, Part 1: *Framework*, defines the components of the URC framework and specifies the “common understandings” between them as conformance requirements, stated in terms of high-level interaction.

A key part of this interaction is the sharing of control and access information through XML documents.

Learn more

While the fundamental components and XML languages are specified by ISO/IEC standards, essential implementation guidelines and other support documents are provided as technical reports by the OpenURC Consortium (see <http://myurc.org/TR/>).

Readers interested in the technical aspects of the standard and its implementation should start with the technical primer available at <http://myurc.org/TR/urc-tech-primer1.0>.

ISO/IEC 24752, does not determine a specific networking protocol between a URC and a target. It only defines requirements for such a networking platform. The idea is that the URC related interaction could be implemented on top of existing networking platforms that support device discovery, control and eventing – such as UPnP (universal plug and play), Web services, HomePlug, etc.

You can run a URC environment at home and use pluggable user interfaces and similar resources in a constrained environment such as a local network. However, the real power of the URC framework unfolds if applied to a global ecosystem.

In such a scenario, different parties contribute the different parts necessary to build flexible user interfaces: providers of devices and services, providers of network services, providers of controllers, providers of pluggable user interfaces, and the users.

A key component of the URC ecosystem is the resource server, which acts as a market place for sharing various resources enabling personalized and pluggable user interfaces. Currently, a pilot resource server is being operated by dot UI (dotui.com).

About the authors



Dr. Gregg Vanderheiden is professor of industrial and biomedical engineering and Director of the Trace Research and Development Center at the University

of Wisconsin-Madison. He has worked in the field of technology and disability for almost 40 years, and is the originator of many standards and guidelines, including the first computer access guidelines in 1985, consumer products guidelines in 1992, and first Web Access Guidelines after www2 in 1995. He serves on many industry and government advisory and planning committees and ICT standards committees. He has received over 150 research grants and worked with over 50 companies. Recent projects include “Raising the Floor” and the “National Public Inclusive Infrastructure”.

The OpenURC consortium

There is a growing community of technology developers applying the URC standards. The impact of implementations will be maximized by sharing resources and following common guidelines. This is one of the objectives of the OpenURC Consortium (www.myurc.org). Everybody can join this community to build a URC ecosystem that will facilitate simple, flexible, and accessible user interfaces.

Currently, there are about a dozen European projects built upon the URC and the universal control hub (UCH) technology, including research and industrial organizations such as DFKI, the University of Prague, VicomTech, Siemens and Sun Microsystems.

The first project of this kind in Europe was i2home (www.i2home.org), which spearheaded the use of URC technology in the field of ambient assistive living. ■

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Dr. Gottfried Zimmermann is an expert on IT usability and accessibility. He received a PhD in computer science from the University of Stuttgart,

Germany, in 1999. In 2000, he joined the Trace Center of the University of Wisconsin-Madison, USA, where he focused on research and development in the area of Universal Design in current and next-generation information and communication technologies. In 2003, he founded Access Technologies Group, a consulting company for ICT accessibility. Recently, he became junior professor of Media Informatics at the University of Tübingen, Germany. He has also been the technical coordinator of the European i2home project since 2006.