

## VIEWING NEXT-GENERATION UNIVERSAL REMOTE CONTROLS FROM A USER-ACTIVITY PERSPECTIVE

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### ABSTRACT

*This paper presents a set of attributes that can be used to describe a possible design and function space for next-generation universal remote controls. Possible new classes of such remotes are examined using user-activities as a basis to consider upcoming paradigm shifts, smartness, programmability, point-of-entry, decoupled smartness, and other aspects of TV-viewing related activities. Examples include personal remotes, integrated electronic organizers and remote controllers, active remotes, multi-modal remote controllers, and remotes that "listen" as well as "talk."*

### INTRODUCTION

Next-generation remote controllers for TVs and home entertainment systems will cease to be stand-alone devices. They will expand to consider 500-channel cable and satellite systems, video-on-demand, Internet-integrated TV, home distribution and control networks, smart homes, personal data assistants (e.g., personal electronic organizers), and more. Many of these changes will come about through the results of the converging computer, TV, and telephony arenas. Other changes will result from increasing wireless communications and mobility and connectivity capabilities, allowing receipt of electronic programming data wirelessly into one's electronic daily organizer, for example, while riding home on the subway. Electronic organizers will be capable of serving as "personal" remote controllers, integrating personal schedules with TV scheduling, and software agents will support TV viewing and scheduling based on personal preferences. Next-generation remote controllers will thus become personal electronic devices, staying attached to a particular user, rather than staying attached to a particular TV and/or room, as they currently do.

Several personal data assistants and/or electronic organizers (the Apple Newton, for example) are already capable of sending and receiving infrared signals to home electronic devices, and several shareware applications have been distributed that make these devices function as Universal TV Remote

Controllers, but with even more functionality than is commonly found on many commercially available Universal Remote Control devices.

All of these changes will be brought about to support changing user activities that result from a state of information overflow, information access flexibility, interactive programming and scheduling, and changes in the delivery architecture for integrated Internet and TV programming.

In an attempt to examine possible evolutionary axes of change for universal remotes, it is instructive to examine the set of dominant usage paradigms exhibited by current remote controls and the home entertainment environments within which they operate. Then, contemplating ways in which these paradigms may be shifted or broken, new models of integrating data, choice, and control present themselves. These can then be integrated with advances, both extant and conceived, in the personal data assistant arena to devise functional models of next generation universal remote controllers that support a wide variety of user activities.

### EXISTING PARADIGMS:

The following paradigms are representative of many functional models of Universal Remotes. These paradigms are listed here only to allow the overall functional space of remotes to be described, not defined. Further, this list is only partial:

- Remotes "live" with a particular TV, within a particular room.
- Remotes "belong to" a particular device or set of devices, not to a person.
- Remotes communicate to devices, but devices do not communicate to Remotes.
- Remotes exhibit little or no functionality when not near a TV or other device.
- Remotes frequently rely on on-screen programming for user navigation and feedback.

- Remotes possess little or no internal state for supporting user activities.
- Remotes require hands-on control to be used.

Each of these paradigms can be modified in obvious ways, many of which allow a whole new set of user activities to be supported; and when combinations of these paradigms are modified simultaneously, significant new functionalities can result.

### USER ACTIVITIES

Next-generation, Internet-integrated programming and TVs, video-on-demand, and 500+ channels will allow viewers to engage in a variety of activities not commonly supported by today's Universal Remotes. These include:

- selective, modal surfing
- bookmarking (and memoization)
- offline organizing and scheduling
- collecting and using other people's "guides"
- profiling of interests and availability
- participation with programming
- semantic searching
- scene setting
- customization and programming
- multi-person interactions and navigation

Examples:

"OK, it's Friday night, the kids and wife are out, so it's just me. OK, Remote, go into scifi mode, and just surf channels 16, 23, 142, 250-253, and 367. Oh yes, and crank up the volume since I'm all alone."

"Woah, Nellie! What's this? A Horse Channel? Didn't even know they had one! OK, Remote, add that one to my surf list, but general-interest mode only."

"Gee, are there any war movies or horror movies showing now (or starting within the next 5 to 10 minutes)? How about any time this weekend?"

"Oops, I nearly forgot! 'Terminator-12' is coming on this Friday night at 9:00. Remote, enter that into my electronic calendar."

These activities are not well supported through the simple addition of a wireless keyboard, mouse, and/or joystick to existing Universal Remote Control function sets.

### THE DESIGN SPACE

To support these types of user activities, a number of design axes can be contemplated. These can be

considered alone or in combination for the purpose of exploring possible next-generation Remote Control functionalities. We have found the following axes to prove insightful:

*PERSONALIZATION:* The Remote can be made to "belong" to one user, or at least to operate differently for different users and modes.

*SMARTNESS:* The Remote can learn, remember, and/or adapt itself to different environments, users, modalities, times, etc.

*MODALITY:* The Remote can be made to operate differently at different times, different locations, or in different user-settable modes.

*2-WAY COMMUNICATION:* The Remote can be allowed to receive as well as send information, both dynamically and statically, in a variety of ways.

*PROGRAMMABLE/EXTENSIBLE:* The user can implement new functionality through a programming language or through macros, data tables, key sequences, etc.

*AUTONOMY:* The Remote can perform certain functions on behalf of its user without requiring the user's intervention. It can also process information for the user, through software agents, possibly using user activity profiles.

*MOBILITY:* A subset of the Remote's functions can be used when away from the TV or other devices. These include both user-initiated and controlled as well as autonomous actions, including receiving electronic programming guides (wirelessly), scheduling events, searching, and filtering.

Using these design axes, we have developed several concepts for next-generation remotes which we believe promise greater support for tomorrow's enriched TV and home entertainment environments. Further, these axes allow us to explore tradeoffs and alternative ways of supporting similar user activities.

### KEY ISSUES

However, a number of significant issues remain to be solved in the wider context of the PC/TV and smart home arenas. For example, where should the point of entry be with respect to electronic programming information? Strengths and weaknesses exist for both the TV (or settop box) as well as for the remote. Perhaps the information should redundantly enter at both points of usage. Also, where should the "smartness" within the system reside? Within the remote, or at the headend or service provider? And for true universality, how do the home control system and the entertainment system network integrate seamlessly? And, which industries control the answers?