Remote control and Home Automation

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1. Remote Control and Home Automation

Not only the number of devices, but also the complexity of the integration makes the problem of remote control complicated. I gave up trying to find the optimal programmable universal remote control of the conventional type. Having spent hours on "programming" the Lapeschi Telegenius, and then losing everything with a battery change or a firmware failure — enough!

Therefore, I bought a [Philips Pronto](#) RU 890 (now obsolete since a long time). This magnificent gadget comes with a touch screen, which can be (almost) arbitrarily filled with customized device- and macro-pages. Programming preferably takes place with the ProntoEdit Windows program (download-able from Philips free of charge), or from the free software [Tonto](#). The program is written entirely in platform independent Java, with sources available (Unfortunately, the program does not support the newer Pronto models, and its author, Stewart Allen, discontinued its development in January 2004.) There is a large user community for the Pronto (and its "compatibles"), in particular, as a great source of inspiration, knowledge, and files, [remotecentral.com](#) should be mentioned.

With the Pronto, a completely field of possibilities was opened. But it does not offer a quick solution to a problem, rather presents you with a new hobby :-).

1.1. Teaching the Pronto Radio Control

I had purchased some 433 MHz radio controlled equipment from [Conrad](#), like for example three of their power outlet strip "Funk-Steckdosenleiste RS-300". The problem was to get the Pronto to generate the radio signals. For this, it turned out to be possible to use half of a remote control extender set, meant to receive an infrared signal with a transmitter that transfers it using 433 MHz radio signals. Later, a receiver converts the signal in infrared again. I removed the receiver board, cut with a Dremel it to fit into the Pronto, and connected it to the Pronto batteries.

Here are some pictures.

[Photo gallery](#)

Using the transmitter and the Pronto, I analyzed the signals, and was able to come up with a C++-program that generates the Pronto codes for arbitrary signals for the Conrad stuff. [Here](#) are the (GPL-licensed) sources. To compile, use a command like `gcc -Wall -o conrad conrad.cc -lstdc++`.

In my living room, all the low-voltage halogen setup, as well as the TV background light, are all switched by the Conrad switches. Also the fountain, water column (powered by an aquarium air pump and halogen light), and water wall are switched by these switches, and thus from the Pronto.

Some A/V devices do not come with remotely controlled power switches that do what I want. This applies to the laserdisk player, the sub-woofer, and the MK2 CD-player. These

can also be switched on and off through the radio controlled power outlet strips.

This was still not enough for me. With the Intertechno radio controlled switches CMR-xx most lamps in the apartment are remotely controllable. (The Intertechno products are also sold under the Düwi name. Apart from the design of the wall switch, they seem to differ only through the higher price.) Fortunately, teaching the Pronto to handle these were much simpler, since someone else had already done the work in the form of a Javascript program, and made it available through download from Remotecentral.

1.1.1. Blinds

In southern Germany, external blinds made up of heavy plastic profiles are extremely common. For home theater, these are excellent: they provide an almost perfect darkness, even with sunlight outside. Electric motors are available, like the Rollotron 9200. Even remote control, and light sensible controls, are available. The drawback with such solutions is of course (not counting the price!) that it is unclear if and how such devices can be integrated in the whole system. For obvious reasons, I wanted to use the Intertechno CMR-500. This thing switches two "channels" with one connector in common. The objective was to remotely control the "up" and the "down" button. Unfortunately, a look at the signals with an oscilloscope showed that there were no "common" for both "up" and "down". Therefore, I equipped the Rollotron with two reed relays, feed by 5 Volts. The modification is described in pictures.

On two windows, more space was available, so instead of the somewhat expensive Rollotron, a cheaper and bulkier device could be used. Also it has the advantage that it can be controlled by the CMR-500 directly, with no relays.

All five blinds in my apartment are remotely controllable.

Here are some photos of the modifications.

Photo gallery

1.2. Infrared codes, in particular discrete codes

For the IR hacker, searching for new commands is like searching for comets and supernovas for the astronomers. In particular, many functions on today's consumer electronic is only available through so-called toggle-codes: For example, pressing the Mute-button turns the muting on (if it was off before), or off (if it was on before). When a human is pressing the buttons on a remote control, this is of course not a problem, because the human knows the state the device is in. If he doesn't know it, he is probably not interested in changing it anyhow. Things are different if a "machine" (for example a macro on a remote control) instead of human is pressing the buttons. Pressing "Power (toggle)" may turn devices on, instead of off, or vice versa. Commands that put a device in a defined state, like "Power on" or "Power off" are called "discrete codes". It should be obvious, that devices with no discrete commands, just toggle commands, lead themselves very badly to automatization.

A look at todays consumer electronics shows that most devices are in fact TOADs ("Toggle Only Actuated Device"), instead of DUDE ("Device Utilizing Discrete Extensions"). In many cases, undocumented discrete codes do exist, and discussed in forums like remotecentral. (Developers are often smarter than the people selling their work.) In some cases, they seem not to exist. Why is this? Of course, the number of physical switches on a device increases the final cost, but this is not the issue. Buttons on a remote control cost less, but has a frightening effect. Still, it is hard to find a good reason for not offering any, e.g., discrete power commands. Particularly disappointing are the magazine tests, for example in German magazines. "Discrete commands" is obviously not a part of their tests, not even their terminology...

1.2.1. Panasonic PT-AE500

With this device, in late 2003, Panasonic manage to produce an absolute price-performance star. It is so much more disappointing, that with respect to the issues here, they managed to do almost every possibly error conceivable. No discrete power signals exist. To select a particular aspect ratio, it is necessary to click yourself through a cyclic (!!) sequence of possible aspect ratios. (It it was not cyclic, it would be possible go to the end of it ("up" many times), and then have a well-defined state!) Discrete input selection is also not possible, but have to be selected through cyclic sequences.

I analyzed the signals, and wrote a program to search through 256 possible candidate codes. Nothing interesting was found. Also on places like remotecentral, nothing appears to be known. The name "Panasonic" does not appear to command a great deal of respect there...

For this reason, I doubt that my next projector will be a Panasonic...

1.2.2. Yamaha RX-V1400

For Yamaha, similar things can be said, just with the different sign... Many, but not all, commands are discrete on the standard remote control. But more commands exist, even documented (!!) on [this page](). Yamaha even provides its users with a [tutorial]() on how to use their extended codes!

1.2.3. Tuxbox/Neutrino

Also the Tuxbox/Neutrino software fails to provide discrete functionality ([Thread]()). My own setup has this functionality. Corresponding patches are available on [my dBox page]().

1.3. Ongoing work; future setup

The possibilities of the 1MB Pronto are since long exhausted, and I am working on a new solution. Exactly how this will look like is still unclear, however, componentes will probably be a [Siemens Simpad SL4](), (probably running Windows CE 4.2 from [Simon]()

Mullenger), using Netremote 2 from Promixis, together with Eventghost running on the HTPC. I acknowledge the influence of this thread by Beisammen. Watch this space in the future...