Perusing a universal remote

During the 1950s, Zenith Radio Corp introduced the first remote control for television. The Lazy Bones device used wires between the remote and the TV. Wireless remote controls appeared shortly thereafter, and the industry has been evolving and improving them ever since. As home-entertainment systems started to include more types of devices, such as DVD players, cable or satellite set-top boxes, and audio systems, the demand has grown to combine the separate remote controls for each of these devices into a single device.

An industrywide remote-control standard would be ideal, but such a solution seems unlikely in the immediate future. The URC (universal remote control) is an approach to help reduce the frustration of using multiple and incompatible remotes to control home-entertainment systems. This Philips Prestige SRU8015 includes many of the components that you typically find in URCs.

Using semitransparent rubber for the buttons and supporting surface enables the remote control to include backlighting for the buttons.

The infrared LED and the transistor to drive the current for the LED provide the interface to the outside world to control the electronic entertainment devices. Some remote-control schemes implement three signals to control a device's on/off state—an explicit on signal, an explicit off signal, and an on/off-toggle signal.

The EEPROM supports the learning function and allows the unit to store the user's settings even between battery changes. The learning function stores the signal transitions and timings for each button code a user "teaches" it.

These coils are battery contacts. To reduce cost, remotes may use a single-sided PCB; all of the traces are on the other side of this board.

To reduce bill-of-material costs, you can directly attach the microcontroller silicon to the PCB without packaging and covered with epoxy. The microcontroller contains a ROM instance of the infrared database; users access the database through an API that is specific to the database vendor. In this example, to access a button entry, the API needs a device-type code; a manufacturer code; and a key code, which corresponds to a row-and-column designation in the Zilog database.

Four transistors on the left side amplify the IR input from the IR photodiode that enables the URC to support learning; newer designs may use a microcontroller that includes these transistors to further reduce costs. The yellow package on the right side is a resonator to provide a low-cost clock source for the system. The electrolyte capacitor (black package) filters out the ripples and stabilizes the power in the system while the IR LED is active.

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