

Programmable Infrared Controller

eZ2998

Abstract

The Programmable Infrared Controller is a remote control, whose operation can be controlled and programmed through a local network (Ethernet). It does not intend to replace a conventional remote control unit. Instead, it is a device that provides new functionality, and can be considered as a cost effective upgrade to the unit it controls. The present implementation is designed with emphasis on air conditioning units, providing the ability:

- To initiate an infrared command from any computer on the same network.
- To program the controller so as to operate on a 'year round' basis, in a predefined manner from any computer on the same network.
- To reprogram the controller for any device that uses a remote control.

The basic idea is to use any computer with a Java2 enabled web browser without the necessity to install any software. This is possible, because the Z80 is using the CMX-Micronet TCP/IP stack, which enables it to host a web page containing a Java applet, an interface to the Programmable Infrared Controller's functionality. However, in the current phase of development, a Java application residing on the user's computer, rather than an applet, is used to interface the Programmable Infrared Controller. This by no means affects the unit's functionality, and the user can execute the program using a java interpreter (e.g. typing: 'java Index' in the command prompt) on any computer. The application then displays a small frame containing three buttons:

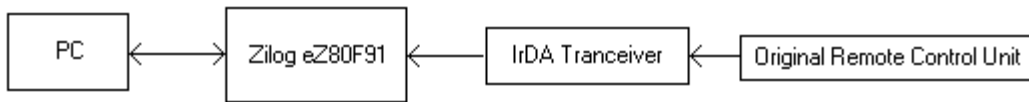
If the user presses the Overriding Commands button, he can select an infrared command from the window that appears, and initiate it. The window provides commands specific for air conditioning units.

If the user presses the Calendar button, the application's main interface appears, displaying a 'calendar'. The days can be selected using the mouse, while the coloured buttons on the right, corresponding to a different preset each, assign a preset to the current selection. By this manner, each day of the year can be assigned to the appropriate preset. Editing the presets is a task to be performed less frequently. Thus, the necessary interface is toggled in and out of view by the 'Show/Hide Preset Editing' button. The presets are edited on a day of week basis, so that in a particular day the Programmable Infrared Controller will act according to the corresponding presets day of week setting. It may sound complicated at first, but it is a simple concept, and the only way to eliminate the need to program each day specifically, and repeat this task each year. The user can choose a preset by its colour from the drop down menu, edit it's name, and iterate through the seven days of the week using the scrollbars to select the time period and temperature, and the buttons on the right to select the function of the air conditioner. The result will be a graph whose height will represent the temperature (Celsius), while the colour will represent the function (Cooling, Heating, Auto, Power Off). Finally, the 'Read Settings' and 'Apply New Settings' upload and download all the data from and to the Programmable Infrared Controller Flash memory (nothing needs to be stored on the computer). The Programmable Infrared Controller could work for many years without the need to reprogram. If the programming must change, this could be done in minutes depending on the complexity of the new program. Thanks to the Real Time Clock peripheral of the eZ80F91 and a backup battery, time is kept accurately, even over power breaks, and leap years are automatically taken into account.

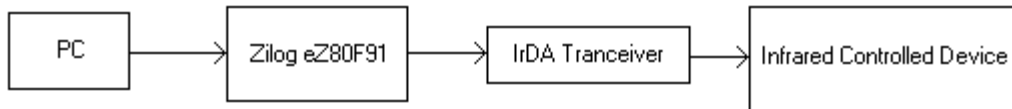
If the user presses the Record IR Commands button he is sequentially prompted to aim the original remote control unit at the IR transceiver and press the appropriate buttons. The actual recording takes place on the eZ80F91 by using its versatile timers and the ZiLOG ZHX1810, the well-known IrDA transceiver whose footprint exists on the Mini Enet Module. The reasons it can replace a dedicated 38khz modulated infrared transceiver in the specific application, giving the option to upgrade to an IrDA interface (of e.g. a palmtop) in the future, are analysed in the complete documentation. It must be noted that all the communication necessary to provide the above functionality takes place through TCP packets.

It is obvious that the current interface refers solely to air conditioning units. Adding support to other devices simply comes down to 'adding buttons' on the Java program. Even so, somebody could still use the Programmable Infrared Controller for any device as it is, simply by associating an air conditioner function for every command. By this way there could be, e.g., a TV set in a public place that could turn on and off, and change channels automatically in a predefined manner at specific hours each day.

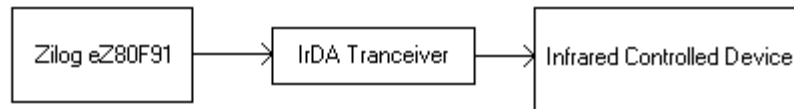
The only hardware intervention necessary consists of connecting some pins in the headers together, since the eZ80F91 on-chip peripherals, 256k Flash and the Mini Enet module's 128k SRAM, IrDA transceiver, Real Time Clock crystal and battery backup, and of course the Ethernet capabilities combined with the CMX-Micronet TCP/IP stack, provide everything necessary to try out and use the Programmable Infrared Controller.



a. Recording infrared commands



b. Performing settings download-upload or executing an overriding command

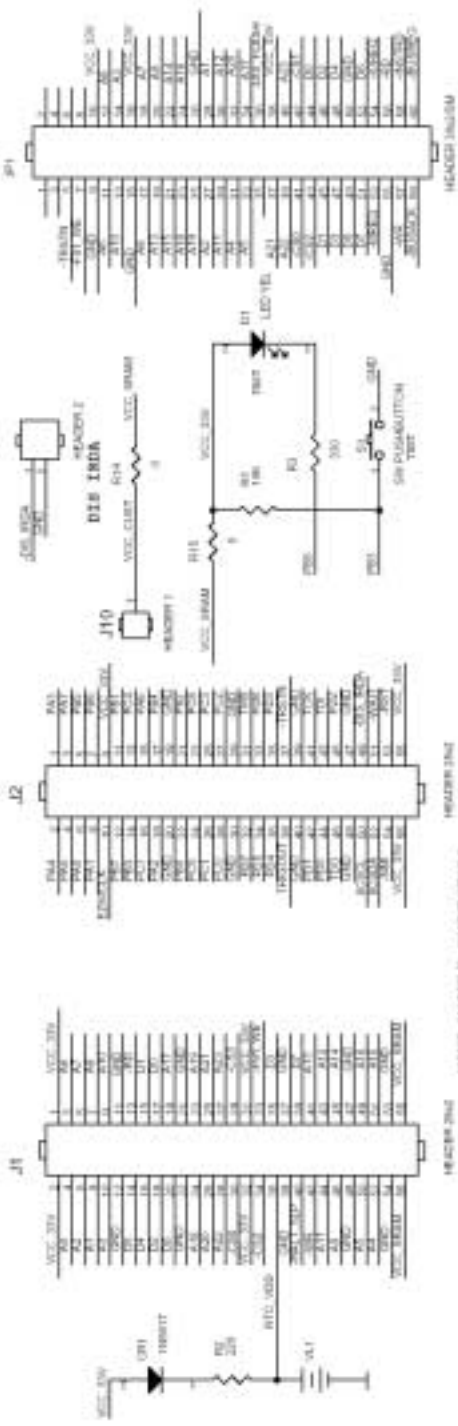


c. 'Calendar' operation enabled, providing autonomous operation of the device

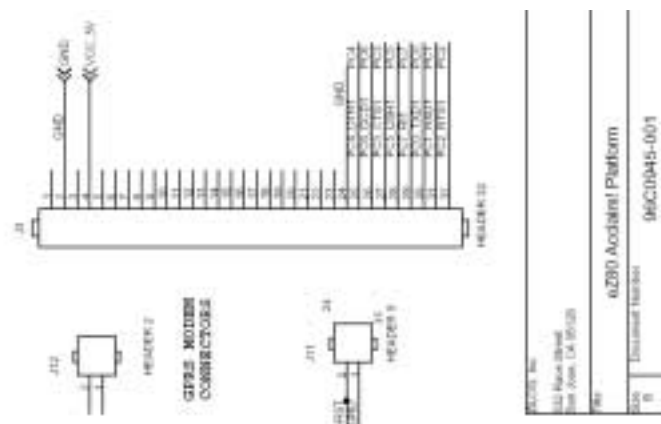
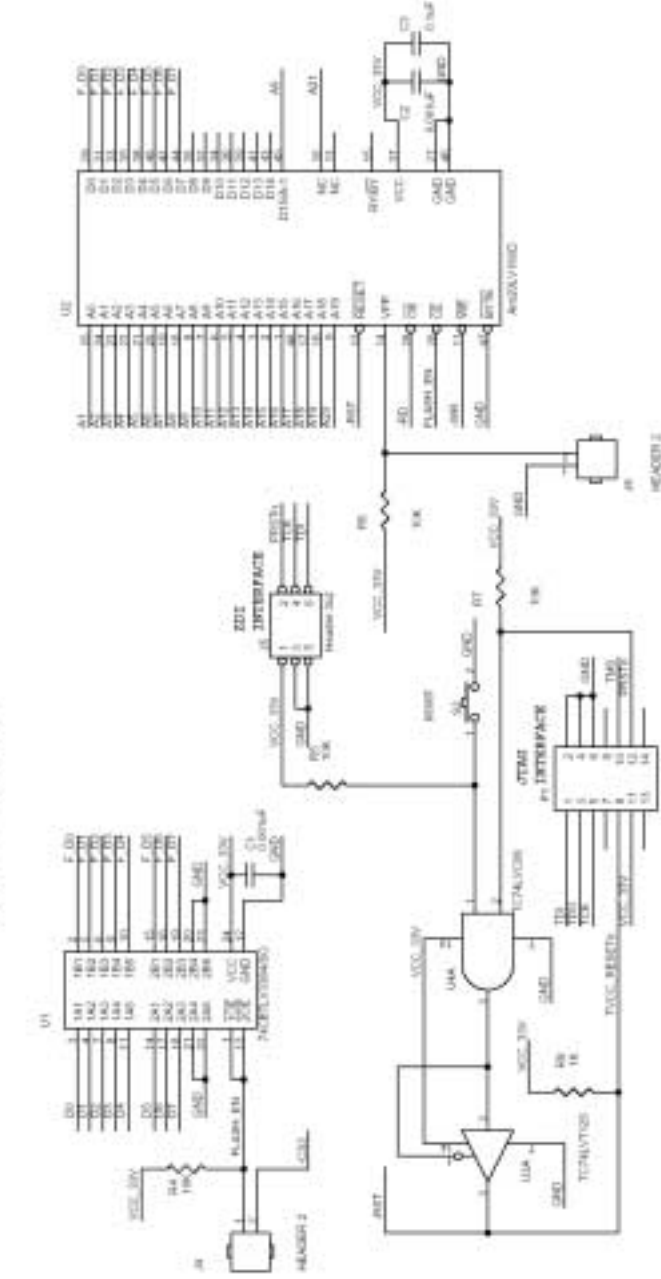


connector 1

connector 2



IEEE MODULE CONNECTORS



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