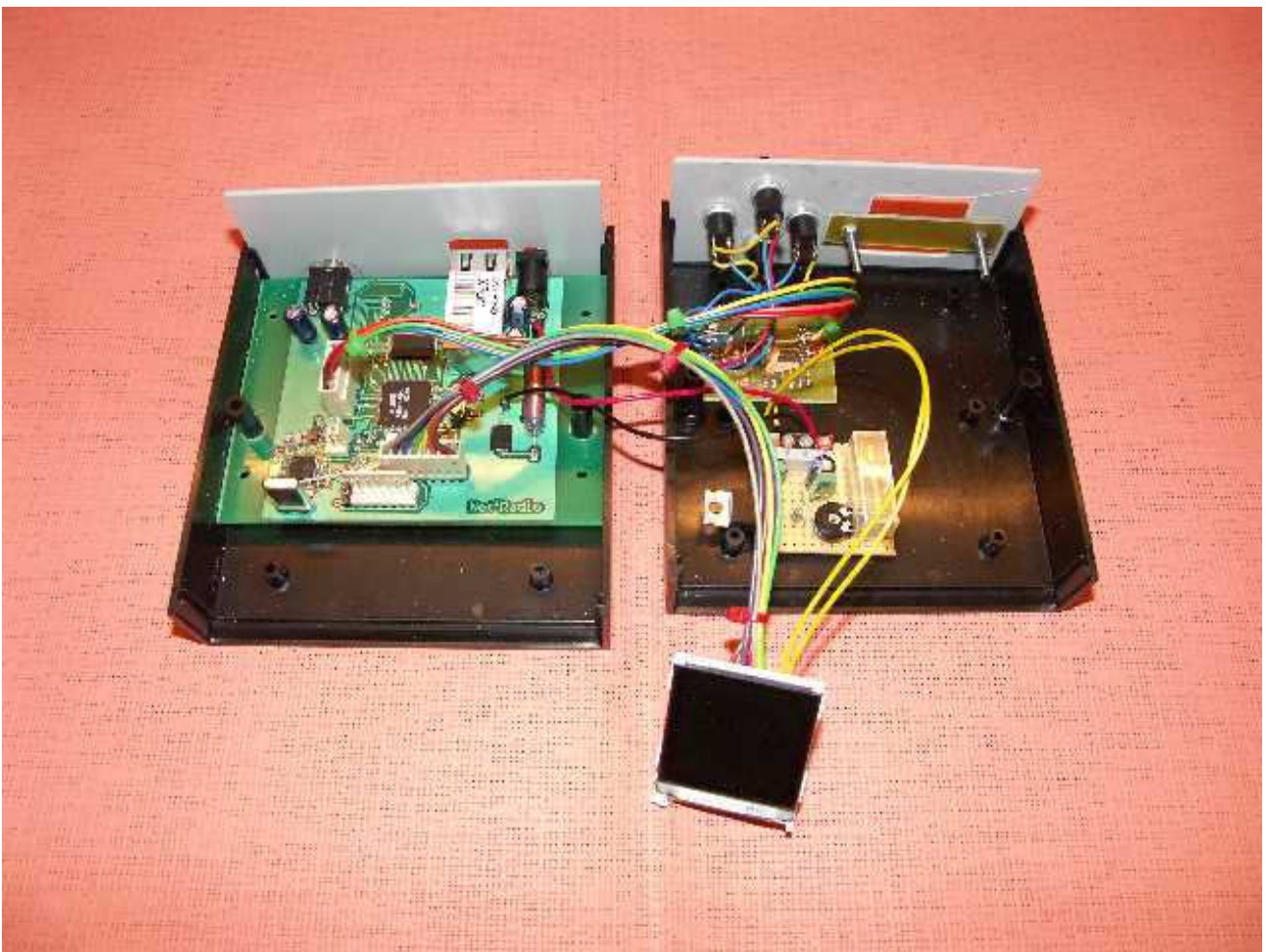


# Net Radio

Contest entry A3814

← ABSTRACT →



Are you sick and tired of low quality broadcast radio ? Do you live in a badly covered area ? Or would you simply like to enjoy the latest Internet MP3 tunes without the hassle of powering your computer on ? Then, perhaps the Net Radio may be usefull to you...

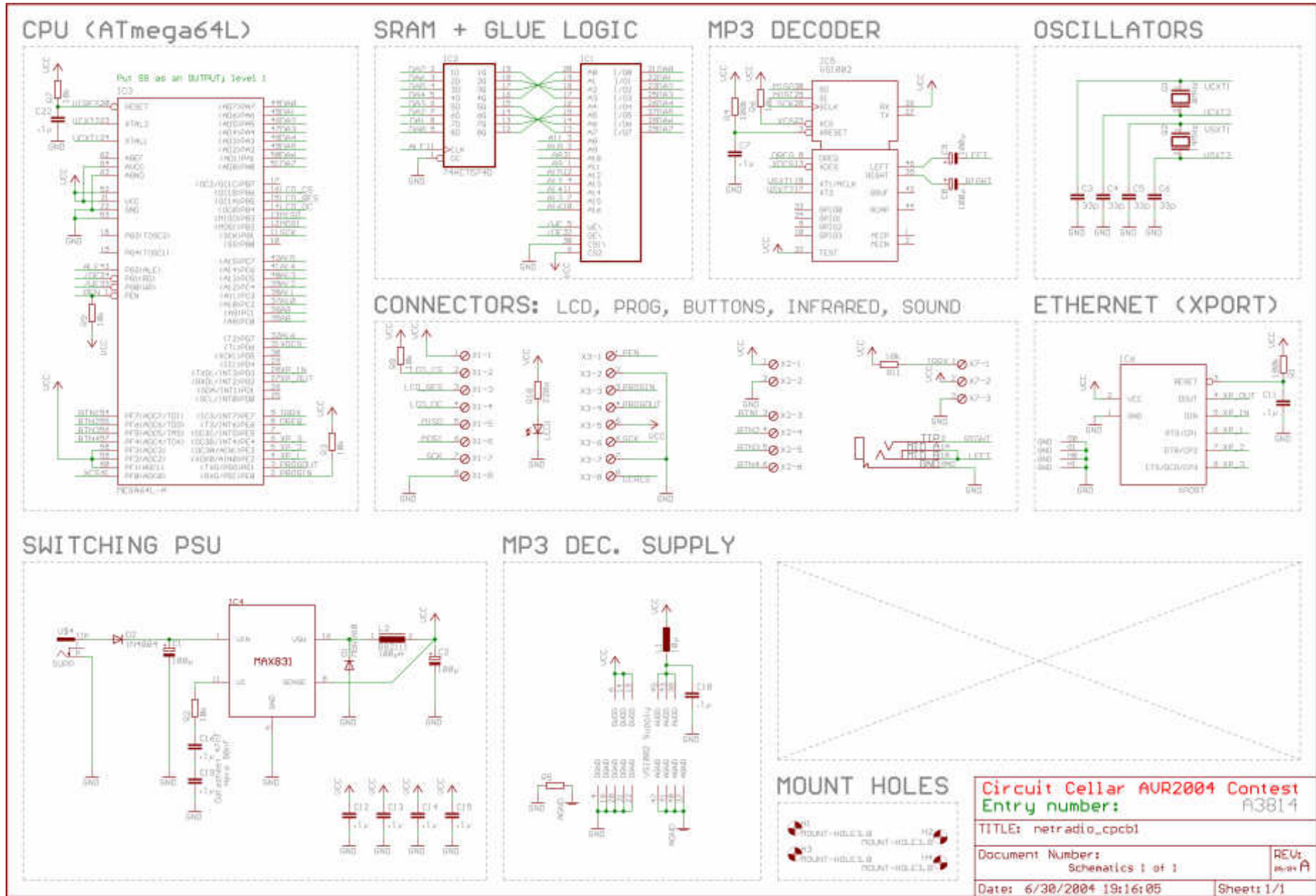
## → So, what is it exactly ? ←

The time of ancient tube radios is over (even if their sound will stay in our memories)... and the time of conventional radios may be over, too: the Net Radio allows to listen to MP3 streaming radios that are broadcasting over the Internet.

Thus, it is possible to enjoy MP3 audio quality, without a PC, and with a great ease of use, thanks to a switch buttons driven User Interface and a very attractive color LCD.

The Net Radio has an Ethernet connector that gives it the ability to receive the MP3 streams from any Internet Radio. The MP3 stream is then decoded thanks to an on-board MP3 decoder, and the audio is output to a standard 3.5mm stereo jack. Couldn't be simpler, could be ?

The heart of the project that makes all of this possible is an ATMEL Atmega64L microcontroller. It is a highly featured RISC device, with plenty of embedded memory, that provides space to store the rather big program of projects like this one. And thanks to low power consumption, it can be interfaced to most new devices that operates at low voltages, making the ideal controller of any real life device.



. (c) 2004.

## → Conclusion ←

This project shows how well the AVR family can be used in any project, from the smallest to the biggest. Here, I use an Atmega device as a LCD controller, a HTTP client, a SRAM driver, an EEPROM verifier, and many more. It drives a parallel bus (for the SRAM), a Serial Synchronous Bus (SPI, for the LCD and the MP3 decoder), and a Serial Asynchronous Bus (The UART, for the Xport). When AVR devices are well used, they will surely lead to successful projects.

The Net Radio is an example of how to mix the best of the technologies of the last decades, like embedded DSPs or color LCD displays, to get a new innovative appliance, without having to reinvent the wheel, as devices that handle quite complex tasks such as MP3 decoding or Ethernet interface + protocol stacks are now available.

And the Net Radio is also suited for WiFi enthusiasts. The Xport has a brother, the WiPort. The WiPort can take the place of the Xport and transform the Net Radio as a WiFi client, thus allowing to listen to MP3 streaming music from everywhere in the house (including the garden), even where you do not have a network cable available !

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## ➔ Code Example ←

This function prints some string on the color LCD screen.

```
void
lcd_puts (
    char* str,
    unsigned char len,
    unsigned char x,
    unsigned char y,
    unsigned char fgcolor,
    unsigned char bgcolor)
{
    uint32_t offset;

    lcd_window(x,x+(len*FONT_WIDTH)-1,y,y+FONT_HEIGHT);

    lcd_select;

    lcd_command(LCD_CMD_RAMWR);

    unsigned char index, col, line, buf;

    for (line=0;line<FONT_HEIGHT;line++)
    {
        for (index=0;index<len;index++)
        {
            offset = pgm_read_word(&(offset6x13[(uint8_t)str[index]]));
            buf = pgm_read_byte(&(font6x13[offset+line]));
            for (col=0;col<FONT_WIDTH;col++)
            {
                if (buf & 0x80)
                    lcd_data(fgcolor);
                else
                    lcd_data(bgcolor);
                buf = buf << 1;
            }
        }
    }

    lcd_deselect;
}
```