Remote Temperature Sensor

– Abstract –

Reg. No. 003067

Public interest in smart metering and home automation solutions has grown over the last years. In 2010 smart energy meters are mandatory for new buildings in Europe.

Based on the W7100 evalutaion board, an extended temperature sensor allows remote monitoring of the temperature and supports control outputs for external equipment, for example a fan or a heater. The prototype includes an output that can drive up to 6A/400VAC/1500VA (see Figure 1).

Figure 2 shows a block diagram of the system. The schematic of the extensions to the evaluation board is shown in figure 3.

The device uses DHCP and NTP for automatic configuration. The temperature sensor device has four different interfaces for user interaction:

- A telnet server on port 3001 for the application command line
- A telnet server on port 3002 for device configuration
- A local console using the LCD and four control buttons
- A terminal server on the serial line.

When the device has finished with the boot process, the display will show the current IP address and the measured temperature (see Figure 1). When a client connects to the application service, the peer IP will be displayed.

The components included in the WIZ7100 constitute a sensible trade-off between usefulness and complexity:

- The 8051 core allows simple applications to be implemented easily.
- The available 64KB RAM are by far enough for such applications.
- The 64KB Flash might run short for some applications (e.g. a web server with a lot of pages), but code banking on the other side comes with an overhead.
- The data flash allows to store simple data records.
- Fail-safe storage with a backup can be implemented using a sector in the flash.

It was easy to implement the temperature sensor application on the WIZ7100. The design of the evaluation board allowed to mount the additional components on the same PCB. Several technical problems had to be solved (slow edges on the IO pins, watchdog resets, tuning the linker, fixing the call tree hierarchy), but these were no real threats to the project, just “lessons learned”.

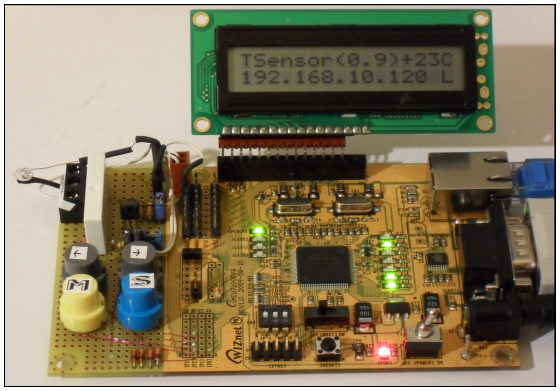

Figure 1: Prototype hardware based on the WIZnet evaluation board.

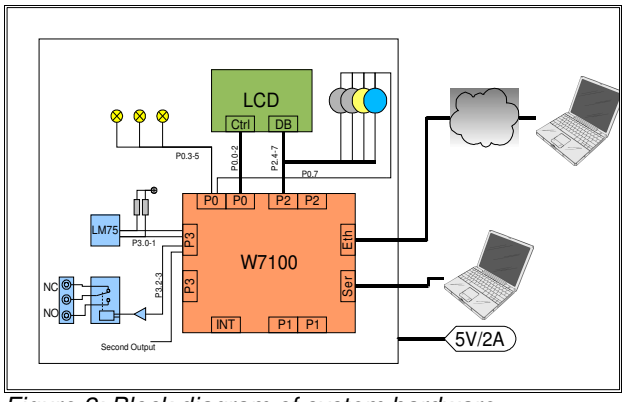

Figure 2: Block diagram of system hardware

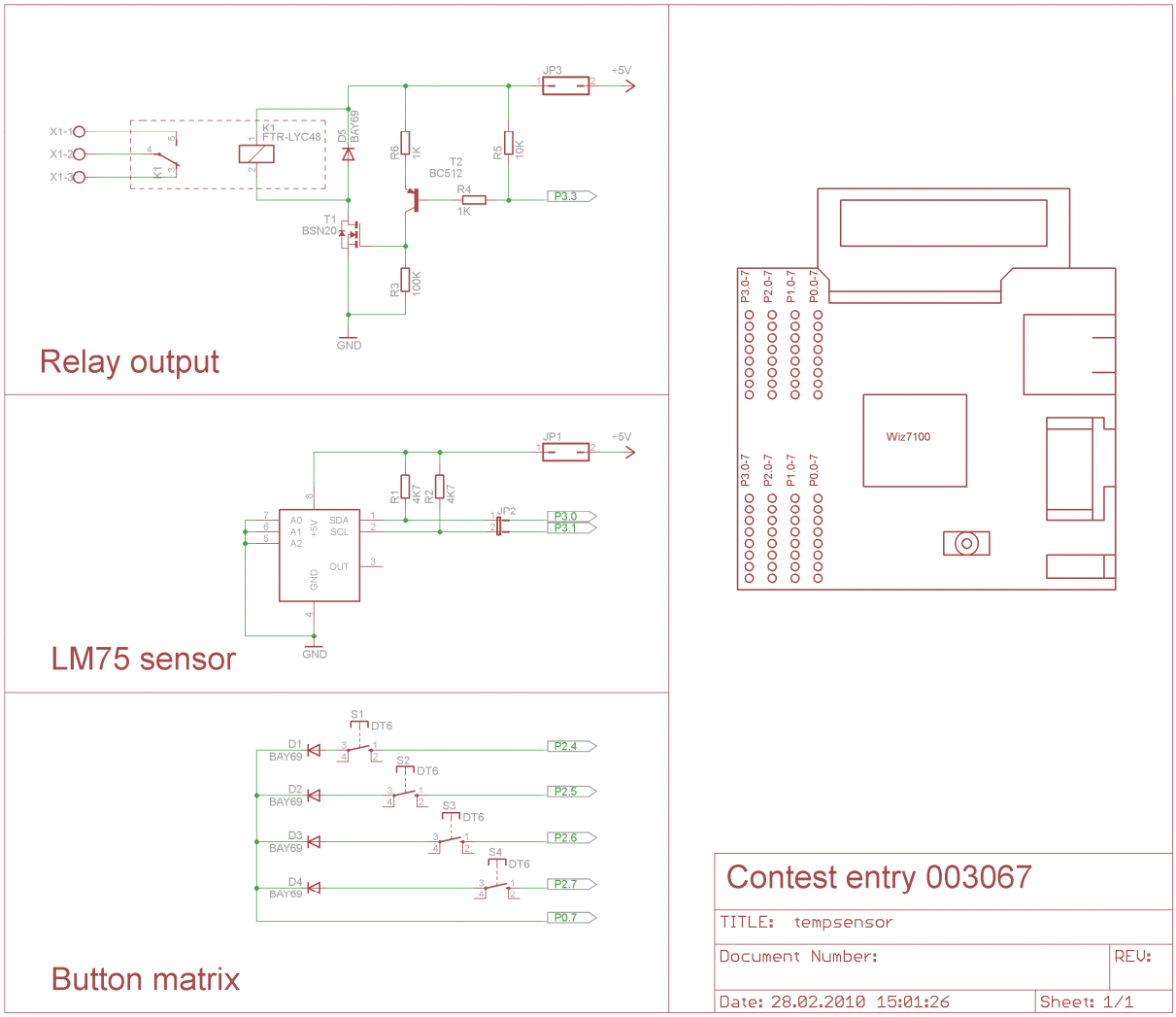

Figure 3: Schematic of extensions to the WIZ7100 evaluation board.