The Internet Plug – Project F2021

The Internet Plug is intended to be a simple device that can control 3 Power Outlets from a web based interface. These days permanent internet connections like cable and DSL are spreading among the people so web based devices started to useful even for the normal households not only for companies. The device can be accessed form anywhere on the ‘Net if one knows the password. Also the device will be protected by the internet attacks by the local firewall used also for connection sharing.

The Internet Plug is Password Protected and the status of the exits is saved in FLASHROM so is not lost in case of a power failure.

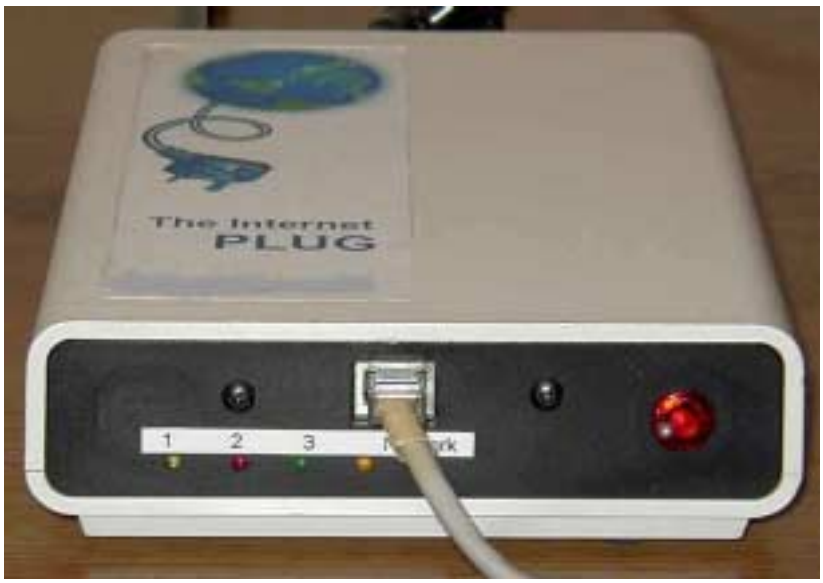
The concept is extremely simple: An interface between the cyber world and the real world. A box connected to both of these worlds accomplishes this.

The implementation is as simple as the concept, a plastic box with a 3 Power outlets and a computer network connection. The three outlets are for general use, any device can be connected, a lamp, a radio, a TV or any other electrical appliance. On the network connection a simple computer or the Internet can be attached. The Box does the rest, actually the box contain a mini web server, a small Motorola micro controller and the power command elements necessary to turn on and off the power to the three sockets.

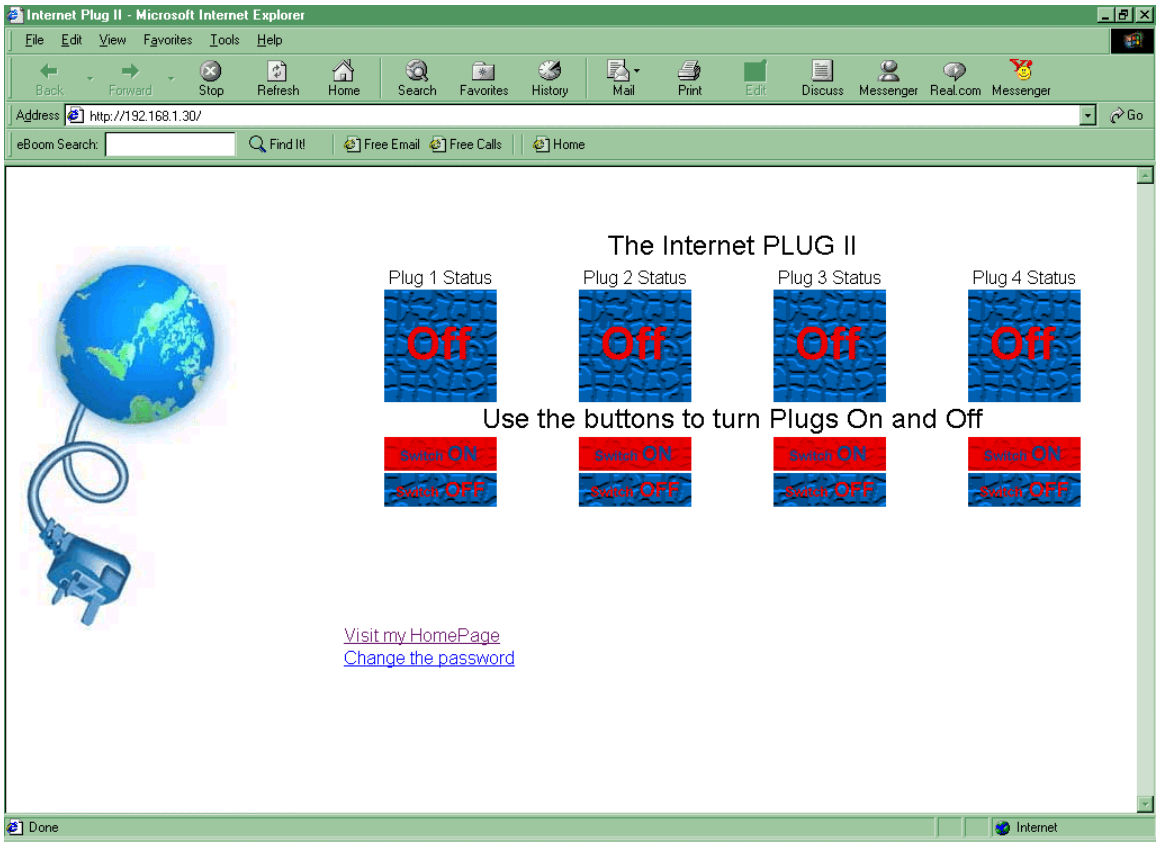
The Internet Plug tries to show a concept of the future: the web-enabled house.

One of the simplest applications will be to control the lights from the distance, meaning from any computer connected to the Internet. Or reset a server that is not responding, or switch the heat on and off to a remote location, or….

First let me show a picture of the Internet Plug:



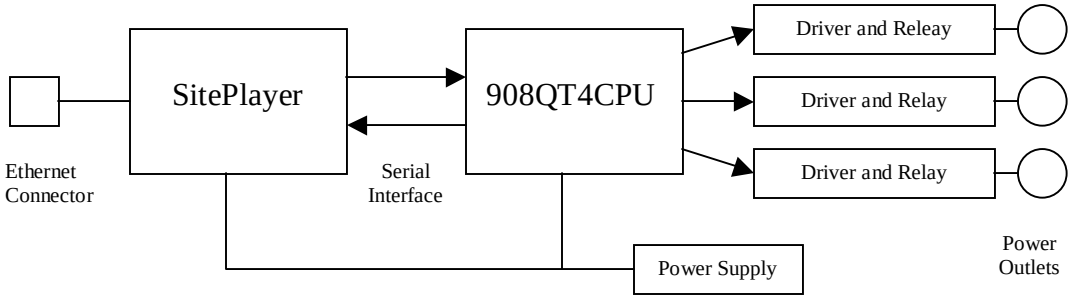
On the front side is easy to observe the three lights showing the status of the Sockets (if the light is on the power to the respective socket is on) and the network connection. On the back side of the box we can find the three sockets and the power cord (not shown). All the commands are received by the web-sever inside the box. Once the Internet plug is connected to a computer network any ordinary web browser (Internet Explorer or any other) can be used to view the status of the power outlets and turn them on and off. No special software is necessary.



The image shows the interface to the web. Extremely simple and intuitive buttons/status indicators are used. Each time a command button is pressed with the mouse the command is executed and the status indicators are updated. In this example the Power is off for all the Power Outlets.

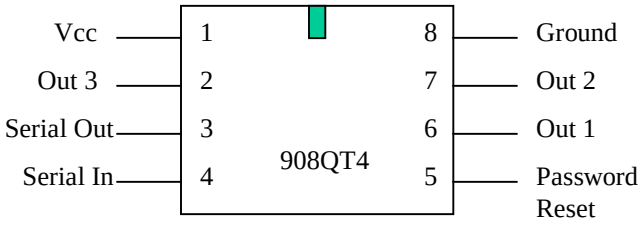
Hardware

The hardware consist of a SitePlayer miniweb server, 908QT4 Motorola Micro controller used as the “Brain” of the system plus some transistors and relays to control



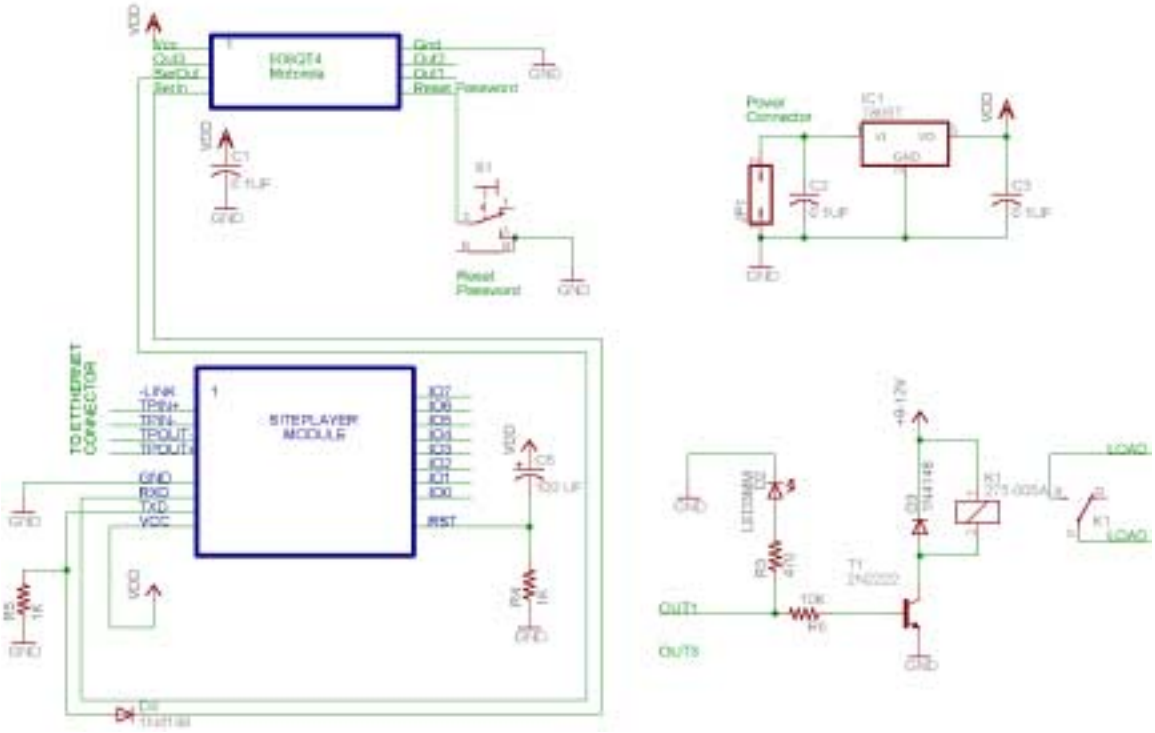
the power Outlets.

The 908QT4 CPU is the main controller. It coordinates all the functions of the device. All the pins are used – 3 of them as outputs, two for the serial communication with the SitePlayer , two for power and ground and one as a password reset input – in case that the password is lost the CPU can be powered up with this pin connected to the ground in order to reset the password to the default value. This is a safety feature implemented in order to solve the situation without reprogramming the micro controller.




```
// Timer Overflow
#pragma TRAP_PROC
void interrupt 6 _TOF_Interrupt(void) {
//***************************************************************************
//* timer_overflow_isr - called 9600 times/sec
//***************************************************************************
    TSC_TOF = 0;          // Clear overflow flag
                  if (flg.rxon==1)                        // Serial Rx Service Interrupt
        {
                  switch (rxcnt)
                  {
                  case 10:    // RX Wait the start bit = 0
                              // Set timer to 333
                              TSC_TSTOP=1;                // Stop Timer
                              TSC_TRST=1;                 // Reset
                              TMODH=1;                    // ser to 333 (3.2m/9600)
                              TMODL=0x4d;
                              TSC_TOF=0;                  // clear pendind int
                              TSC_TSTOP=0;                // start timer

                              if (PTA_PTA3==0)   // start bit ok
                                        {
                                        rxcnt--;            // goto data bits
                                        // set KbdInt off
                                        KBSCR_IMASKK=1;     // mask KbdInt
                                        KBIER_KBIE3=0;    // stop KbdInt for bit PTA3
                                        KBSCR_ACKK=1;   // delete any pending KbdInt
                                        KBSCR_IMASKK=0;     // enable KbdInt
                                        }
                              else                          // Start bit=1!!! Error.
                                        flg.rxon=0;         // KbdInt is on, TimerRxInt off,
                                                            // wait another start bit in KbdInt

                              break;
                  case 1:     // RX Wait the stop bit = 1
                              if (PTA_PTA3==1)   // Stop  bit ok
                                        if (flg.rxready==0)     // do not override a prev. RX byte
                                                  {
                                                  flg.rxready=1;          // RX Stop bit ok, char ready
                                                  rxbuff=rxchar;          // put the char in rxbuffer
                                                  }

                              flg.rxon=0;                   // Stop Timer ISR Rx
```

```
                                        // set KbdInt on
                                        KBSCR_IMASKK=1;             // mask KbdInt
                                        KBIER_KBIE3=1;    // start KbdInt for bit PTA3
                                        KBSCR_ACKK=1;    // delete any pending KbdInt
                                        KBSCR_IMASKK=0;             // enable KbdInt

                                break;
                        default:rxcnt--;                                // RX Data Bits, lsb first, rxcnt 2..9
                                        rxchar=rxchar>>1;
                                        rxchar=rxchar+128*PTA_PTA3;
                                        break;
                        }
                }



                if (flg.txon==1)                        // Serial Tx Service Interrupt
                {
                        switch (txcnt)
                        {
                        case 10:txcnt--;                        // TX Start Bit = 0
                                        PTA_PTA4 = 0;
                                        break;
                        case 1: //txcnt--;                      // TX Stop Bit = 1
                                        flg.txon=0;
                                        PTA_PTA4 = 1;
                                        break;
                        default:txcnt--;                        // TX Data Bits, lsb first, txcnt = 9..2
                                        PTA_PTA4 = txchar&1;
                                        txchar=txchar>>1;
                                        break;
                        }
                }



        // timeout ISR
         if (flg.timeout==0)
                  {
                  timeout1--;
                  if (timeout1==0)
                                  flg.timeout=1;
                  }



}
```


VDD
Vcc
Out3
SerOut
Serin
Gnd
Out2
Out1
Reset Password
GND
C1
0.1UF
S1
Reset Password
TO ETHERNET CONNECTOR
-LINK
TPIN+
TPIN-
TPOUT-
TPOUT+
GND
RXD
TXD
VCC
SITEPLAYER MODULE
IO7
IO6
IO5
IO4
IO3
IO2
IO1
IO0
RST
C5
R4
1K
R5
1K
D2
Power Connector
IC1
VI
VO
GND
C2
0.1UF
C3
0.1UF
+9.12V
LED(RED)
D3
1N4148
K1
LOAD
T1
2N2222
R6
10K
OUT1
OUT3