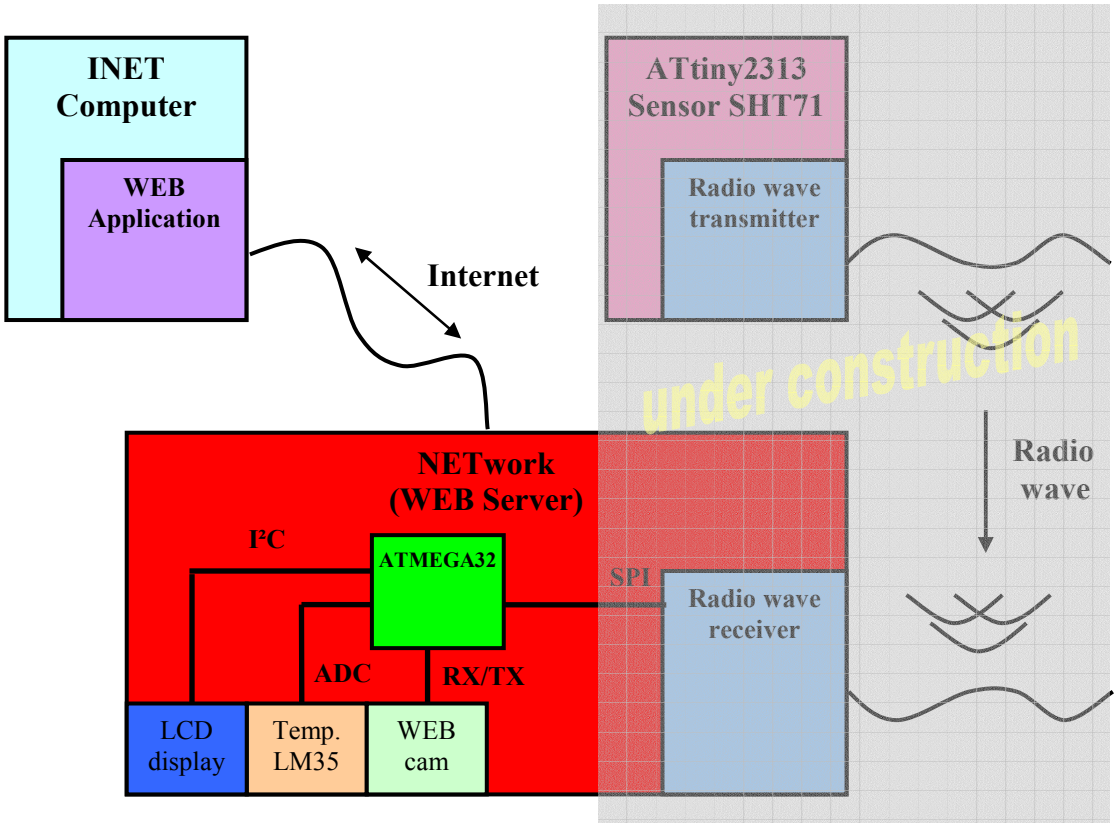
Documentation NETwork

Content

1. System overview



2. HW components

2.1. ATmega32

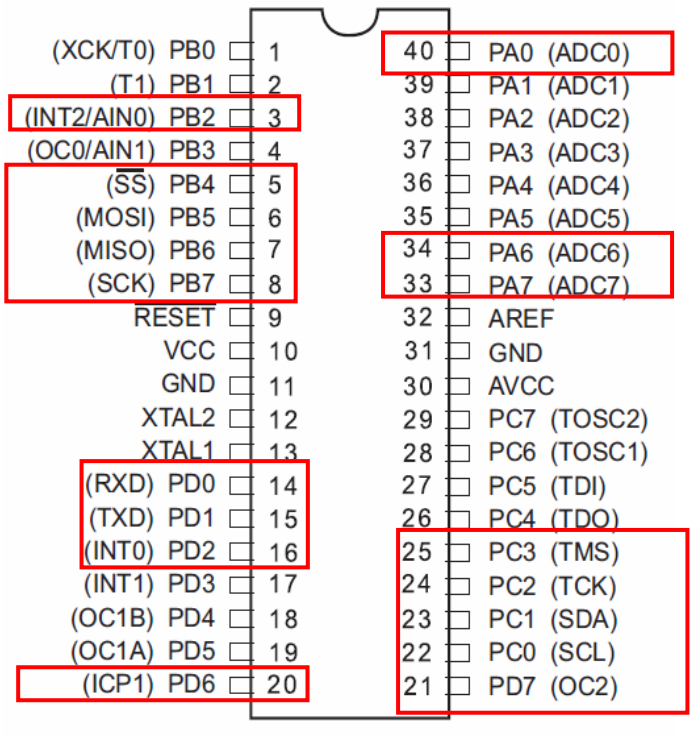
The RISC is used for communication with the temp. sensor, display and network controller. To be able to get pictures out of the cam, a UART crystal with a specific frequency of 7.1457MHz has to be used.

For measuring ADC values the reference on AREF is the 5V power supply, because it is the power supply for the temp. sensor LM35

Port mapping µC:

Pin	Direction	Type	function
PA0	Input	ADC	Data signal for LM35 temp. sensor
PA7	Input	ADC	5V power supply
PA6	Input	ADC	3V power supply
PB2	Output	digital	Interrupt (NINT) for ENC28J60
PB4	Output	digital	Chip select (NCS) for ENC28J60
PB5	Output	digital	Data input (MOSI) for ENC28J60
PB6	Output	digital	Data output (MISO) of ENC28J60
PB7	Output	digital	Clock signal (SCK)for SPI data transmission
PC0	Output	digital	Clock signal (SCL) for I2C display data transm.
PC1	Output	digital	Data line (SDA) for I2C display
PC2	Output	digital	Reset (NRESET) for ENC28J60
PC3	Output	digital	Reset (NRESET) for Atmega32 µC
PD0	Input	digital	Data input (RxD) from web cam MCA-25
PD1	Output	digital	Data output (TxD) for web cam MCA-25
PD2	Output	digital	Enable for web cam MCA-25
PD6	Output	digital	Enable for I2C display backlight
PD7	Output	digital	Enable for CAM LED lamp cluster

2.2.



CAM Ericcson MCA-25

The cam is part of a mobile phone and communicate over a two wire interface with TX and RX. The cam has to be enabled over a high level at the reset pin and is supplied with nearly 3,6V.

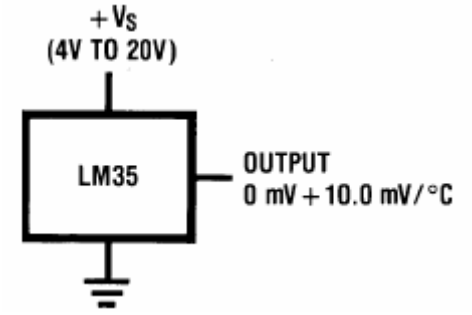
The initialisation routine is a long procedure with lots of definitions for handshake and presettings, but after that, it is easy to get a picture via HTML request out of the cam and it works very fast.

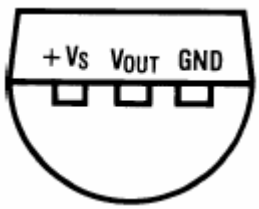
Midas LCD:

CAM		µC
1	NC	-
2	NC	-
3	NC	-
4	Kamera TX	PD0
5	Kamera RX	PD1
6	NC	-
7	Eanable (Hi)	PD2
8	NC	-
9	NC	-
10	GND	GND
11	Vcc (3,4-4,2 V)	5V-2*Ud

2.3. Temperature sensor LM35

The temp. Sensor is a simple three pin sensor which is connected to 5V, GND and directly to ADC0 of the µC. The temp. range starts from 0 degree up to 100 degree. With 230mV at its output the sensor measures a temperature of 23 degrees.





With an ADC reference voltage of 5V the temp could be calculated with the following formular:

Temp °C = ADC ref. voltage * ADC bit value / ADC max. bits * normalization factor

e.g. 5V * 47bit / 1023bit * 100°C/V = 23°C

2.4. Network Controller ENC28J60

The network controler communicates over SPI with the µC. The power supply is 3V and the network jack is directly connected to the TX and RX pins without a transformer.
The network SW stack is availble at suppliers homepage.

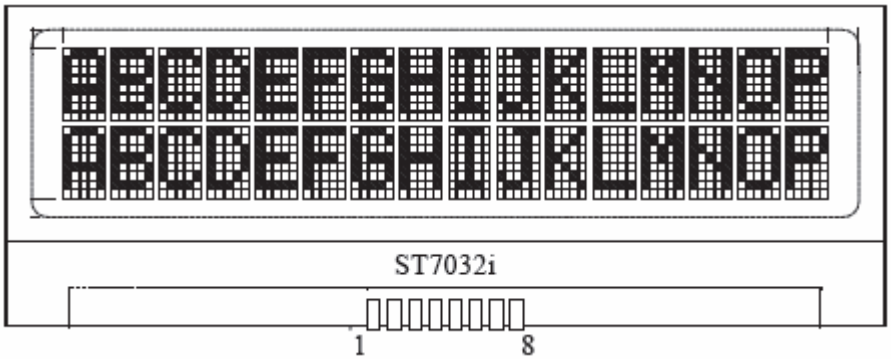
2.5. Midas I2C display

The display MCCOG21605D6W-BNMLWI is connected to the I2C pins SDA and SCL on µC pins PC1&0, but the internal TWI interface was not used for communication withe the display. The initialisation and transmission of the control and data bytes were done by toogling the pins manually via sbi and cbi comannds.

The reset pin (8) and VIN pin (1) were connected directly to VDD. The internal display control chip ST3032i from Sitronix has its own interface protocol and a fixed slave adress of 0111110(0) (7Chex).

Display pin description:

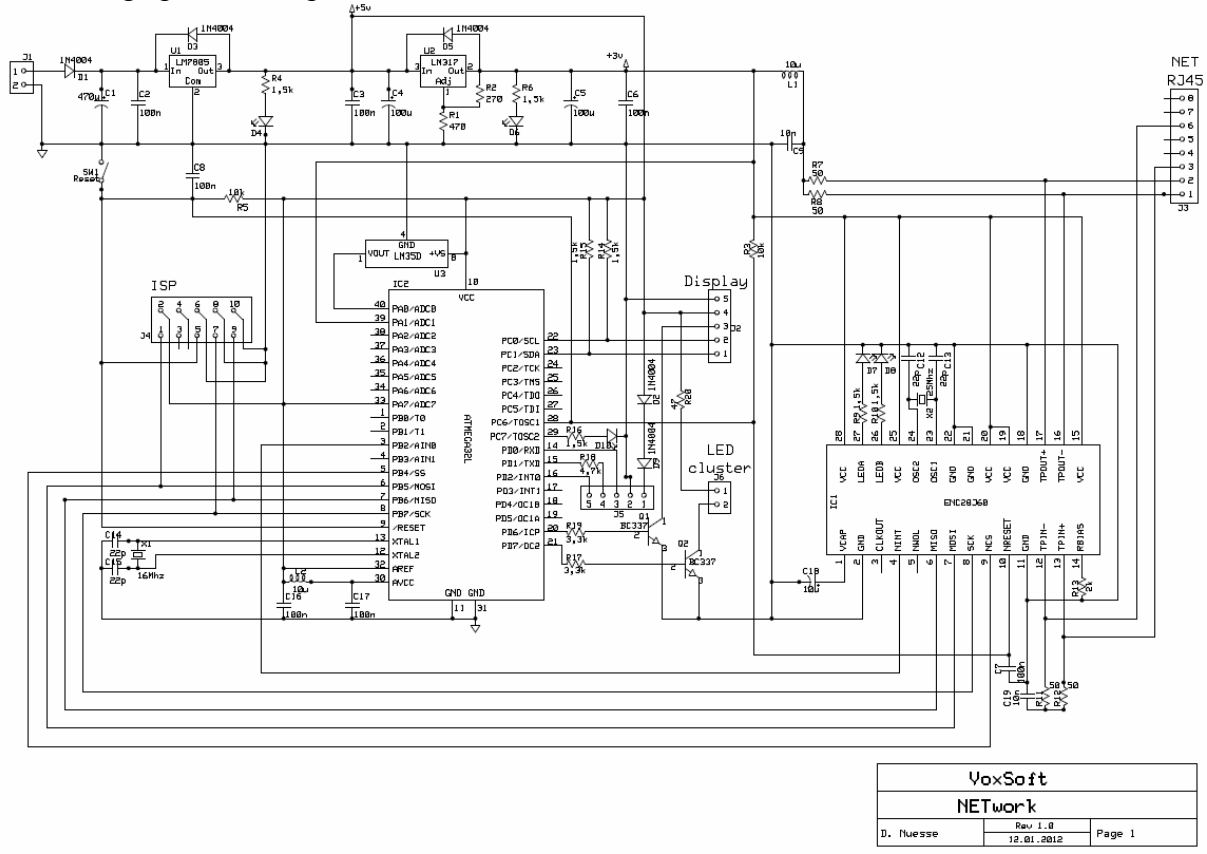
Pin	Description
1 VOUT	DC/DC for built-in booster, connected to VDD in this application
2 CAP1N	Capasitor for built-in booster, not connected in this application
3 CAP1P	Capasitor for built-in booster, not connected in this application
4 VDD	5V power supply
5 VSS	Ground
6 SDA	Data input for I2C data transmission
7 SCL	Clock input for I2C data transmission
8 NRST	Reset input, connected to VDD in this application



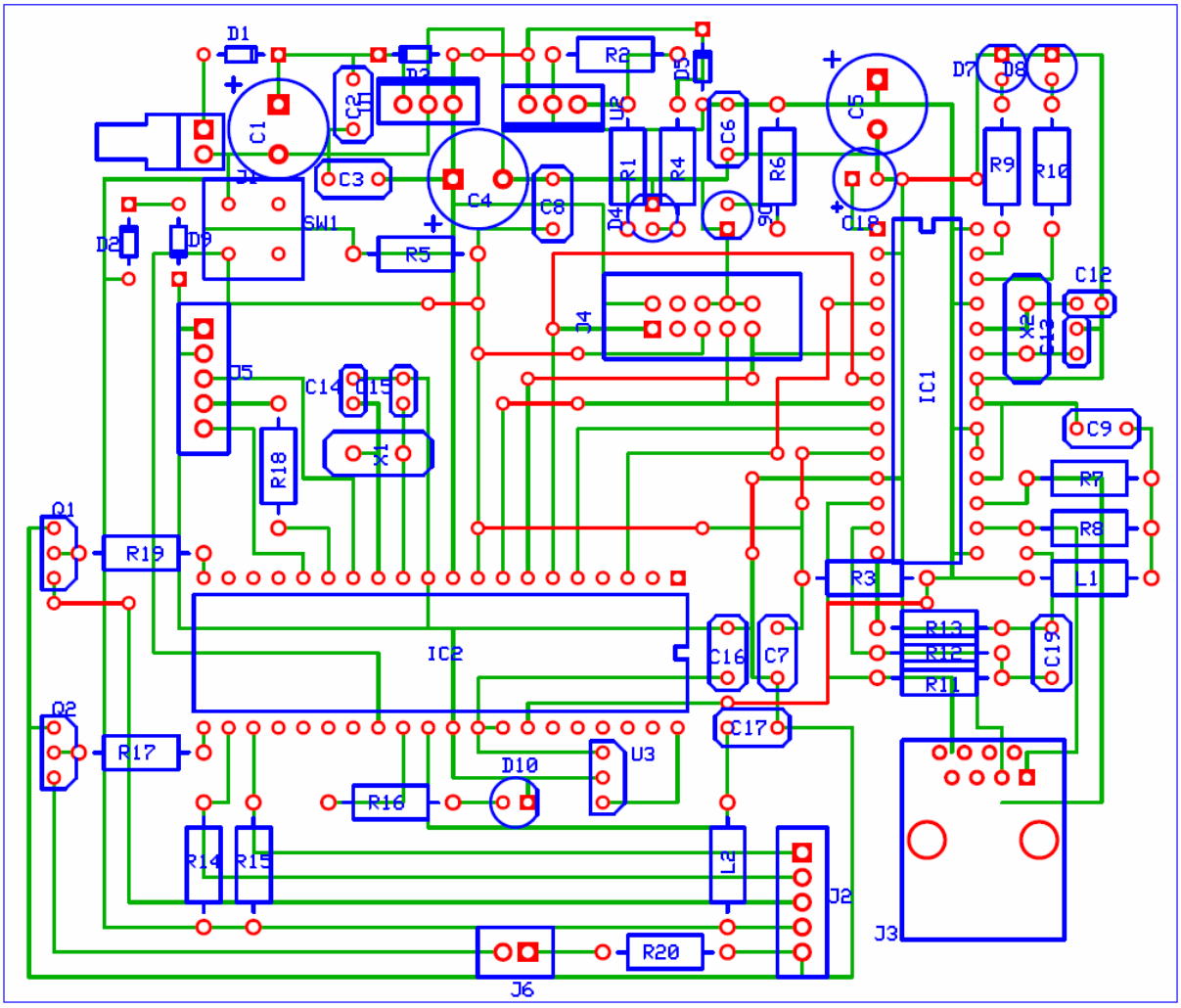
3. Schematic and layout

Webcam and LCD display are connected via connectors to the webserver board. There is no transformator or inductance neccessary between the network jack and the network controller ENC28J60 when a stable network transmission is guaranteed like in small intranet network enviornments at home.

For the 5V power supply it is recommened to use a cooler at the voltage regulator 7805, in case of high power dissipation.



The layout fits on a half euro card pcb and there is enough space for other electrical circuits.



4. Software

4.1. Webserver

Basis is a source code for embedded systems which can be found in the internet by searching with phrases like “ atmega web server”.

4.2. Camera

The cam code is also available in several projects which can be found in the www.

4.3. Temperature sensor

All functions are quite simple implementations of reading in an ADC value and the calculation for the centigrade value can be found in chapter 2.3.

4.4. LCD Display

In the specification there is a short description for the display initialisation in assembler code, after translation into C++ and additional functions for communiction the source looks like the example on the web page.

4.5. Browser pages

Enclosed some screen shots from the web pages “webcam” and “weather”