Firmware /GPIO18

The /GPIO18 firmware works as PC interface with 18 digital I/O lines. The data direction for each line is programmable (18 GPIO).

I/O lines are combined to ports B, C an D. Each port offers six I/O lines.

Port B0…PortB5	Digital I/O
Port C0…PortC5	Digital I/O = ADC 0..5
Port D2…PortD7	Digital I/O

In addition voltages at port C lines can be read with an internal 10 bit ADC. The ADC reference voltage can be taken from three sources:

External reference voltage
A individual reference voltage is supplied trough the VREF input (0<Vref<Vcc).

Internal reference voltage VCC
The positive supply voltage (Vcc) is used as reference voltage. (approx. 5V)

Internal reference voltage 1.1 V
A 1.1 Volt reference is generated internally.

A internal pull-up resistor can be activated or all lines that are programmed as input.
This could be useful to bind open inputs to a defined potential.

Protocol description

Baud 57600
8 data bits
No parity
1 stop bit

Request / Response communication is used. A request consists of seven data bytes. After receiving seven bytes, the device responses with a 15 bytes long response data block
A sample rate of approx. 150 samples/sec can be achieved.

Request: 7 bytes

Byte1: ADC reference selection (0=EXTERN; 1=INTERN VCC; 3=INTERN 1.1V)
Byte2: Direction Port B
Byte3: Direction Port C
Byte4: Direction Port D
Byte5: Data Port B
Byte6: Data Port C
Byte7: Data Port D

Bytes 2..4 set the data direction of each port line. A SET bits sets the corresponding line to output, a CLEAR bit sets the line to INPUT.

Bytes 5..7 set the output state for each port line. A SET bit sets the output HIGH, a CLEAR bit sets the output LOW. In case a line was set to INPUT direction, a SET bit ACTIVATES the pull-up for the input line and a CLEAR bit deactivates the pull-up for the input line.

The bit numbers in the data bytes correspond with port line numbers. For example a SET BIT 2 in request byte 4, defines port line D2 as output.

Response: 15 Bytes

Byte 1: Status port B
Byte 2: Status port C
Byte 3: Status port D
Byte 4: ADC0 LSB
Byte 5: ADC0 MSB
Byte 6: ADC1 LSB
Byte 7: ADC1 MSB
Byte 8: ADC2 LSB
Byte 9: ADC2 MSB
Byte 10: ADC3 LSB
Byte 11: ADC3 MSB
Byte 12: ADC4 LSB
Byte 13: ADC4 MSB
Byte 14: ADC5 LSB
Byte 15: ADC5 MSB

Bytes 1…3 represent the digtial state of the I/O lines. A SET bit indicates a HIGH level at the corresponding line. This is NOT depending on the lines data direction.

Bytes 4...15 are paired to six words, containing the 10 bit conversion result of the ADC channels (Port C0…C5). Voltage can be calculated as follows: Voltage = VREF * (MSB * 256 + LSB) / 1023