Applied Programming - 4.Task

4) Communication between microcontrollers using the TWI interface

4.1) Important chapters in the datasheet of the ATmega32

- Two-wire Serial Interface
- Analog to Digital Converter
- 16-bit/8-bit Timer/Counter including PWM
- Interrupt-Programming
- Watchdog Timer

4.2) Preface

Three microcontrollers (1 master, 2 slave) should communicate by means of a TWI interface. The two slaves transmit collected data to the master where the data are displayed on a graphical display.

4.3) Detailed description of the task

Two microcontrollers (slave) collect the data of a photo transistor via the internal Analog to Digital Converter and sends the data to the third microcontroller (master) using a TWI interface. The received data have to be displayed on a graphical display (numerical value, time-dependent curve - the gap between the new value and the old (overwritable) one should be 6 pixels) and must generate two PWM-signals according to the light intensities. The PWM-signals control two different LEDs.

The sampling rate should be chosen appropriate (for slow changes of the light intensity - several ms up to several seconds) and has to be constant (independent of code length, use a Timer/Counter). The PWM-signals control two LEDs which become brighter when the surrounding light intensities darken and vice versa.

The whole software has to be implemented Interrupt-controlled.