AMS Lab Exercise 5
"I2C bus and LM75"

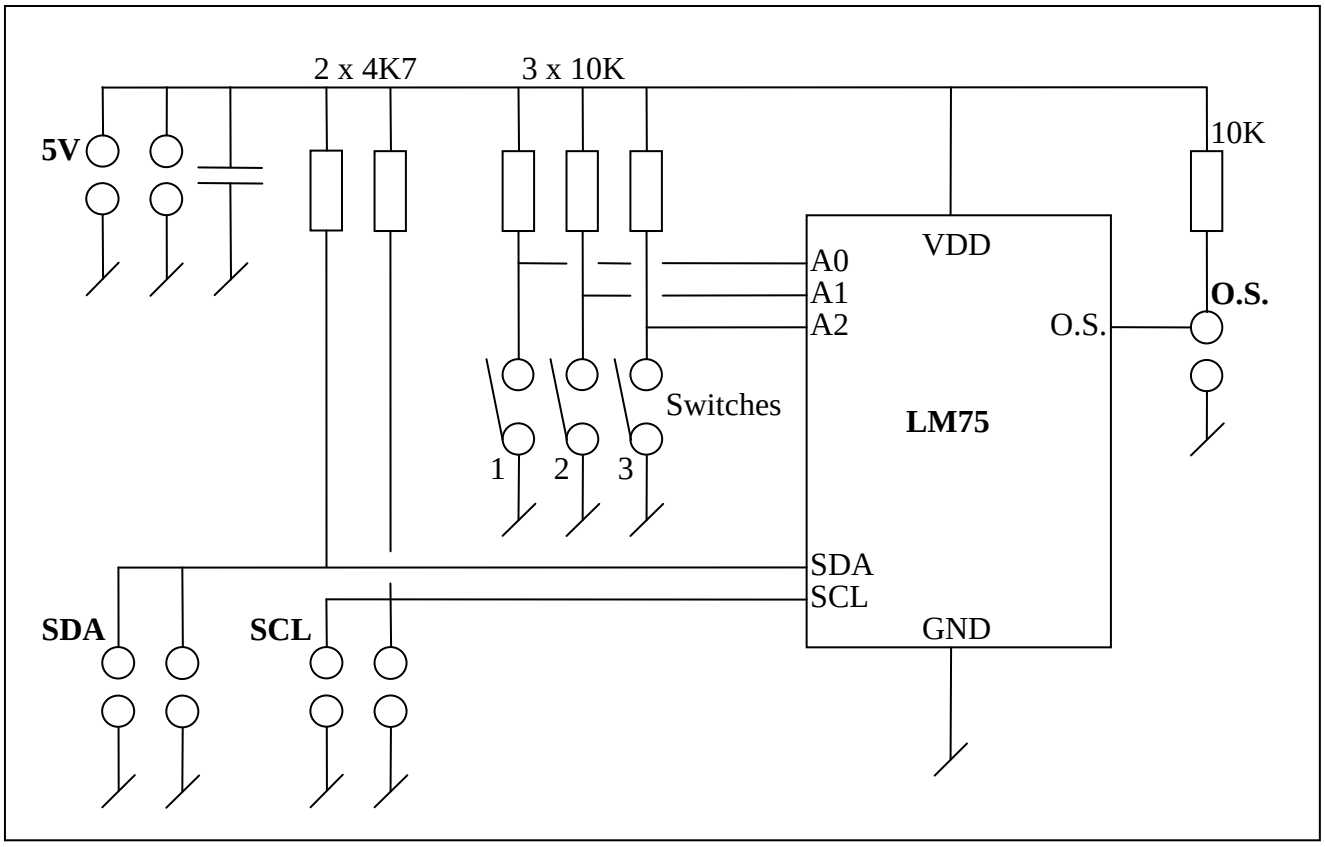
Purpose
To get experienced with the Mega32 TWI interface and the LM75 temperature sensor.

Literature
- Textbook (Mazidi): Sections 18.1-18.3 (pages 629-652) - **or** the I2C lesson.
- LM75 data sheet (IECA file sharing, LAB16 folder).

The Exercise
In this exercise we are going to use the Mega32 TWI for I2C communications.
We will interface two LM75 temperature sensors and display the readings at a terminal.

Study the LM75 data sheet and the guidelines given in the I2C lesson.

For the exercise, PCBs with a LM75 slave can be borrowed (you need 2 of them):



LM75: I2C slave.

5 volt: These connectors are for power supply (from STK500) and for connecting power to the next slave unit (if any).
SDA and SCL: These connectors are for the I2C bus (connect to the corresponding I2C port pin at Mega32) and to the next slave unit (if any).
O.S.: This connected is the alarm output from the LM75. Can be connected to an interrupt input at Mega32. Not used in this exercise.

The 3 switches are used for setting up the LM75 local I2C address (A2-A0).
Notice: Setting a switch ON, sets the corresponding address input LOW.

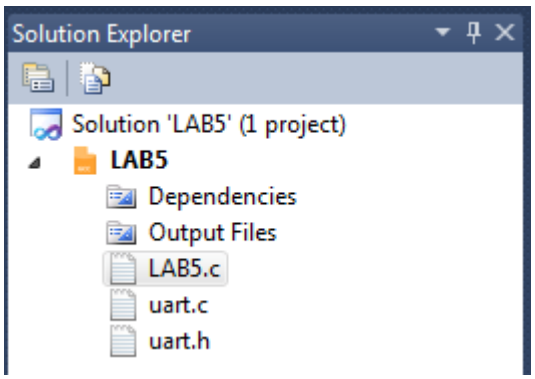
For this exercise, a UART driver ("uart.c" and "uart.h) is available in the folder "files for LAB5".

The program should initialize the UART and the TWI.

Then is shall in an endless loop read 2 temperature sensors and send a string to the terminal telling the user the two temperatures. The sensors should not be read more often than every half second. Otherwise they will self-heat (not a good thing for a temperature sensor ☺).

For this exercise the program is partially written and available in the folder "files for LAB5".

Create a new AVR GCC project and add the UART driver form LAB5:



"LAB5.c" is the partially implemented program files fetched from Campusnet.

Start by carefully studying the partly implemented program.
The basic I2C functions given are simular to the examples from the textbook / the I2C lesson.

Then write the missing code sections (indicated by arrows).

Test the program using "Tera Terminal" and the two sensors properly attached to the Mega32.
Warm up the sensors for instance by rubbing them by a finger.

As an alternative solution, you might use the alphanumeric LCD display at the "AVR Demo Board" for displaying instead of sending the values using the UART.