Exercise I

Connecting hall-effect position sensor to the computer. Reading data from it

Find out how to connect NSE-5310 position sensor to the WaveShare EX-F320 experiment board programmed in NI USB-8451 compatibility mode.

Hints: Look at NSE-5310 datasheet p. 18, experiment board scheme and NI USB-8451 port map. In spite of possibility to activate internal pull-ups of SCL and SDA lines inside C8051F320 MCU it is recommended to attach external pull-up resistors 2K7 to these lines lulling to 3.3V, as the internal pull-ups are weak (about 22K). It is advised to connect communication lines to the GND by 56pF capacitors to suppress high-frequency noise. Such capacitors are good for suppressing noise at communication speeds up to 1MHz. As the maximal communication sped of NI USB-8451 is 250 kHz, these values can be increased up to 4 times.

Warning: all manipulations with the circuitry should be done with the power off.

When the sensor is connected, its functionality should be tested in LabView. You can start with the LabView example Microchip 24LC512 Read.vi. Other examples also can be useful. For the description of VIs used you can look in Help and NI-845X Hardware and Software Manual pp. 49-73 (Basic Programming Model). For the description of the data structure of the sensor see NSE-5310 datasheet pp. 12, 13. If you have troubles, try to monitor status of the communication lines by the oscilloscope. Do you see the expected signal? Does the sensor send some response?

If communication is established, write the VI displaying the running chart of position and the numeric indicator of position in um. Indicators showing status information also can be useful. Use the rubber strip with the magnets to test the functionality.