Lab Assignment 4  

Equipment used: AVR Butterfly + Motor  
To be programmed in: Assembly language

**EXPERIMENT 1  Read Analog Input**
- Connect a potentiometer to the analog input.  
Write a main assembly program:
- In an endless loop, read its value and convert it to range 0..255.
- Call Assembly subroutine with value divided by 32 (result range 0..7)
Write an assembly subroutine:
- Display parameter value (0..7) on the LEDs on Port D (pins 6..0) in bar graph form.

**EXPERIMENT 2  Open Loop Motor Control**
The speed of DC motors can be controlled by using PWM (pulse width modulation) The ratio between on-time to total cycle-time determines motor speed.

Connect a motor via an opto-coupler or transistor to output pin 7 on Port D.

Extend the program from Experiment 1 to:
In an endless loop:
- read potentiometer value
- convert value to range 0..255
- display (value/32) on LED bank
- switch on motor pin
- wait for about (number* 1 \( \mu \)s)
- switch off motor pin
- wait for about ((255-number)* 1 \( \mu \)s)

The motor should run faster or slower, resp., depending on the analog potentiometer input.