```
/*
 * ADCsigndiff.c
 *
 * Created: 26/06/2013 16:42:35
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 *
 ================================================================================
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 *
 * Description
 * ---------------------------------------------------
 * ADC conversion
       12 bit resolution
       left adjustment
       Gain 1
       Free run mode
       Signed differential input
       Pin A2 -- Positive input
       Pin A1 -- Negative input
 *
 * Converts the analogue value into volts and saves it
 * into the variable "vin"
 *
 * Uses polling system: checking bit IF
  */

#define F_CPU 2000000UL
#define __AVR_ATxmega128A3U
#include <avr/io.h>
#include <util/delay.h>
#include <math.h>

// Global functions prototype
void ADC_config();

// ADC variables
signed int reading;
float vin;

//------------------------------------------------------------- Functions
// Configures ADC
void ADC_config()
{
      // Channel 0, ADC A, differential
      ADCA_CH0_CTRL = ADC_CH_INPUTMODE_DIFF_gc;
      // Differential pin connections
      // Positive at Pin 2, PORTA
      // Negative at Pin 1, PORTA
      ADCA_CH0_MUXCTRL = ADC_CH_MUXPOS_PIN2_gc | ADC_CH_MUXNEG_PIN1_gc;
      // Enables free run and signed mode
      ADCA_CTRLB = ADC_FREERUN_bm | ADC_CONMODE_bm;
      // Vref = internal (VCC / 1.6) = 3.3 / 1.6 = 2.0625
      ADCA_REFCTRL = ADC_REFSEL_VCC_gc;
      // ADC prescaler = 64
      ADCA_PRESCALER = ADC_PRESCALER_DIV64_gc;
      // Enable ADC module
      ADCA_CTRLA = ADC_ENABLE_bm;
      // Start-up time
      _delay_us(100);
}

int main(void)
{
      // Configure module ADC
      ADC_config();
```

```
    while(1)
    {
            // Wait till IF = 1; conversion complete
            while(!(ADCA_INTFLAGS & 0x01)){}
            reading = ADCA_CH0RES;
            ADCA_INTFLAGS = 0x01;
            // Converts reading value into voltage
            // Vcc / 1.6 = 3.3 / 1.6 = 2.065
            /*
                  2.065 --------- 2047
                  x     --------- reading

                  vin = (reading * 2.065) / 2047
            */
            vin = (reading * 2.0625) / 2047.0;
     }
}
```