1. Project title: XMC 2Go Temperature Sensor Interfacing

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2. Abstract

Temperature sensor has a large scale usage in industrial applications. It is used in weather determination, all kinds of devices for temperature monitoring, industrial applications and more.

3. Introduction, project aims and objectives

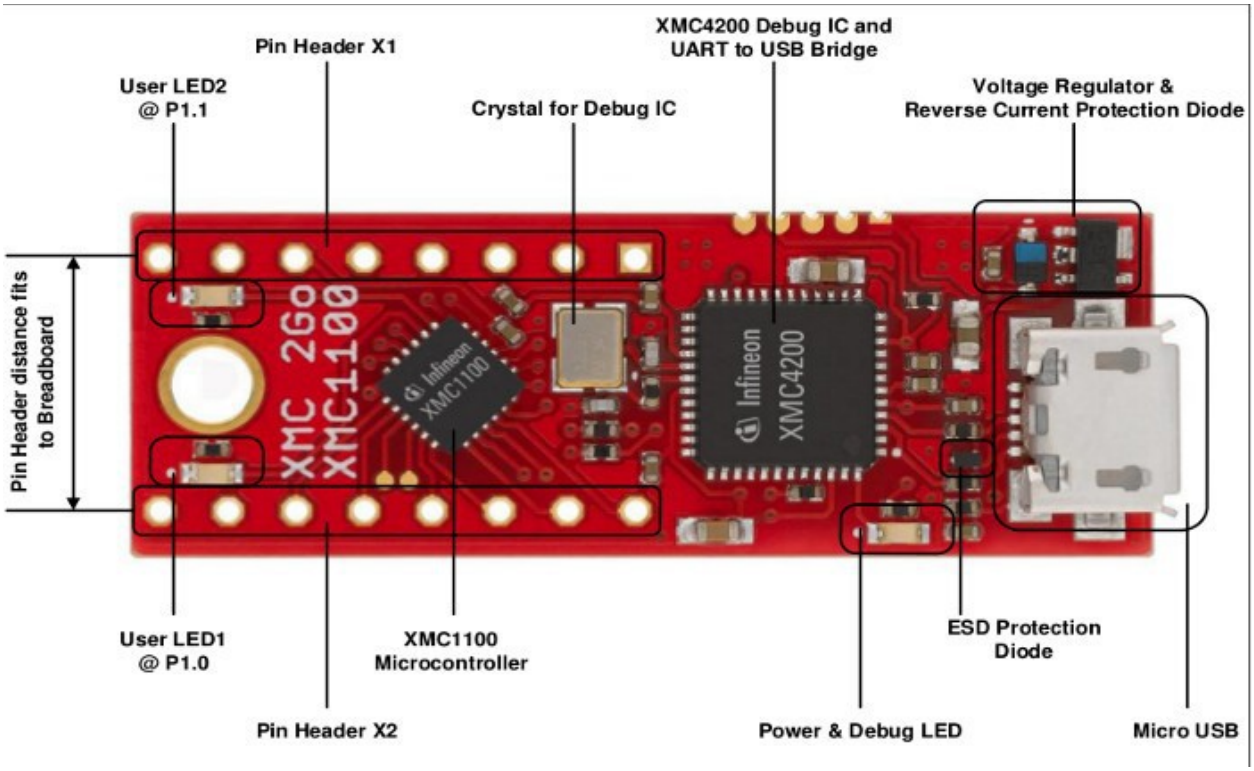
This project proposes to use an Analog Temperature Sensor(LM393). The output of the sensor will be read by a XMC2Go development board.
The purpose of this project is to learn how to use Infineon Dave IDE and how to develop applications using Dave components.

4. System overview

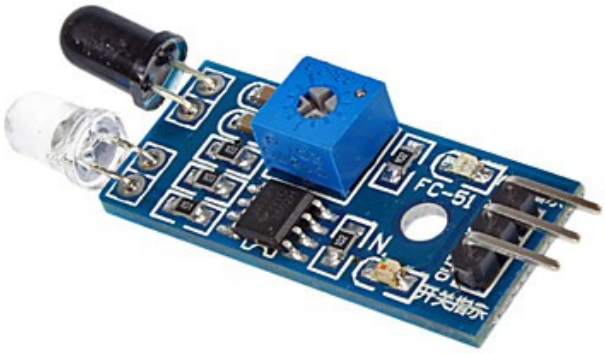
To develop this project we chose to use a XMC2Go development board from Infineon along with the LM393 temperature sensor.
The XMC2Go is intended for small devices which need processing power and small consumption (wearable devices).
LM393 is an analog temperature sensor which can measure from0°C to 70°C temperature (2V to 36 V input) with high precision. In this system I used P2.0 analog input from development board to read the output of the sensor.

5. Schematics and components

- **1x XMC 2Go**



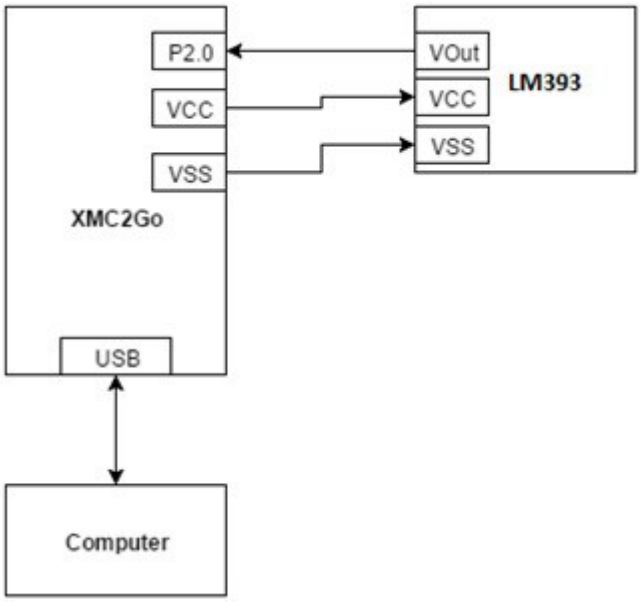
1x LM393



Components:

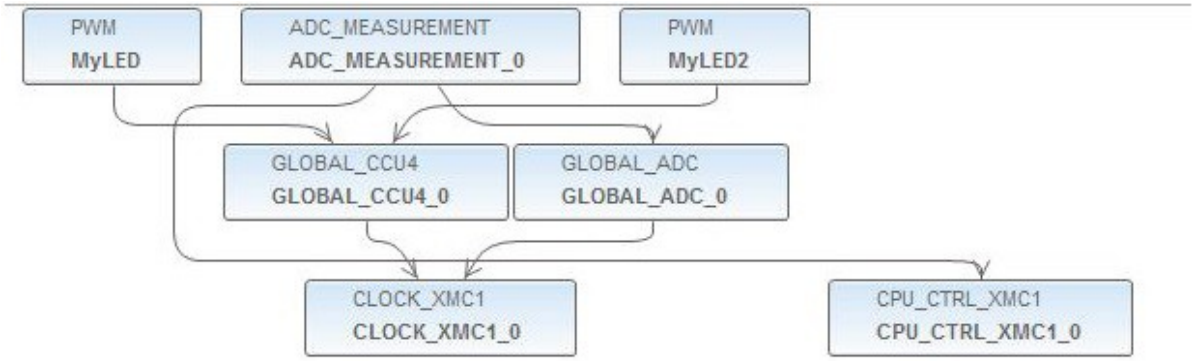
- 1x XMC 2Go
- 1x LM393
- 3x connection wires
- 1x mini-usb cable

Schematic:



6. Software

DAVE components used:



The most important part of the code is presented:

```
 void Adc_Measurement_Handler()
 {
                #if(UC_SERIES == XMC11)
                        result =
ADC_MEASUREMENT_GetResult(&ADC_MEASUREMENT_Channel_A_handle);
                #endif
                result = result >> ((uint32_t)ADC_MEASUREMENT_0.iclass_config_handle-
>conversion_mode_standard * (uint32_t)2);
                resistance = (float) R25 / ((65536.0 / result) - 1);
                steinhart = (float) resistance / THERMISTORNOMINAL;          // (R/Ro)
                steinhart = (float) log(steinhart/R25);                      // ln(R/Ro)
                steinhart *= (float) 1/ BETA ;                       // 1/B * ln(R/Ro)
```

```
                steinhart +=(float) 1.0 / (TEMPERATURENOMINAL + 273.15);   // + (1/To)
                steinhart = (float) 1.0 / steinhart;                       // Invert
                temperature = (float) steinhart - 273.15;                  // convert to C
 }

while(1U)
 {
       ADC_MEASUREMENT_StartConversion(&ADC_MEASUREMENT_0);
       if(temperature < 20)
         {
       PWM_SetDutyCycle(&MyLED, 0);
       PWM_SetDutyCycle(&MyLED, 10000);
         }
       else
         {
       PWM_SetDutyCycle(&MyLED2, 0);
       PWM_SetDutyCycle(&MyLED2, 10000);
         }
 }
```

7. Project results & applications

After testing the output of sensor we have the following results:

- We manage to view that the temperature in normal condition is about 20 degres and the first led is on
- After we increase the temperature the second led is on

8. Reference

http://www.infineon.com/dgdl/Infineon-KP235-DS-v01_00-en.pdf?fileId=db3a30432ad629a6012af67ba47c0b0f

http://www.infineon.com/cms/en/product/evaluationboards/KIT_XMC_2GO_XMC1100_V1/productType.html? productType=db3a304443537c4e01436ccecb5d154f

http://pdf1.alldatasheet.com/datasheet-pdf/view/3068/MOTOROLA/LM393.html

https://en.wikipedia.org/wiki/Steinhart%E2%80%93Hart_equation