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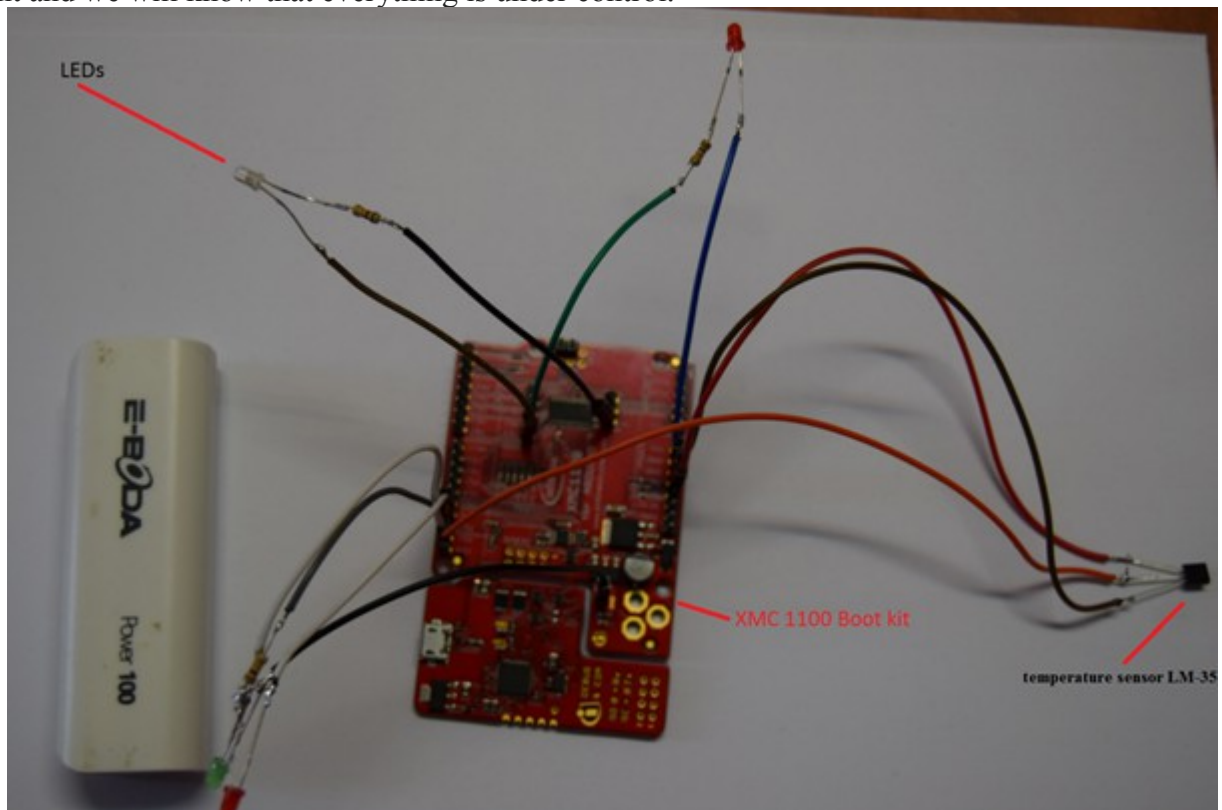
Fire detection system for the house

1. Abstract

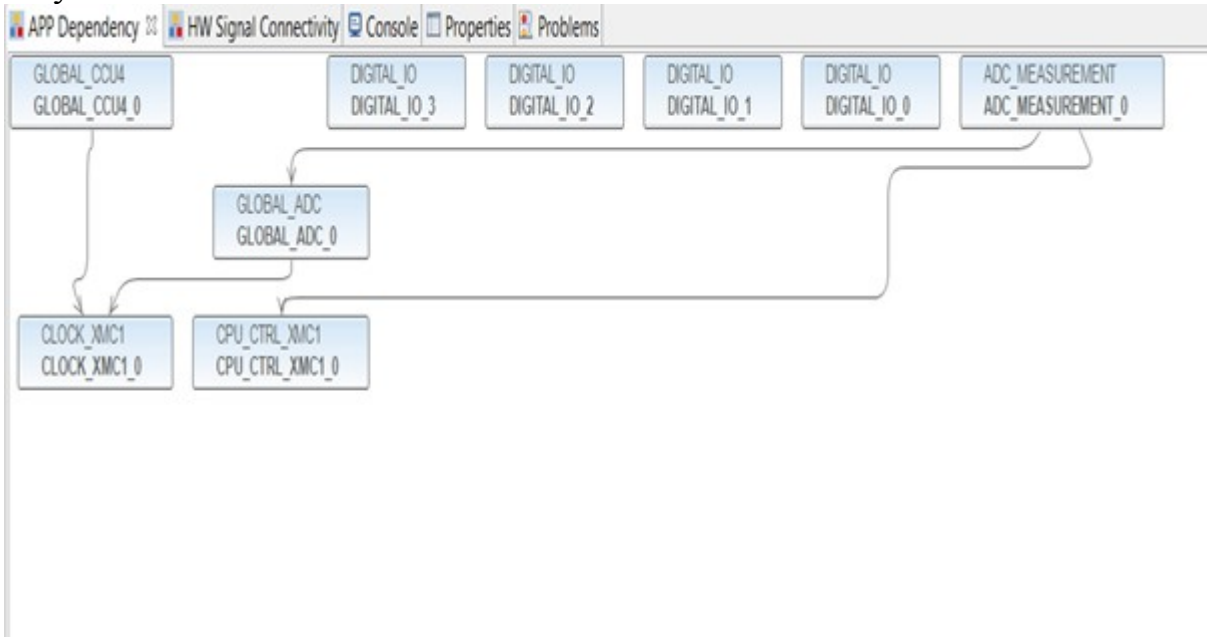
Using XMC_1100 Boot Kit, a temperature sensor and LEDs i created a project which measures the temperature of the environment and prevents any types of problems.

2. Introduction

Using the analogical temperature sensor LM_35 i will measure the temperature in the house. If the temperature increases sharply, over 40-45 degrees, a red LED, P 0.6, will light. When the temperature is over 60-65 degrees the red LED, P 0.7, will be turned on and over 100 degrees the green LED, P 2.1, will light. If the temperature in the house is in the normal limits the blue LED will light and we will know that everything is under control.



3. System Overview



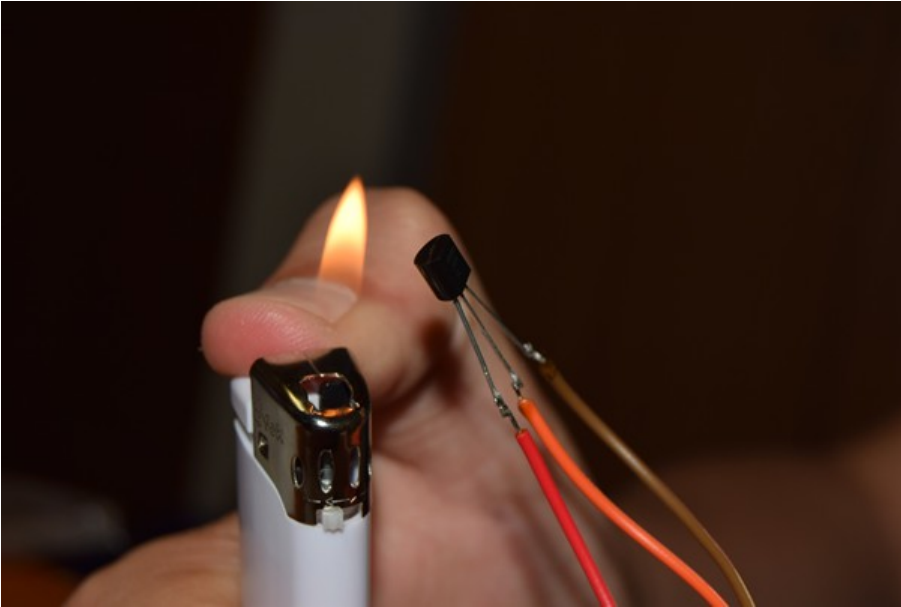
4. Schematic and components

For implementation i used the following components:

-XMC 1100 Boot Kit



-temperature sensor LM-35



In my project i used a temperature sensor LM-35 which has 3 pins and acts like a transistor. The right part of the sensor contains VCC-5V. Through the middle of the wire the analogical signal is sent. The left one contains the ground, GND. Each LED is connected at GND, then the first LED is connected to P0.5, the second one to P0.6, the third LED to P0.7 and the last one to P2.1. The code contains a block ADC Measurement, 4 Digital IO for the 4 LEDs and a global register ADC.

In the main function i initialized measurement conversion ADC (analogical digital convert). The void function contains ADC_Measurement_Handler, which is a recursive one. I used a static variable, which will give the result of the channel from ADC. This variable will be compared with the first limit, which will light the first LED.

The void function ADC Measurement Handler converts the temperature in signal. It takes his voltage from 5V and from the data wire which goes to the LEDs.

The data pine of the temperature sensor gives a different temperature of the input voltage, giving at the output a different voltage, which depends of the temperature which he gets exposed to. If the first voltage is 4V, the temperature is the normal limits. That is shortly what ADC Measurement does.

For every IO digital block the Input/Output pine is set. The settings on the OUTPUT are Push Pull mode and the initial level is Low.

The source code is:

DAVE CE - temp/main.c - DAVE™ - C:\Workspace\DAVE-4.2-64bit\WS_2016_04_28

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Project Explorer

- temp [Active - Debug]
 - Includes
 - Dave
 - Libraries
 - Startup
 - main.c
 - linker_script.ld
 - solverbak

```

1  #include <DAVE.h> //Declarations from DAVE Code Generation (include SFR declaration)
2  /* @brief main() - Application entry point */
3
13 int main(void)
14 {
15     DAVE_STATUS_t status; //Initialization of DAVE status
16
17     status = DAVE_Init(); /* Initialization of DAVE APPS */
18
19     if(status == DAVE_STATUS_FAILURE) //If DAVE status fails then the program will return error
20     {
21         /* Placeholder for error handler code. The while loop below can be replaced with a user error handler. */
22         XMC_DEBUG("DAVE APPS initialization failed\n");
23
24         while(1)
25         {
26
27         }
28     }
29     ADC_MEASUREMENT_StartConversion(4ADC_MEASUREMENT_0); // ADC measurements start
30     /* Placeholder for user application code. The while loop below can be replaced with a user application code. */
31     while(1)
32     {
33
34     }
35 }
36

```

APP Dependency Tree

Search filter Clear

- ADC_MEASUREMENT_0
 - CPU_CTRL_XMC1_0
 - GLOBAL_ADC_0
 - CLOCK_XMC1_0
 - DIGITAL_IO_0
 - DIGITAL_IO_1
 - DIGITAL_IO_2
 - DIGITAL_IO_3
 - GLOBAL_CC04_0
 - CLOCK_XMC1_0

APP Dependency

```

graph TD
    CC04[GLOBAL_CC04_0  
GLOBAL_CC04_0] --> ADC[ADC_MEASUREMENT_0  
ADC_MEASUREMENT_0]
    IO3[DIGITAL_IO_3  
DIGITAL_IO_3] --> ADC
    IO2[DIGITAL_IO_2  
DIGITAL_IO_2] --> ADC
    IO1[DIGITAL_IO_1  
DIGITAL_IO_1] --> ADC
    IO0[DIGITAL_IO_0  
DIGITAL_IO_0] --> ADC
    ADC --> GLOBAL_ADC[GLOBAL_ADC_0  
GLOBAL_ADC_0]
    GLOBAL_ADC --> CPU_CTRL[CPU_CTRL_XMC1_0  
CPU_CTRL_XMC1_0]
    GLOBAL_ADC --> CLOCK_XMC1[CLOCK_XMC1_0  
CLOCK_XMC1_0]

```

APP Dependency HW Signal Connectivity Console Properties Problems

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Project Explorer

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```

37 void Adc_Measurement_Handler(void) //recursive function that will make measurements on ADC
38 {
39     static uint32_t result_my_channel; //declaring static variables that will keep the result canal
40
41     /*Read out conversion results*/
42     result_my_channel = ADC_MEASUREMENT_GetResult(&Adc_Measurement_Handler);
43     if (result_my_channel < 300) //checking and comparing each threshold value predefined
44     {
45         DIGITAL_IO_SetOutputHigh(&DIGITAL_IO_0); //LED lighting depending on the threshold
46     }
47     else
48     {
49         DIGITAL_IO_SetOutputLow(&DIGITAL_IO_0); //turn off each LED depending on the threshold
50     }
51     if (result_my_channel > 300 && result_my_channel < 400)
52     {
53         DIGITAL_IO_SetOutputHigh(&DIGITAL_IO_1);
54     }
55     else
56     {
57         DIGITAL_IO_SetOutputLow(&DIGITAL_IO_1);
58     }
59     if (result_my_channel > 400 && result_my_channel < 500)
60     {
61         DIGITAL_IO_SetOutputHigh(&DIGITAL_IO_2);
62     }
63     else
64     {
65         DIGITAL_IO_SetOutputLow(&DIGITAL_IO_2);
66     }
67     if (result_my_channel > 500 && result_my_channel < 600)
68     {
69         DIGITAL_IO_SetOutputHigh(&DIGITAL_IO_3);

```

APP Dependency Tree

Search filter Clear

- ADC_MEASUREMENT_0
 - CPU_CTRL_XMC1_0
 - GLOBAL_ADC_0
 - CLOCK_XMC1_0
 - DIGITAL_IO_0
 - DIGITAL_IO_1
 - DIGITAL_IO_2
 - DIGITAL_IO_3
 - GLOBAL_CC04_0
 - CLOCK_XMC1_0

Reference

<https://www.infineonforums.com/forums/8-XMC-Forum>

<https://www.infineonforums.com/threads/4142-About-LEDTS-Peripheral>
[http://www.infineon.com/cms/en/product/microcontroller/development-tools-software-and-kits/dave-version-4-free-development-platform-for-code-generation/channel.html?
channel=db3a30433580b37101359f8ee6963814](http://www.infineon.com/cms/en/product/microcontroller/development-tools-software-and-kits/dave-version-4-free-development-platform-for-code-generation/channel.html?channel=db3a30433580b37101359f8ee6963814)
<http://www.ti.com/lit/ds/symlink/lm35.pdf>