NUC240實現ADC中值濾波器

NuMicro® 32 位系列微控制器範例代碼介紹

文件資訊

代碼簡述	本範例代碼使用 NUC240 實現中值濾波器過濾 ADC 雜訊
BSP 版本	NUC230_240 Series BSP CMSIS v3.01.001
開發平台	NuEdu-EVB-NUC240 v1.0

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1 功能介紹

1.1 簡介

此程式碼用一個簡易的中值濾波器來過濾ADC雜訊。ADC連續取樣資料5次，將資料排序後，取出中間值，即為濾波後結果。

1.2 執行結果

使用NuEdu-EVB-NUC240與NuEdu-Basic01連接，轉動NuEdu-Basic01的可變電阻，NUC240 ADC通道0連續取樣5次並將資料做排序後取出中間值，即為結果。編譯專案並進入除錯模式執行程式，過濾結果會列印在Serial Window UART #1。

```
voltage=2.490000
voltage=2.500000
voltage=2.490000
voltage=2.500000
voltage=2.490000
voltage=2.500000
voltage=2.490000
voltage=2.500000
voltage=2.490000
voltage=2.500000
voltage=2.490000
voltage=2.500000
voltage=2.490000
voltage=2.500000
```

2 代碼介紹

2.1 中值濾波器

ADC連續取樣5次資料，將資料作排序後，取出中間值，即為濾波後結果。

```
while (1)
{
    /* ADC value range: 0 ~ 4095 */
    g_au32Buffer[g_u32l] = Get_ADC_Knob();

    /* select sort */
    if (g_u32l == 5)
    {
        for (g_u32i = 1; g_u32i <= 3; g_u32i++)
        {
            g_u32k = g_u32i;

            for (g_u32j = g_u32i + 1; g_u32j <= 5; g_u32j++)
            {
                if (g_au32Buffer[g_u32j] < g_au32Buffer[g_u32k])
                    g_u32k = g_u32j;
            }

            if (g_u32k != g_u32i)
            {
                g_au32Buffer[0] = g_au32Buffer[g_u32i];
                g_au32Buffer[g_u32i] = g_au32Buffer[g_u32k];
                g_au32Buffer[g_u32k] = g_au32Buffer[0];
            }
        }

        g_u32l = 0;

        /* ADC value to voltage value */
        d_newVoltage = (3.27 / 4095.0) * g_au32Buffer[3];

        /* round to two decimal places */
        d_newVoltage = (double)((int)(d_newVoltage * 100) / 100.0);
```

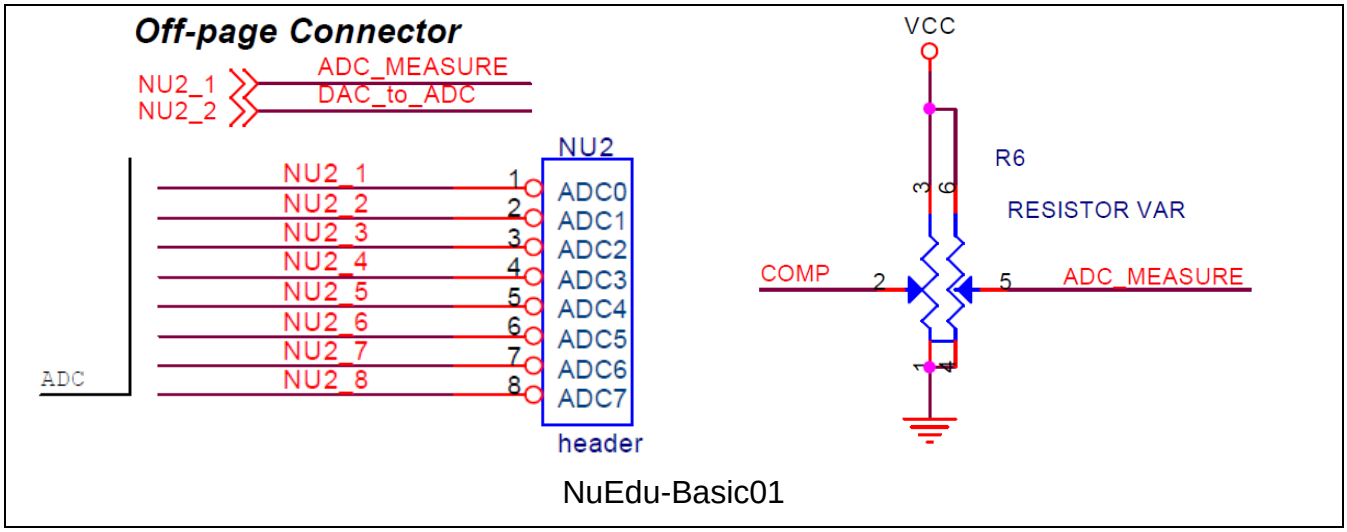
```
        if (d_newVoltage != d_oldVoltage)
        {
            printf("voltage=%f\n\r", d_newVoltage);
            d_oldVoltage = d_newVoltage;
        }
    }

     g_u32l++;
}
```

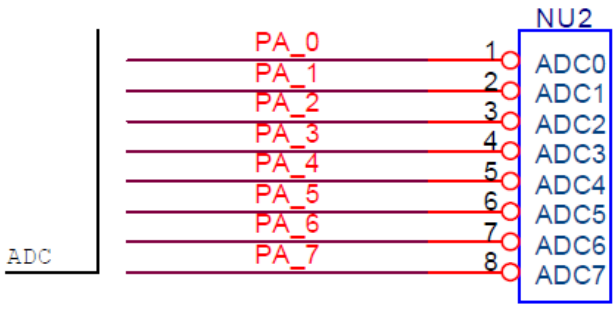
3 軟體與硬體環境

- **軟體環境**
  - BSP 版本
    - NUC230_240 Series BSP CMSIS v3.01.001
  - IDE 版本
    - Keil uVersion 4.74
- **硬體環境**
  - 電路元件
    - NuEdu-EVB-NUC240 V1.0
    - NuEdu-Basic01
  - 示意圖

    將NuEdu-EVB-NUC240與NuEdu-Basic01連接如下圖顯示。



NuEdu-Basic01



NuEdu-SDK-NUC240

4 目錄資訊

- EC_NUC240_ADC_Median_Filter_V1.00
  - Library — Sample code header and source files
    - CMSIS — Cortex® Microcontroller Software Interface Standard (CMSIS) by Arm® Corp.
    - Device — CMSIS compliant device header file
    - NuEdu — Library for NuEdu-SDK-NUC240 board
    - StdDriver — All peripheral driver header and source files
  - SampleCode
    - ExampleCode — Source file of example code

5 如何執行範例程式

1. 根據目錄資訊章節進入 ExampleCode 路徑中的 KEIL 資料夾，雙擊 NUC240_ADC_Median_Filter.uvproj。
2. 進入編譯模式介面
   a. 編譯
   b. 下載代碼至記憶體
   c. 進入 / 離開除錯模式
3. 進入除錯模式介面
   a. 執行代碼

6 修訂紀錄

Date	Revision	Description
Nov. 1, 2019	1.00	1. 初始發布

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