TCRT5000紅外傳感器的控制

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 NANO130 控制 TCRT5000 感測器
BSP 版本	Nano100B_Series_BSP_CMSIS_v3.01.000
開發平台	NuTiny-EVB-Nano130

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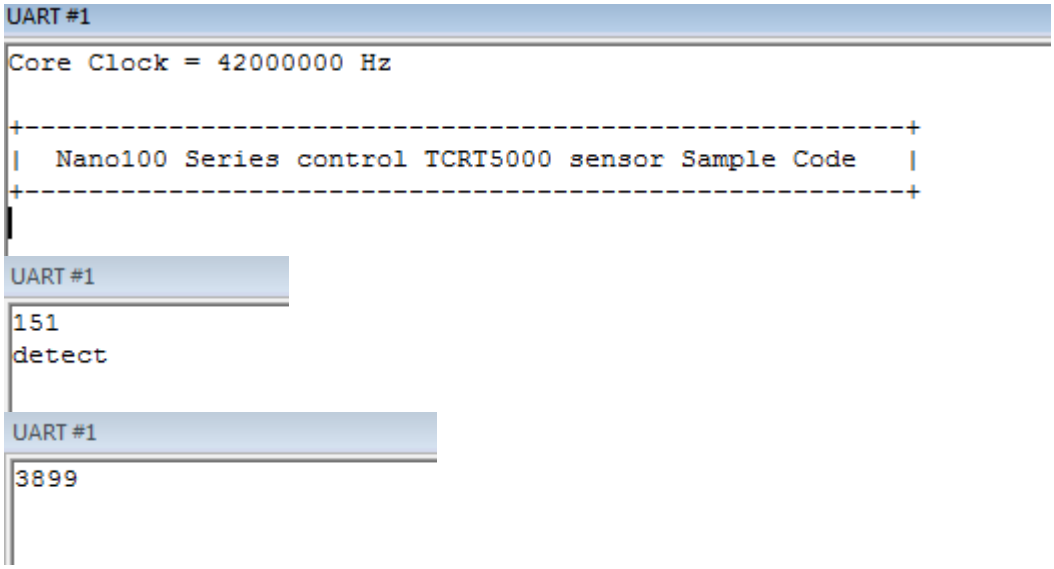
1 功能介紹

1.1 簡介

TCRT5000 感測器的工作原理與一般的紅外感測器一樣，一傳一感。
TCRT5000 具有一個紅外發射管和一個紅外接收管。當發射管的紅外信號經反射被接收管接收後，接收管的電阻會發生變化，在電路上一般以電壓的變化形式體現出來,本範例代碼使用 Nano130 經過 ADC 轉換後輸出結果。電阻的變化起取于接收管所接收的紅外信號強度，常表現在反射面的顏色和反射面接收管的距離。

1.2 執行結果



2 代碼介紹

ADC 初始化：

```
void Open_Volume_Knob(void)
{
     uint32_t ADC_Source_Clock_DIV;

     /* Initial ADC Function Pin */
     SYS->PA_L_MFP = (SYS->PA_L_MFP & ~SYS_PA_L_MFP_PA0_MFP_Msk) | SYS_PA_L_MFP_PA0_MFP_ADC_CH0;
     GPIO_DISABLE_DIGITAL_PATH(PA, BIT0);

     /* Safe for other unknown ADC device */
     while(ADC_IS_BUSY(ADC));
     SYS_UnlockReg();
     /* Initial ADC Clock Source */
     ADC_Source_Clock_DIV = _ADC_Source_Clock / ADC_Clock;
     if(ADC_Source_Clock_DIV>256)
     {
          Open_Volume_Knob_Fail = TRUE;
          ADC_Source_Clock_DIV = 256;
          ADC_Clock = _ADC_Source_Clock / 256;
          printf("\nADC Clock Initial Fail!\n");
     }
     else
     {
          Open_Volume_Knob_Fail = FALSE;
     }

     CLK_SetModuleClock(ADC_MODULE,CLK_CLKSEL1_ADC_S_HXT,CLK_ADC_CLK_DIVIDER(ADC_Source_Clock_DIV));
     CLK_EnableModuleClock(ADC_MODULE);
     SYS_LockReg();

     /* Initial ADC Peripheral */
     ADC_Open(ADC, ADC_INPUT_MODE_SINGLE_END, ADC_OPERATION_MODE_SINGLE_CYCLE, ADC_CH_0_MASK);
     ADC_SET_RESOLUTION(ADC, ADC_RESSEL_12_BIT);
     ADC_SET_REF_VOLTAGE(ADC, ADC_REFSEL_POWER);
     ADC_CLR_INT_FLAG(ADC, ADC_ADF_INT);
     ADC_POWER_ON(ADC);
}
```

MCU 通過 ADC 獲得 TCRT5000 感測器測量到的值：

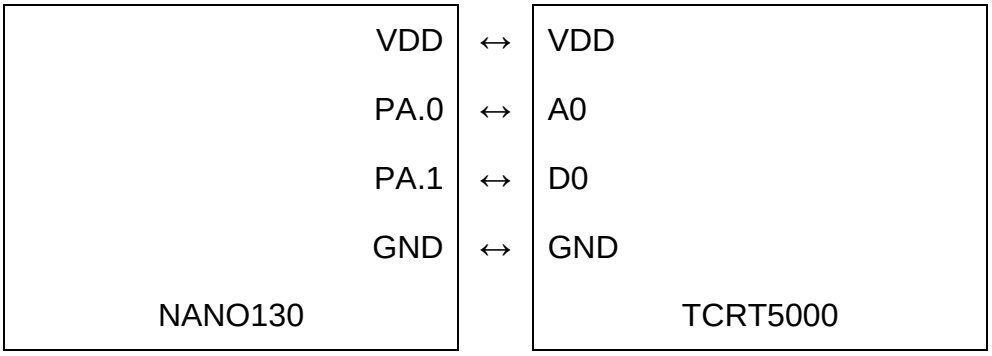
```
uint32_t Get_Volume_Knob(void)
{
    uint32_t ADC_Raw_Data;

    /* Start ADC Coversion */
    ADC_START_CONV(ADC);
    while(!(ADC_GET_INT_FLAG(ADC, ADC_ADF_INT)));
    ADC_CLR_INT_FLAG(ADC, ADC_ADF_INT);
    ADC_Raw_Data = ADC_GET_CONVERSION_DATA(ADC, 0);

    return ADC_Raw_Data;
}
```

3 軟體與硬體環境

- **軟體環境**
  - BSP 版本
    - Nano100B_Series_BSP_CMSIS_v3.01.000
  - IDE 版本
    - Keil uVersion5.25
- **硬體環境**
  - 電路元件
    - NuTiny-EVB-Nano130
    - TCRT5000
  - 示意圖



4 目錄資訊

- EC_NANO130_TCRT5000_IR_Sensor_Control_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-xxxx 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 TCRT5000_IR_Sensor_Control.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
Jul.24, 2019	1.00	1. 初始發布.

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