TCRT5000红外传感器的控制

NuMicro® 32 位系列微控制器范例代码介绍

文件信息

代码简述	本范例代码使用 NANO130 控制 TCRT5000 传感器
BSP 版本	Nano100B_Series_BSP_CMSIS_v3.01.000
开发平台	NuTiny-EVB-Nano130

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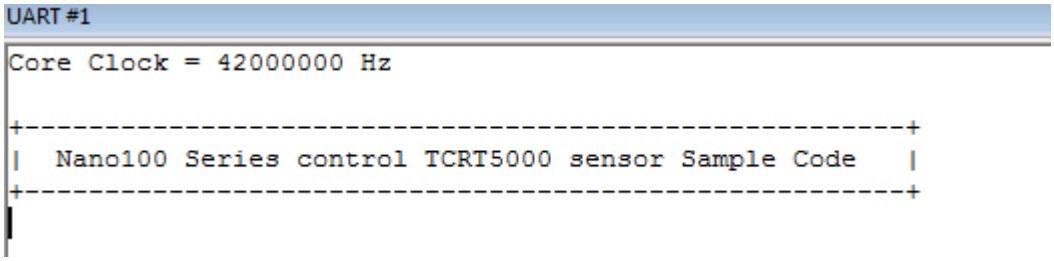
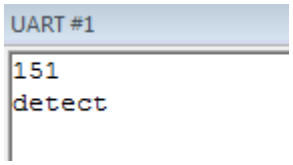
1 功能介绍

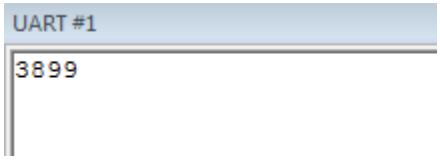
1.1 简介

TCRT5000 传感器的工作原理与一般的红外传感器一样,一传一感。
TCRT5000 具有一个红外发射管和一个红外接收管。当发射管的红外信号经反射被接收管接收后，接收管的电阻会发生变化，在电路上一般以电压的变化形式体现出来,本范例代码使用 Nano130 经过 ADC 转换后输出结果。电阻的变化起取于接收管所接收的红外信号强度，常表现在反射面的颜色和反射面接收管的距离。

1.2 执行结果







2 代码介绍

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 通过 ADC 获得 TCRT5000 传感器测量到的值：

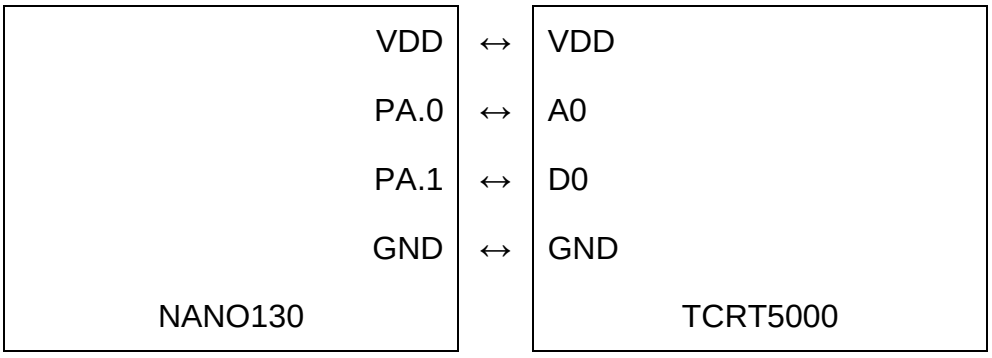
```
uint32_t Get_Volume_Knob(void)
{
    uint32_t ADC_Raw_Data;

    /* 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 软件与硬件环境

- 软件环境
  - BSP 版本
    - Nano100B_Series_BSP_CMSIS_v3.01.000
  - IDE 版本
    - Keil uVersion5.25
- 硬件环境
  - 电路组件
    - NuTiny-EVB-Nano130
    - TCRT5000
  - 示意图



4 目录信息

- 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 如何执行范例程序

1. 根据目录信息章节进入 ExampleCode 路径中的 KEIL 文件夹，双击 TCRT5000_IR_Sensor_Control.uvproj。
2. 进入编译模式接口
   a. 编译
   b. 下载代码至内存
   c. 进入 / 离开除错模式
3. 进入除错模式接口
   a. 执行代码

6 修订纪录

Date	Revision	Description
Jul.24, 2019	1.00	1. 初始发布.

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