TCRT5000 IR Sensor Control

Example Code Introduction for 32-bit NuMicro®Family

Information

Application	This sample code uses Nano130 to control the TCRT5000 sensor
BSP Version	Nano100B_Series_BSP_CMSIS_v3.01.000
Hardware	NuTiny-EVB-Nano130

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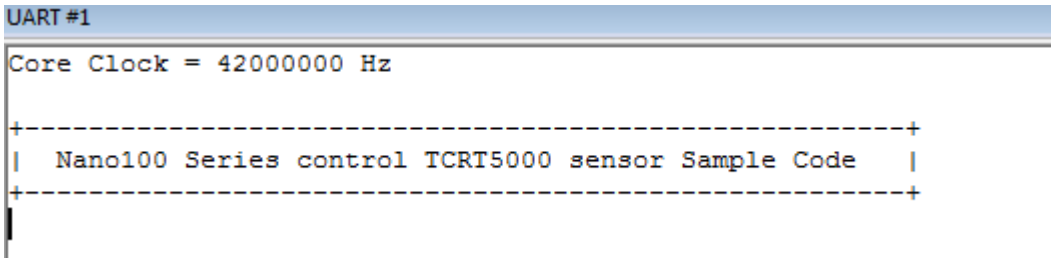
1 Function Description

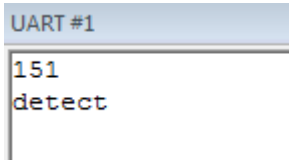
1.1 Introduction

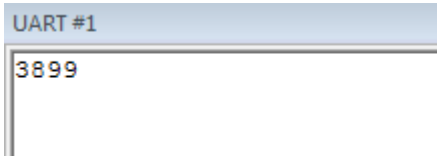
The TCRT5000 sensor works on the same principle as ordinary infrared sensors.

The TCRT5000 has an infrared emitter tube and an infrared receiver tube.When the infrared signal of the transmitter tube is received by the receiving tube through reflection, the resistance of the receiving tube will change, which is generally reflected in the form of voltage change on the circuit. This sample code uses Nano130 to output the result after ADC conversion.The change of resistance is based on the intensity of infrared signal received by the receiving tube, which is often reflected in the color of the reflecting surface and the distance between the receiving tube and the reflecting surface.

1.2 Demo Result







2 Code Description

The ADC initialization：

```
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 obtains the values measured by TCRT5000 sensor through ADC：

```
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;
}
```

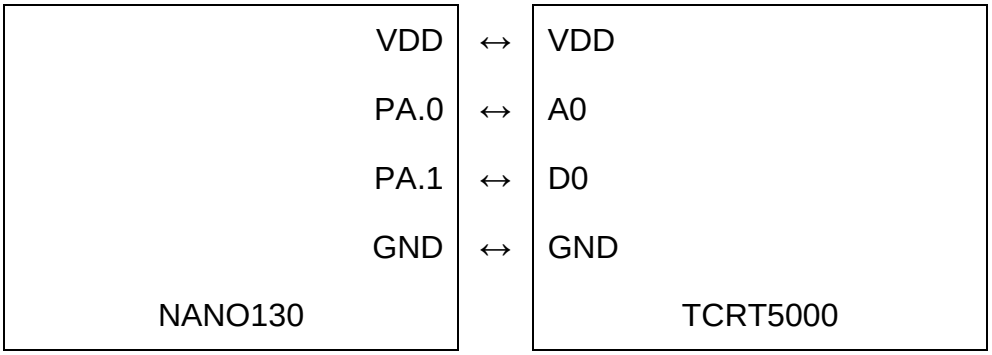
3 Software and Hardware Environment

Software Environment

- BSP version
  - Nano100B_Series_BSP_CMSIS_v3.01.000
- IDE version
  - Keil uVersion5.25

Hardware Environment

- Circuit components
  - NuTiny-EVB-Nano130
  - TCRT5000
- Diagram



4 Directory Information

- 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 How to Execute Example Code

1. Browsing into sample code folder by Directory Information(section 4) and double click TCRT5000_IR_Sensor_Control.uvproj.
2. Enter Keil compile mode
   a. Build
   b. Download
   c. Start/Stop debug session
3. Enter debug mode
   a. Run

6 Revision History

Date	Revision	Description
Jul.24, 2019	1.00	1. Initially issued.

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