Nano130 Communication With BT Module

Example Code Introduction for 32-bit NuMicro® Family

Information

Application	本范例代码使用 Nano130 与蓝牙模块 VICTOR-BT4030 进行通讯
BSP Version	Nano100B_Series_BSP_CMSIS_v3.03.000
Hardware	NuEdu-EVB-Nano130+NuEdu-Basic01

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1 功能描述

本范例介绍如何和蓝牙模组进行沟通，实现无线通讯。这次使用的蓝牙模组型号为威凯特 VICTOR-BT4030，能够支持蓝牙 4.0 标志协议的双模(Dual-Mode)蓝牙模组，其使用的控制芯片也是来自新唐 M051 系列。

在 sample code 中，我们使用 NuEdu-EVB-Nano130 板上的 UART1 连接蓝牙模组，使用者可以安装附件 BT_Control.apk,并透过 App 下指令给 NuEdu 板，当 NuEdu 板接收到来自使用者的命令后，将会控制相对应的 Basic01 板上的元件，如：LED,七节管，蜂鸣器。

控制命令格式如下：

资料格式

Byte1	Byte2	Byte3	Byte4
LED 灯	七节管(左)	七节管(右)	蜂鸣器音阶

由于一次传输 4 个字节命令，因此设定

UART0->TLCTL |= UART_TLCTL_RFITL_4BYTES ;

使得 FIFO 收到 4 个字节才会触发中断，并进入中断处理，接收这 4 个字节的控制命令。

2 代碼描述

首先初始化串口 1，设置波特率为 9600 接收蓝牙发送的数据：

```
    void UART1_Init(void)
    {
        /* Enable IP clock */
        CLK_EnableModuleClock(UART1_MODULE);

        /* Select IP clock source */
        CLK_SetModuleClock(UART1_MODULE,CLK_CLKSEL1_UART_S_HIRC,CLK_UART_CLK_DIVIDER(1));

       /* Set PA multi-function pins for UART1 RXD and TXD */
        SYS->PC_H_MFP &= ~( SYS_PC_H_MFP_PC10_MFP_Msk | SYS_PC_H_MFP_PC11_MFP_Msk);
        SYS->PC_H_MFP |= (SYS_PC_H_MFP_PC10_MFP_UART1_RX |
SYS_PC_H_MFP_PC11_MFP_UART1_TX );

         SYS_ResetModule(UART1_RST);

        /* Configure UART1 and set UART1 Baudrate */
        UART_Open(UART1, 9600);
         /* Set RX FIFO Trigger Level to 4 bytes */
         UART0->TLCTL |= UART_TLCTL_RFITL_4BYTES ;

    }
```

通过串口 1 的中断服务函数将收到的 4 字节数据存入 Command 数组中

```
void UART1_IRQHandler(void)
{
    /* Get all the input characters */
    while(UART_IS_RX_READY(UART1))
    {
                /* Get the character from UART Buffer */
        UART_Read(UART1, Command, 4);
    }
}
```

后面解析每个字节的数据然后控制 NuEdu-Basic01 板上的 LED 灯，七节管，蜂鸣器：

```
void LED_on(unsigned int temp)
{
    if((temp&1)!=1)
        LED1_OFF;
    else
        LED1_ON;

    temp=temp>>1;

    if((temp&1)!=1)
        LED2_OFF;
    else
        LED2_ON;

    temp=temp>>1;
    if((temp&1)!=1)
        LED3_OFF;
    else
        LED3_ON;

    temp=temp>>1;
    if((temp&1)!=1)
        LED4_OFF;
    else
        LED4_ON;

    temp=temp>>1;
    if((temp&1)!=1)
        LED5_OFF;
    else
        LED5_ON;

    temp=temp>>1;
    if((temp&1)!=1)
        LED6_OFF;
    else
        LED6_ON;

    temp=temp>>1;
```

```
    if((temp&1)!=1)
        LED7_OFF;
    else
        LED7_ON;

    temp=temp>>1;
    if((temp&1)!=1)
        LED8_OFF;
    else
        LED8_ON;

}
void Show_Seven_Segment(unsigned char no, unsigned char number)
{
    SEG_A_OFF;
    SEG_B_OFF;
    SEG_C_OFF;
    SEG_D_OFF;
    SEG_E_OFF;
    SEG_F_OFF;
    SEG_G_OFF;
    SEG_H_OFF;
    SEG_CONTROL1_OFF;
    SEG_CONTROL2_OFF;

    switch(number)
    {
    case 1:
        SEG_CONTROL1_ON;
        break;

    case 2:
        SEG_CONTROL2_ON;
        break;
    }

    switch(no)
    {
    //show 0
    case 0:
        SEG_A_ON;
```

```
        SEG_B_ON;
        SEG_C_ON;
        SEG_D_ON;
        SEG_E_ON;
        SEG_F_ON;
        break;

    //show 1
    case 1:
        SEG_B_ON;
        SEG_C_ON;
        break;

    //show 2
    case 2:
        SEG_A_ON;
        SEG_B_ON;
        SEG_G_ON;
        SEG_E_ON;
        SEG_D_ON;
        break;

    //show 3
    case 3:
        SEG_A_ON;
        SEG_B_ON;
        SEG_G_ON;
        SEG_C_ON;
        SEG_D_ON;
        break;

    //show 4
    case 4:
        SEG_F_ON;
        SEG_B_ON;
        SEG_G_ON;
        SEG_C_ON;
        break;

    //show 5
    case 5:
```

```
        SEG_A_ON;
        SEG_F_ON;
        SEG_G_ON;
        SEG_C_ON;
        SEG_D_ON;
        break;

    //show 6
    case 6:
        SEG_A_ON;
        SEG_F_ON;
        SEG_E_ON;
        SEG_G_ON;
        SEG_C_ON;
        SEG_D_ON;
        break;

    //show 7
    case 7:
        SEG_A_ON;
        SEG_B_ON;
        SEG_C_ON;
        SEG_F_ON;
        break;

    //show 8
    case 8:
        SEG_A_ON;
        SEG_B_ON;
        SEG_C_ON;
        SEG_D_ON;
        SEG_E_ON;
        SEG_F_ON;
        SEG_G_ON;
        break;

    //show 9
    case 9:
        SEG_A_ON;
        SEG_B_ON;
        SEG_C_ON;
```

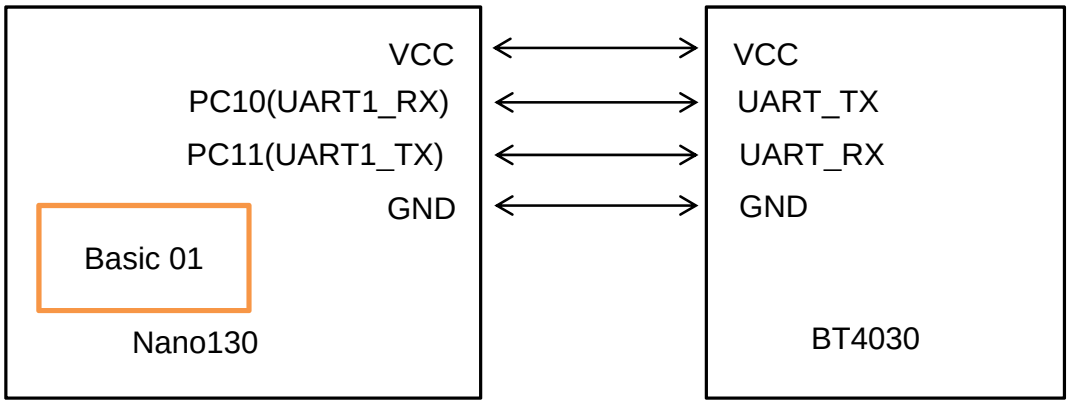
```
        SEG_F_ON;
        SEG_G_ON;
        break;
    }
}
void Write_Buzzer(unsigned int frequence, unsigned int duty)
{

    // Config PWM1 channel 1
    PWM_ConfigOutputChannel(PWM1, 1, frequence, duty);
    // Enable PWM1 channel 1 to drive buzzer module
    PWM_EnableOutput(PWM1, 0x02);
}
```

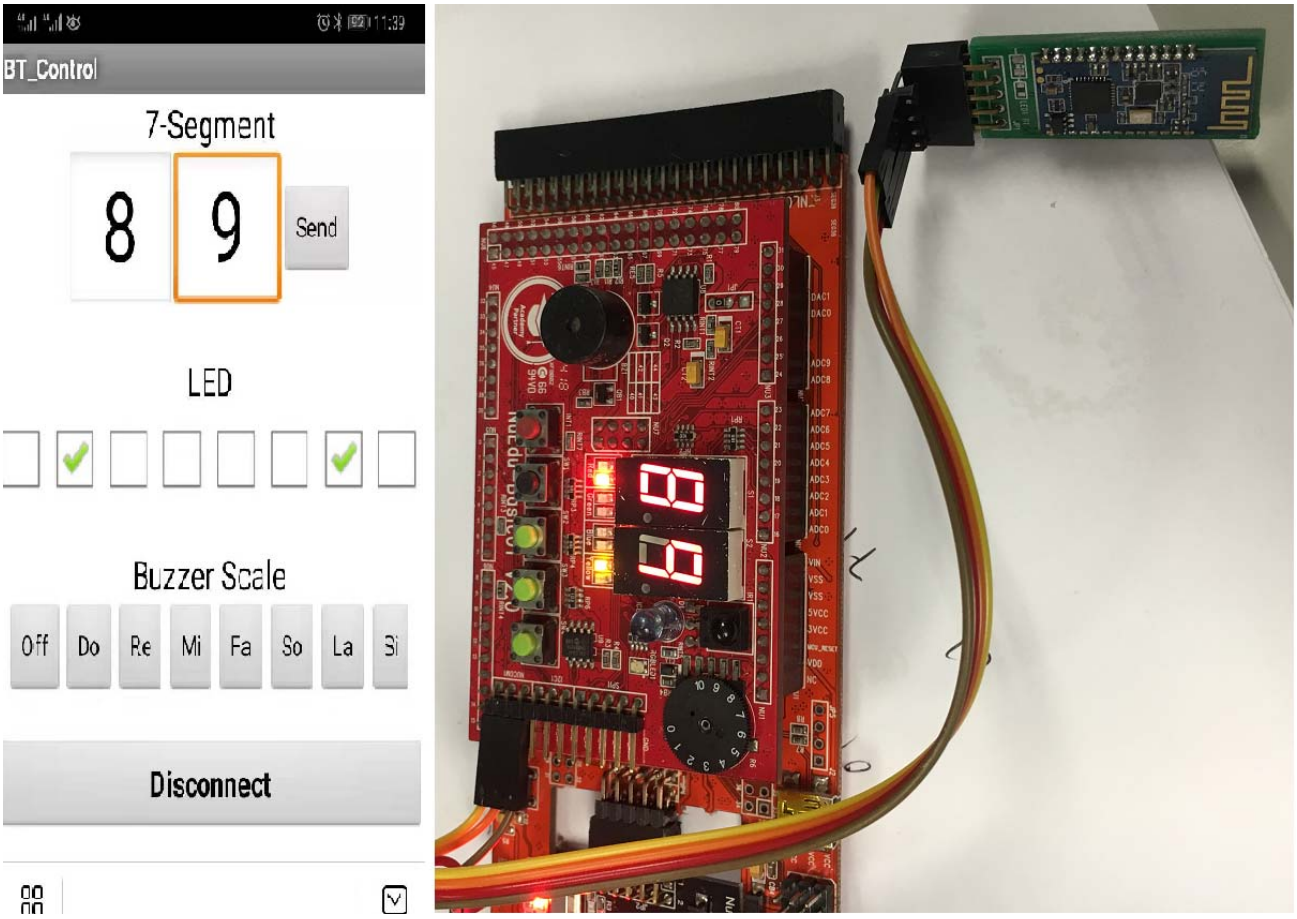
3 软件和硬件环境

- **软件环境**
  - BSP 版本
    - Nano100B_Series_BSP_CMSIS_v3.03.000
  - IDE 版本
    - Keil uVersion 4.6
- **硬件环境**
  - 电路元件
    - NuEdu-EVB-Nano130
    - NuEdu-Basic01
    - VICTOR-BT4030
  - 示意图

Nano130 使用 UART1 接收 BT4030 的数据，然后解析数据后控制 Basic1 板上的 LED 灯，七节管，蜂鸣器。



演示效果


BT_Control
7-Segment
8
9
Send
LED
Buzzer Scale
Off
Do
Re
Mi
Fa
So
La
Si
Disconnect

4 目录信息

- EC_Nano130_Wireless_Communication_With_Bluetooth_Module_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 board
    - StdDriver — All peripheral driver header and source files
  - SampleCode
    - ExampleCode — Source file of example code

5 如何执行示例代码

1. 根据目录信息章节进入 ExampleCode 路径中的 KEIL 文件夹，双击 Nano130_Communication_With_Bluetooth
2. 进入边界模式界面
   a. 编译
   b. 下载代码到内存
   c. 进入/离开除错模式
3. 进入除错模式界面
   a. 执行代码

6 修订纪录

Date	Revision	Description
Sep.25, 2019	1.00	1. 初始发布.

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