NUC472 USB Hub

Example Code Introduction for 32-bit NuMicro® Family

Information

Application	This code uses the two USB interfaces to implement a USB hub.
BSP Version	NUC472 Series BSP CMSIS V3.03.000
Hardware	Nu-LB-NUC472

1 Function Description

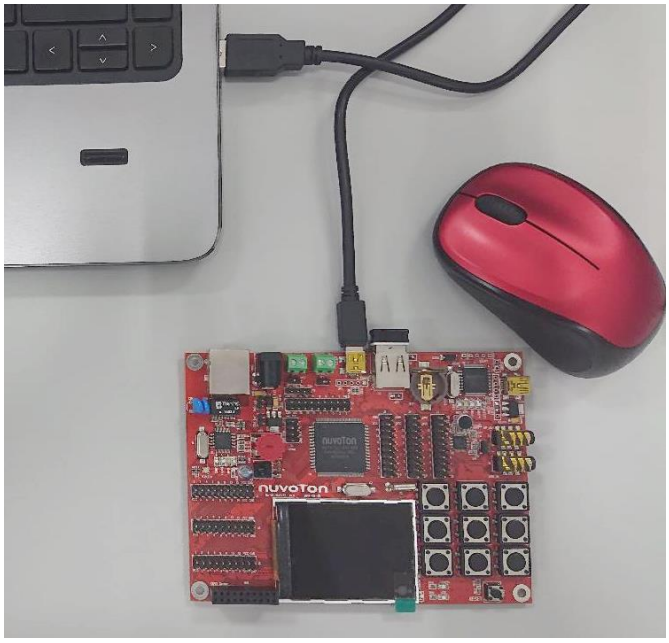
1.1 Introduction

This example code uses the two USB interfaces of NUC472, one USB interface is connected to the USB device, and the other is connected to the PC as a USB hub. The application performs pre-processing and then passes it to the PC after the NUC472 receives the USB device data.

1.2 Principle

The MCU will use the USB host driver to obtain the USB device data, and then transfer the data to the PC. For example, when the mouse is connected to NUC472, the PC can recognize the mouse and receive the information of the mouse.

1.3 Demo Result



2 Code Description

Main function is for polling and management USB device event :

```
int32_t main(void)
{
    HID_DEV_T    *hdev;

    /* Lock protected registers */
    if(SYS->REGLCTL == 1)
        SYS_LockReg();
    /* Init System, IP clock and multi-function I/O */
    SYS_Init();
    /* Init UART0 for printf */
    UART0_Init();
    /* Init USB HOST */
    USBH_Open();
    Delay(0x800000);
    USBH_HidInit();

    printf("Wait until any HID devices connected...\n");
    while(1) {    /* USB Host port detect polling and management */
        if(USBH_ProcessHubEvents()) {
            hdev = USBH_HidGetDeviceList();
            if(hdev == NULL)
                continue;

            while(hdev != NULL) {
                init_hid_device(hdev);
                if(hdev != NULL)
                    hdev = hdev->next;

                /* USB Device interface initiate */
                USBD_Open(&gsInfo, HID_ClassRequest, NULL);
                /* Endpoint configuration */
                HID_Init();
                /* Enable USBD interrupt */
                NVIC_EnableIRQ(USBD_IRQn);
                /* Start transaction */
                USBD_Start();
```

```
                while(1);
            }
        }
    }
}
```

USB device descriptor recognize and transfer to USB host：

```
int  init_hid_device(HID_DEV_T *hdev)
{
    int   i, ret;


    printf("\n\n==================================\n");
    printf("  Init HID device : 0x%x\n", (int)hdev);
    printf("  VID: 0x%x, PID: 0x%x\n\n", hdev->udev->descriptor.idVendor, hdev->udev-
     >descriptor.idProduct);


    ret = HID_HidGetReportDescriptor(hdev, desc_buff, 1024);
    if(ret > 0) {
        printf("\nDump report descriptor =>\n");
        for(i = 0; i < ret; i++) {
            if((i % 16) == 0)
                printf("\n");
            printf("%02x ", desc_buff[i]);
        }
        printf("\n\n");
    }

    /*
     *  Example: GET_PROTOCOL request.
     */
    ret = HID_HidGetProtocol(hdev, desc_buff);
    printf("[GET_PROTOCOL] ret = %d, protocol = %d\n", ret, desc_buff[0]);

    /*
     *  Example: SET_PROTOCOL request.
     */
    ret = HID_HidSetProtocol(hdev, desc_buff[0]);
    printf("[SET_PROTOCOL] ret = %d, protocol = %d\n", ret, desc_buff[0]);

    /*
```

```
     *  Example: GET_REPORT request on report ID 0x1, report type FEATURE.
     */
    ret = HID_HidGetReport(hdev, RT_FEATURE, 0x1, desc_buff, 64);
    if(ret > 0) {
        printf("[GET_REPORT] Data => ");
        for(i = 0; i < ret; i++)
            printf("%02x ", desc_buff[i]);
        printf("\n");
    }

    printf("\nUSBH_HidStartIntReadPipe...\n");
    if(USBH_HidStartIntReadPipe(hdev, int_read_callback) == HID_RET_OK) {
        printf("Interrupt in transfer started...\n");
    }
    return 0;
}

void  int_read_callback(HID_DEV_T *hdev, uint8_t *rdata, int data_len)
{
    /*Setting USB DMA to tranfer the USB device data*/
    USBD_SET_DMA_READ(INT_IN_EP_NUM);
    USBD_SET_DMA_ADDR((uint32_t)rdata);
    USBD_SET_DMA_LEN(data_len);
    USBD_ENABLE_DMA();
    while(USBD->DMACTL & USBD_DMACTL_DMAEN_Msk);
    USBD->EP[EPA].EPTXCNT = data_len;
}
```

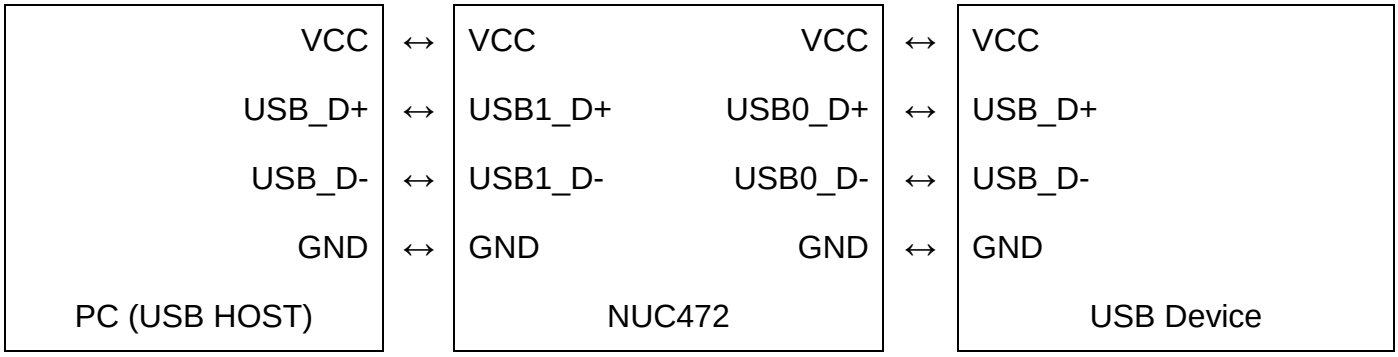
3 Software and Hardware Environment

Software Environment

- BSP version
  - NUC472 Series BSP CMSIS V3.03.000
- IDE version
  - Keil uVersion 5.26

Hardware Environment

- Circuit components
  - Nu-LB-NUC472
- Diagram



4 Directory Information

- EC_NUC472_USB_Hub_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
    - StdDriver — All peripheral driver header and source files
    - UsbHostLib — USB host library source code
  - 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 NUC472_USB_Hub.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. 11, 2019	1.00	1. Initially issued.

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