

MSPM0_K210 handwritten digit recognition

1. K210 communicates with MSPM0

1.1 Experimental prerequisites

This tutorial uses the MSPM0G3507 development board. K210 needs to run the program in **K210-AI(MSPM0G3507)** to start the experiment

MSPM0G *1

K210 visual module *1 (must have an SD card (with AI models), camera)

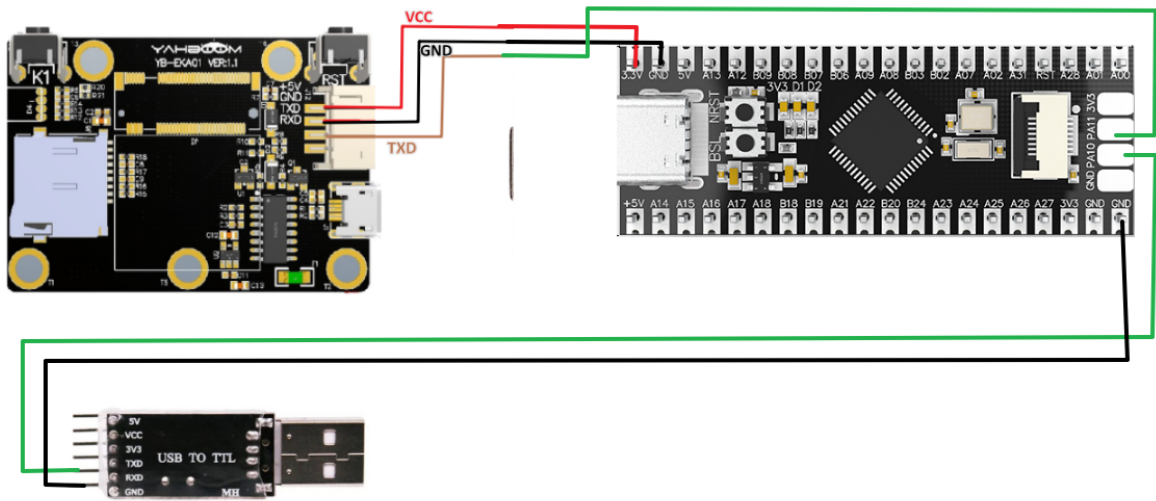
USB to TTL module *1

1.2 Experimental wiring

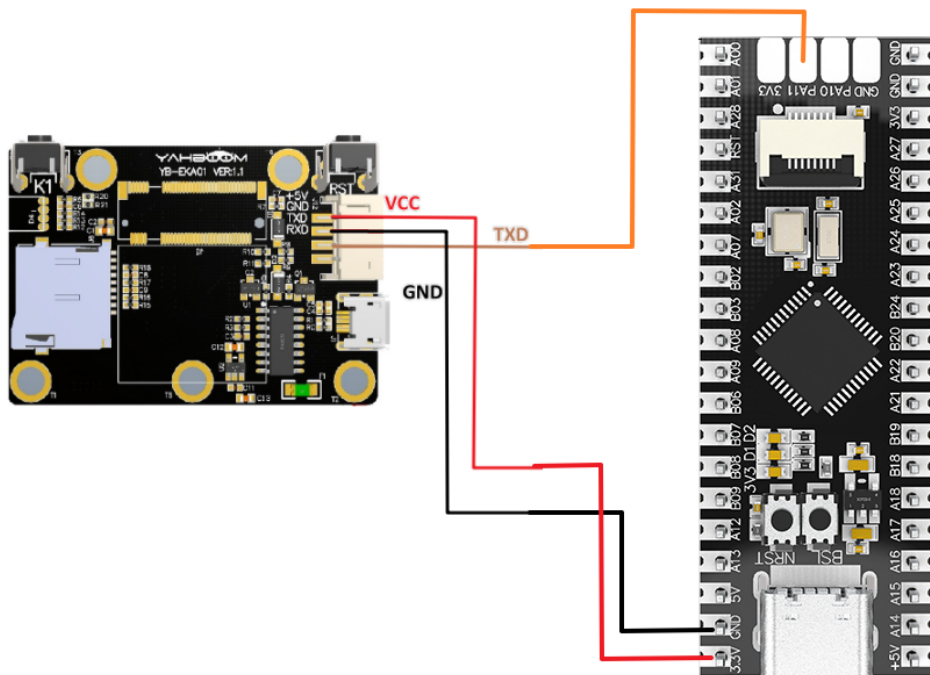
Method 1: Use USB to TTL module

MSPM0G	K210 visual module
RX	TXD
GND	GND
VCC	5V

MSPM0G	USB to TTL module
TX	RXD
GND	GND



Method 2: Use the onboard Type-C port



1.3 Main code explanation

This example sets the baud rate of the serial port printing to 115200 bps, and the baud rate of the k210 module connection is set to 115200 bps.

Type Filter Text... X <<

PROJECT CONFIGURATION...
Project Config... 1/1 ✓ +

MSPM0 DRIVER LIBRARY ...
SYSTEM (9)
Board 1/1 ✓ +
DMA +
GPIO +
MATHACL +
Configuration NVM +
RTC +
SYSCTL 1/1 ✓ +
SYSTICK 1/1 ✓ +
WWDT +
ANALOG (6)
ADC12 +
COMP +
DAC12 +
GPAMP +
OPA +
VREF +
COMMUNICATIONS (6)
I2C +
I2C - SMBUS +
MCAN +
SPI +
UART 2/4 ✓ +
UART - LIN +
TIMERS (6)
TIMER - CAPTURE +

Software > UART

UART (2 of 4 Added) ⓘ
+ ADD REMOVE ALL
✓ MYUART
✓ K210_Uart
Name MYUART
Selected Peripheral UART0
Quick Profiles
UART Profiles Custom
Basic Configuration
UART Initialization Configuration
Clock Source BUSCLK
Clock Divider Divide by 1
Calculated Clock Source 32.00 MHz
Target Baud Rate 115200
Calculated Baud Rate 115211.52
Calculated Error (%) 0.01
Word Length 8 bits
Parity None
Stop Bits One
HW Flow Control Disable HW flow control

Type Filter Text... X << < → Software > UART

PROJECT CONFIGURATIO...

Project Config... 1/1 ✓ (+)

MSPM0 DRIVER LIBRARY ...

SYSTEM (9)

Board 1/1 ✓ (+)

DMA (+)

GPIO (+)

MATHACL (+)

Configuration NVM (+)

RTC (+)

SYSCCTL 1/1 ✓ (+)

SYSTICK 1/1 ✓ (+)

WWDI (+)

ANALOG (6)

ADC12 (+)

COMP (+)

DAC12 (+)

GPAMP (+)

OPA (+)

VREF (+)

COMMUNICATIONS (6)

I2C (+)

I2C - SMBUS (+)

MCAN (+)

SPI (+)

UART 2/4 ✓ (+)

UART - LIN (+)

TIMERS (6)

TIMER - CAPTURE (+)

TIMER - COMPARE (+)

UART (2 of 4 Added) ②

✓ MYUART

✓ K210_Uart

Name K210_Uart

Selected Peripheral UART1

Quick Profiles ^

UART Profiles Custom ▾

Basic Configuration ^

UART Initialization Configuration ^

Clock Source BUSCLK ▾

Clock Divider Divide by 1 ▾

Calculated Clock Source 32.00 MHz

Target Baud Rate 115200

Calculated Baud Rate 115211.52 ▾

Calculated Error (%) 0.01

Word Length 8 bits ▾

Parity None ▾

Stop Bits One ▾

HW Flow Control Disable HW flow control ▾

```
int main(void)
{
    SYSCFG_DL_init();

    NVIC_ClearPendingIRQ(MYUART_INST_INT_IRQN); //清除串口中断标志 clear the serial
    port interrupt flag
    NVIC_EnableIRQ(MYUART_INST_INT_IRQN); //是能串口中断 Enable serial port
    interrupt

    while (1)
    {
        if (k210_msg.class_n != 0) //例程号不为空 Routine number is not empty
        {
            if (k210_msg.class_n == 11) //是手写数字识别 Handwritten digit
            recognition
            {
                sprintf(buff_com, "class =
                %d,x=%d,y=%d,w=%d,h=%d\r\n", k210_msg.class_n, k210_msg.x, k210_msg.y, k210_msg.w, k2
                10_msg.h);
                uart0_send_string(buff_com);
                k210_msg.class_n = 0;
            }
        }
    }
}
```

```

        delay_ms(500);
    }
}

```

After the above program, if this routine is run, the members of the k210_msg structure will have corresponding values and will be processed through the serial port printing

k210_msg: is the structure for receiving information, and its main members are

- x: is the horizontal coordinate of the upper left corner of the identified box (range: 0-240)
- y: is the vertical coordinate of the upper left corner of the identified box (range: 0-320)
- w: is the width of the identified box (range: 0-240)
- h: is the length of the identified box (range: 0-320)
- id: is the identified label
- class_n: routine number
- msg_msg[20]: valid data

After the data is received and processed by the function, each member of k210_msg will store valid information. If you want to perform secondary development, you can directly call the members of k210_msg

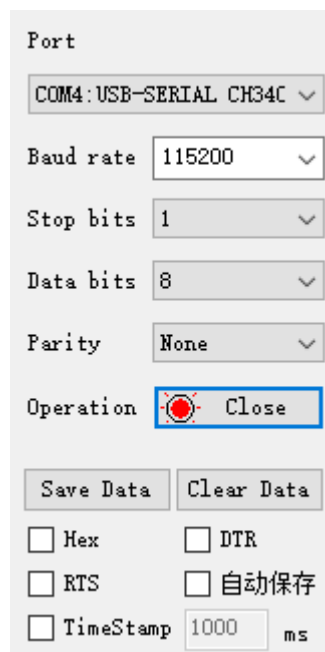
Note: The keil project source code must be compiled under the SDK path.

1.4 Experimental Phenomenon

1. After connecting the cable, the K210 perspective module runs offline. Please check 【6.2 K210 as coprocessor】 -- 【ReadMe】

Link: <http://www.yahboom.net/study/K210-AI-Camera>

2. Set the serial port assistant to the interface shown in the figure



3. Then run the handwritten digit recognition routine, and the serial port assistant will print out the important information transmitted by k210 to MSPM0G, as shown in the figure below

```
id = 0
id = 8
id = 8
id = 8
id = 8
id = 8
id = 8
id = 8
id = 8
id = 8
id = 8
id = 8
id = 8
id = 8
id = 0
id = 0
id = 6
id = 6
id = 5
id = 1
id = 9
id = 9
id = 1
id = 5
id = 6
id = 0
id = 6
id = 5
```

Handwritten digit recognition only transmits one member variable of k210_msg, id.

id: refers to the recognized digital ID (0-9)