Development of serial port Bluetooth communication module based on STM32

Jian Huang
XiJing University, Xi'an 710123, China;
565200245@qq.com

Keywords: Bluetooth communication; Automatic pairing; AT command

Abstract. Bluetooth communication technology is becoming more and more mature, and it is suitable for wireless communication in short distance. Especially suitable for networking. And Bluetooth both sides to communicate, must use AT instruction to set, and its communication rate, Internet Password and so set to the same. This paper studies how to set the Bluetooth automatic pairing with STM32, can automatically realize the interconnection, short distance communication, and realize the effective data transmission, test results show that this method can realize the interconnection, reliable communication, with higher speed.

Introduction

Bluetooth communication is committed to solving the communication problem of the last 10 meters. After years of development, it has been mature and widely used. Bluetooth uses frequency hopping technology to split data into packets and transmit data packets through 79 designated Bluetooth channels. Each channel has a bandwidth of 1 MHz. Bluetooth 4 uses 2 MHz pitch to hold 40 channels. The first channel starts at 2402 MHz, every 1 MHz channels, to 2480 MHz. With adaptive frequency hopping (Adaptive Frequency-Hopping, referred to as AFH) function, usually jump 1600 times per second.

Bluetooth usually can realize point-to-point communication, and the communication speed can reach several megabytes to tens of megabytes, and the effective communication distance is 10 meters.

Design

Bluetooth Hardware Design

The Bluetooth module circuit is shown in figure 1. Fig. 1 is powered by 3.3V, and UART_TXD and UART_RXD can be connected to any serial port of the STM32 to communicate.

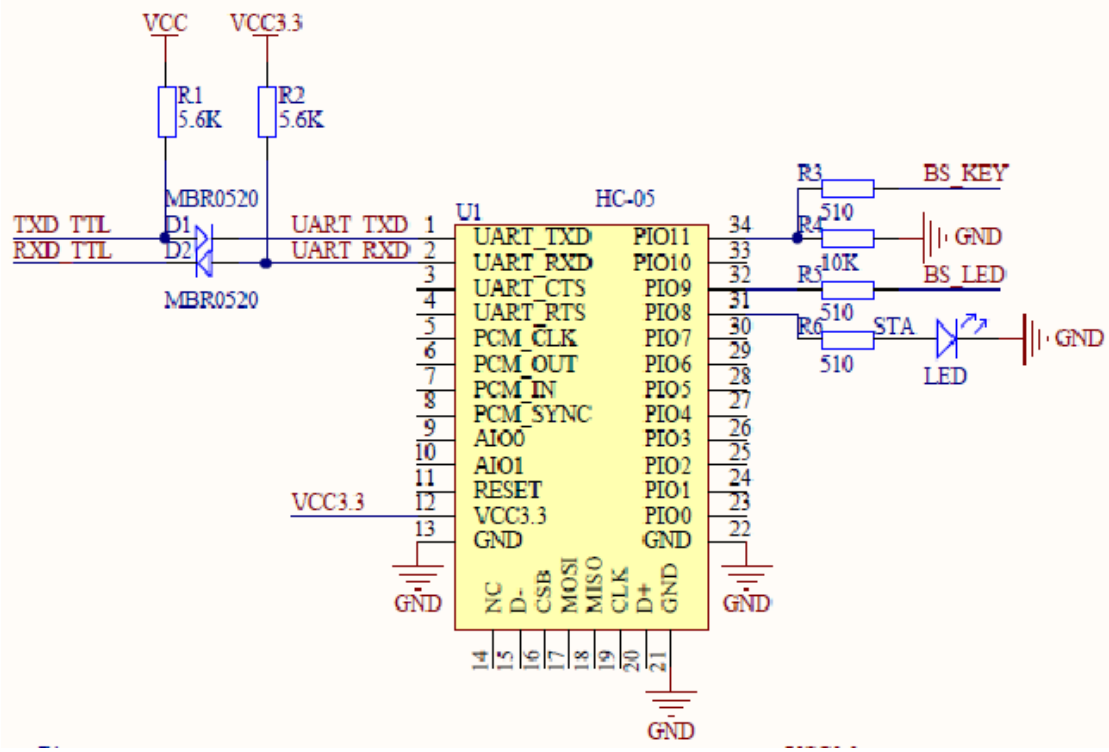

Figure 1. Bluetooth module circuit diagram

Bluetooth Auto Pairing Procedure

Bluetooth automatic pairing steps are as follows:

1) first, use the AT+ORGL (CR) command to initialize the 2 modules and set them as factory configurations.

2) the two module should be set with AT+ROLE (CR) command as a primary one and one from the other.

3) the connection code of the two modules should be the same, set by AT+PSWD equal to XXXX.

4) the addresses of the two modules are bound to each other by AT+BIND (CR). Use AT+ADDR (CR) to see their respective addresses.

Software Program

In this design, under KEIL 5, programming with C language. Bluetooth module automatically matching and data transfer. Some code is given below:

```
void USARTx_idle_init(unsigned char i)
  {
USART_InitTypeDef USART_InitStructure;
GPIO_InitTypeDef    GPIO_InitStructure;
NVIC_InitTypeDef NVIC_InitStructure;
RCC_APB2PeriphClockCmd (RCC_APB2Periph_GPIOA, ENABLE);
RCC_APB1PeriphClockCmd(RCC_APB1Periph_USART2, ENABLE);
  RCC->APB2ENR|=1<<0;
AFIO->MAPR&=0XFFFFFFF7;
AFIO->MAPR|=1<<3;
GPIO_InitStructure.GPIO_Pin      = GPIO_Pin_6;
GPIO_InitStructure.GPIO_Mode    = GPIO_Mode_IN_FLOATING;
GPIO_Init(GPIOD, &GPIO_InitStructure);
GPIO_InitStructure.GPIO_Pin      = GPIO_Pin_5;
```

```
GPIO_InitStructure.GPIO_Speed = GPIO_Speed_50MHz;
GPIO_InitStructure.GPIO_Mode    = GPIO_Mode_AF_PP;
GPIO_Init(GPIOD, &GPIO_InitStructure);
USART_InitStructure.USART_BaudRate = 38400;
USART_InitStructure.USART_WordLength= USART_WordLength_8b;
USART_InitStructure.USART_StopBits= USART_StopBits_1;
USART_InitStructure.USART_Parity= USART_Parity_No ;
USART_InitStructure.USART_HardwareFlowControl =USART_HardwareFlowControl_None;
USART_InitStructure.USART_Mode= USART_Mode_Rx | USART_Mode_Tx;
  USART_Init(USART2, &USART_InitStructure);
NVIC_InitStructure.NVIC_IRQChannel = USART2_IRQn;
NVIC_PriorityGroupConfig(NVIC_PriorityGroup_2);
NVIC_InitStructure.NVIC_IRQChannelPreemptionPriority=3 ;
NVIC_InitStructure.NVIC_IRQChannelSubPriority = 3;
NVIC_InitStructure.NVIC_IRQChannelCmd = ENABLE;
NVIC_Init(&NVIC_InitStructure);
USART_ITConfig(USART2, USART_IT_RXNE, ENABLE);
USART_ITConfig(USART2, USART_IT_IDLE, ENABLE);
USART_Cmd(USART2, ENABLE);
  }
```

Summary

This paper expounds the method of Bluetooth communication with STM32 serial port, designs the hardware circuit, and describes its working principle. The method and steps of automatic pairing of Bluetooth are given. In KEIL MDK, the program is written in C language, which realizes the initialization of Bluetooth module and realizes the automatic connection and data transfer of Bluetooth module. It has certain practical value.

Reference

[1] Su Song, Hu Li, et al. Indoor location method of Low Power Bluetooth mobile phone terminals [J], surveying and mapping bulletin.2015,12:81-84.
[2] Zhang Qun, Yang Xu, Zhang Zhengyan, Lu yong. Design and implementation of serial communication of Bluetooth module [J], laboratory research and exploration,.2012, 31 (3): 79-82.
[3] Guo Keyou, Zhang Fan, Li Na, et al. Design of remote control door system based on Bluetooth technology [J]. experimental technology and management, 2013, 30 (1): 111-114.
[4] Yin Jie, Yang Zongshuai, Nie Hai, et al. Reflective infrared remote control car intelligent tracking system design based on [J]. electronic design engineering, 2013, 21 (23): 178-180.
[5] Yin Xiaoguang, Fu Zhuang, Cao Qixin, et al. Application of Bluetooth wireless communication technology in [J].. AGV machinery and electronics, 2003 (2): 19-22.