

LAB 10

SERIAL

OBJECTIVES:

- To write a program to transfer data to a PC serially.
- To write a program to receive data from a PC serially.

REFERENCES:

- Mazidi & Naimi “The STM32F103 Arm Microcontroller and Embedded Systems,” Chapter 10.

MATERIALS:

- Keil IDE
- A Terminal software like Terminalbpp or Putty.
 - <https://sites.google.com/site/terminalbpp/>
- Blue pill or any other STM32F10x trainer board
- ST-Link V2
- A computer (or a cell phone with OTG USB port)
- Some LEDs
- A switch

ACTIVITY 1

Connect your trainer board to the PC's USB port. (Use a USB to serial converter to connect the TXD and RXD pins of the microcontroller to the USB port of your PC.)

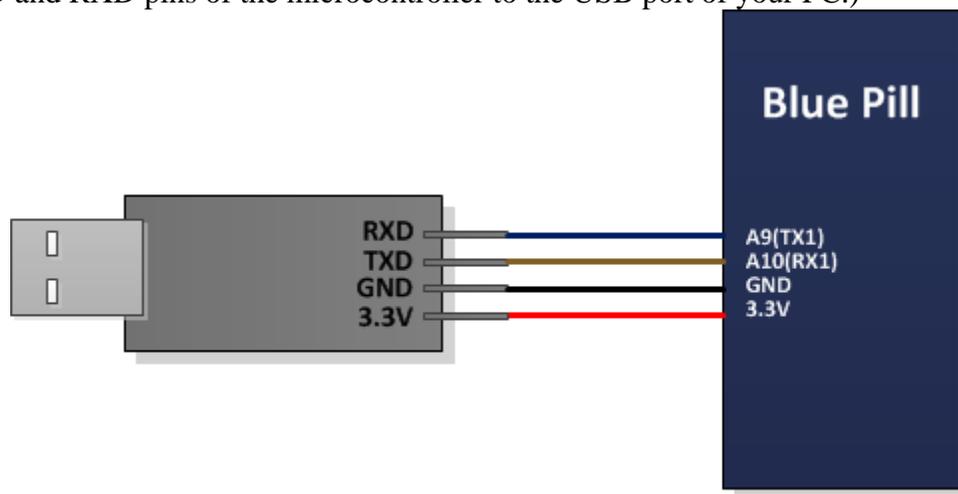


Figure 1: Connecting the TXD, RXD, and GND pins of the converter and the trainer board

If you have not installed the driver of your USB-Serial Converter, install it. Then write a program to transfer your last name to the PC continuously. On the PC side you need to use a Terminal program (e.g. [Terminalbpp](#)). Here are the steps to prepare Terminalbpp:

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- 1) Open the Terminalbpp software.
- 2) Pick 9600 *baud rate* (or whatever baud rate you programmed the microcontroller), 8-bit data, no parity bit (none), and 1 stop bit. Set the *Handshaking* to *none*.

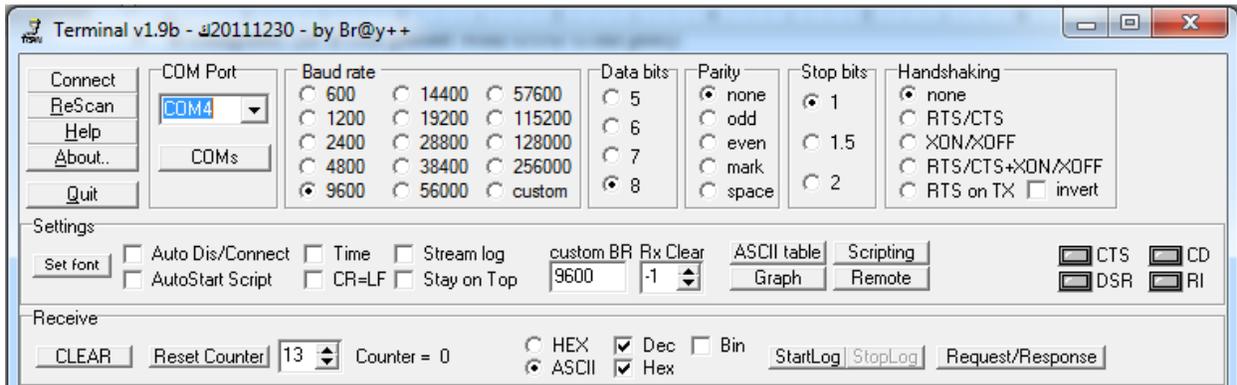


Figure 2: Configuring the Serial Port

- 3) Click on the *COM Port* combo box and choose the proper port. If more than one port exists and you don't know which port to choose, right click on *My Computer* and click on *Manage*. In the *Computer Management*, pick the *Device Manager* and choose *Ports (COM & LPT)*. Now you see the list of available serial devices which are connected to your PC. Unplug your device and plug it again and see which device is added to the list. In the Terminal choose its COM port.

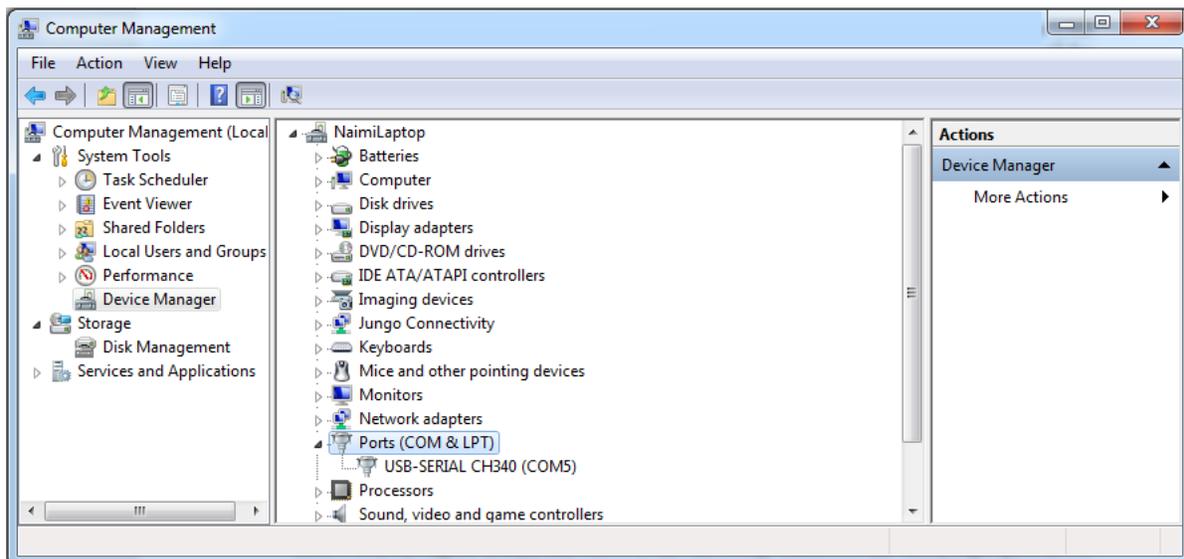


Figure 3: Device Manager

- 4) In the Terminal, click on the Connect Button. After running your serial program, you should see your last name fills the Receive box of the Terminal.

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ACTIVITY 2

After making sure that Activity 1 works properly, write a program to get data from the PC and display it on an LCD. If you do not have an LCD connected to the trainer board, connect PORTA to LEDs and observe the incoming characters (or use a logic probe). To send data to the board, type your message in the text box and press the Send button. Make sure that +CR is unchecked. As you send a char key on the PC's keyboard, the character is sent to the microcontroller serially and is displayed on LEDs. The characters displayed on LEDs are in ASCII (binary).

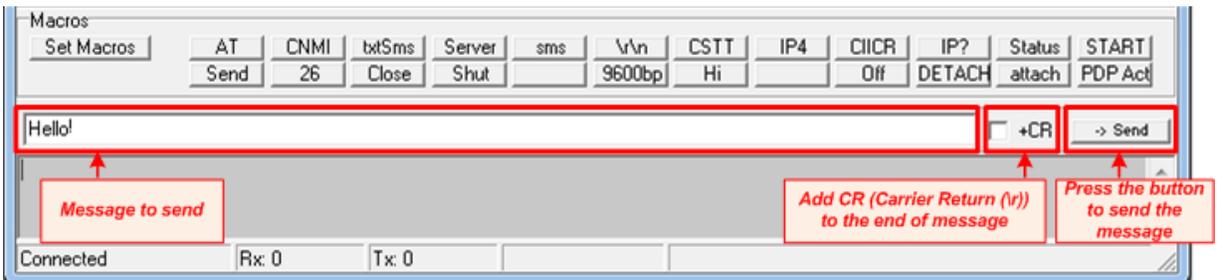


Figure 4: Sending a Message to the Board

ACTIVITY 3

Connect a Switch to a GPIO pin of your trainer board. Write the following program:

- 1) If SW=0, send "Hello" to the PC.
- 2) If SW=1, send "Bye" to the PC.

ACTIVITY 4

Modify and run the program in Activity 3 to transfer the data at the rate of 56K

ACTIVITY 5

Connect the Trainer board to the PC. Write and test the following program:

- The Trainer sends a message to the PC's Terminal asking the user for a string of characters to be typed.
- The program gets the characters from PC and saves them in an internal buffer in the RAM.
- Then sends the contents of the RAM buffer to the PC.