Name: Khoi Nguyen

Class: ECE 5780

Pre lab 4

1. What is the difference between a parallel and serial interface?
    a. The main difference between parallel and serial interfaces is how data is transmitted:
        i. Parallel interfaces transmit blocks of data using multiple wires, with each wire representing the value of a single binary bit ➔ offer higher bandwidth but have more complexity and potential synchronization (wire delay) issues at high speeds or over long distances.
        ii. Serial interfaces use a single wire to stream a block of data over time by lining up the bits one after another ➔ simplifies connections and reduces synchronization issues, making them more suitable for high-speed or long-distance communication
2. What is the difference between a synchronous and asynchronous interface?
    a. The difference between synchronous and asynchronous interfaces lies in how they synchronize data transmission:
        i. Synchronous systems use a separate "clock" signal to notify the receiver when to sample; the data capture often synchronizes to a transition like a rising or falling edge of the clock ➔ simpler in design, but they do require the extra clock connection
        ii. Asynchronous systems operate without a physical clock signal ➔ more complex asynchronous interconnects, and they also have lower data rates than synchronous connections.
3. What is one thing that a communication protocol does?
    a. Protocols define the meaning of bits to create useful data because hardware standards make it possible to convert an input signal into a collection of bits
4. What does the baud rate of a signal mean?
    a. The baud rate represents the number of bits per second that the sender transmits. The data transmission speed within a communication system can be measured by its bandwidth.
5. What register in the USART would you use to enable the transmitter hardware?
    a. Control register 1 (USART_CR1) enables/disables interrupt conditions and portions of the USART peripheral so we can use it to enable the transmitter hardware.
6. Does the transmit (TX) line of the USB-USART cable connect to the transmit (TX) or receive (RX) of the STM32F0?
    a. Yes. To communicate, the transmitter of one device must be connected to the receiver of the other. If necessary, refer to the following when connecting the cable to the board.
        i. USB-UART Transmit (TX) → STM32F0 Receive (RX)
        ii. USB-UART Receive (RX) → STM32F0 Transmit (TX)