Cairo University
Faculty of Engineering
Electronics and Communications
Department

ELC303A: Computer 3A
Computer Architecture
3rd year 2018 – 2019
Term Project
Due to : 23/12/2017

UART & USB Emulator

Using MATLAB, write a code to emulate the USB and UART protocol in the transmitting state. The code reads 2 text files based on the user request:

- **A Configuration File:** which is a text file that contains the protocol parameter (like protocol name, bit rate, number of stop bits …). You will create 2 configuration files: one for UART and the other for USB. The first line of a configuration file specifies the protocol name as either "USB" or "UART". Any other protocol name should result in an error message to the user. Your emulator first asks the user which protocol to use. You can implement this either as code or using MATLAB GUI.
  In the case of UART:
    - Ask about the number of data bits per packet (either 7, or 8 bits).
    - Ask about the number of stop bits (one or two).
    - Ask about the parity (even, odd, or non).
    - The code then read the bit duration from the second line of the configuration file.
  In the case of USB: You code reads the following information:
    - The second line will be the synchronization pattern (8 bits: 7 zeros followed by a one)
    - The third line will be the length of the packet identifier (8 bits for PID). Note that PID of the first packet is 1 and is increased by 1 for every new packet.
    - The fourth line will be the destination address (11-bits) (assume any 11 bit address)
    - The fifth line is the size of the payload (assume it 128 bytes)
    - The fifth line specifies the bit duration

- **An Input Data File:** which is an ASCII text file that contains the data to be transmitted by the protocol specified by the user. Please use the attached file (inputdata.txt)

Procedure/Output:
- Plot a sample of the bit sequence to be transmitted by both protocols (the first 2 bytes in UART and the first 2 packet in USB).
- If the bit duration of both protocols is equal, report back to the user the total time required to transmit the input data file, the percentage overhead, and the efficiency of each protocol.
- If the bit duration of both protocols is equal, plot the increase of the percentage overhead of both protocols versus the file size. (Hint: you can use the input data file over and over instead of creating bigger files)

- If the bit duration of both protocols is equal, plot the increase of the transmission time of both protocols versus the file size. (Hint: you can use the input data file over and over instead of creating bigger files)
- Each group of 3 or 4 students should submit a zipped folder that contains (1) a report of maximum 8 pages (not including your code), (2) your code/work. Submit also a hard copy of the report to the TA.
- To receive full credit, you need to explain and comment on any observed outputs/trends/….

Logistics:
Any case of cheating will result in a ZERO project grade to ALL involved students

Useful Material:
Before working in GUI see this quick tutorial
(https://www.mathworks.com/videos/creating-a-gui-with-guide-68979.html).