CPE 325: Embedded Systems Laboratory
Laboratory Assignment #9

Assignment [100 pts]

You are given a program for the MSP430F2013 microcontroller in a binary form (source code is not available to you). This program implements a simple beacon, controlled via the SPI interface. The beacon works as follows:

- LED3 is turned on during one time slot (one time slot lasts for 32 milliseconds). After that first time slot, there is a pause when LED3 is turned off. This pause lasts for P time slots. After that, the cycle repeats.
- When the program receives a number from the range 1-100 via SPI, it sets P to that value, allowing to change how often the beacon blinks.
- When the program receives 0, it replies with the current value of P through SPI.
- When the program receives 255, it turns LED3 off completely.
- The program ignores all other numbers received through SPI.

Load that program to MSP430F2013 and do the following assignment:

1. Write a program for MSP430FG4618 that asks the user to enter P in Putty/MobaXterm as follows: **"Beacon pause: "**.

   When a number from 1 to 100 is entered and the ENTER key is pressed, the program converts the entered value to a number (you can use `atoi` function for this) and sends this value to MSP430F2013 via SPI to change the pause of the beacon. Display a new message when the user hits ENTER.

   If the user enters **"?"** instead of a number, your program should send 0 to MSP430F2013 and read the response (the current length of the pause). Display the received value in Putty/MobaXterm at the new line as follows: **"Current pause: <pause>"**.

   If **"-"** is entered, the master device sends 255 to the beacon to turn it off.

   If an invalid string or number is entered, the program prints **"Invalid pause entered"**

2. Implement your own version of the program for MSP430F2013 with the same functionality. You can start with this part and not use the given program if you want.

Hints:

- You can reuse the functions that you made in the previous lab for UART communication as well as functions `SpiGetState` and `SpiSetState` from demo code.
- You can use the Watchdog Timer of MSP430F2013 in the same way as you did it with MSP430FG4618. Do not use ACLK: this clock source is not available in this microcontroller.

- Make a delay of a hundred clock cycles between SpiGetState and SpiGetState function calls when you request the current value of pause.

Bonus [10 pts]

1. **Bonus 5 points** will be given to students who demonstrate their assignment by establishing Bluetooth connection between MSP430FG4618 and PC rather than using RS-232 connection.
2. **Bonus 5 points** will be given to students who use DMA to copy data to the transmission buffer for UART communication instead of using a loop.

Deliverables

1. Source files (C files)