

EE 308

Homework 13

Due April 27, 2005

1. Compare the SCI interface to the SPI interface.
 - (a) What is the maximum data transmission rate (in bytes/second) possible with the HCS12 SCI interface? How long will it take the HCS12 to transmit 1024 bytes of data at this rate?
 - (b) What is the maximum data transmission rate (in bytes/second) possible with the HCS12 SPI interface? How long will it take the HCS12 to transmit 1024 bytes of data at this rate?
 - (c) Why is there such a large difference in data rates?

2. Write a C function

```
int sci_init(int device, int nbits, int baud, int parity, int rcvr, int xmtr)
```

which does the following:

- `device` should be either 1 or 2, 1 indicating that the function should initialize SCI1, and 2 indicating that the function should initialize SCI2.
- `nbits` should be either 8 or 9, for the number of data bits the SCI should transmit.
- `baud` should be a number which corresponds to a possible baud rate for the HCS12.
- `parity` should be 0, 1, or 2, with 0 indicating no parity, 1 indicating odd parity, and 2 indicating even parity.
- `rcvr` should be either 0 or 1, with 0 indicating that the receiver should not be enabled, and 1 indicating that the receiver should be enabled.
- `xmtr` should be either 0 or 1, with 0 indicating that the transmitter should not be enabled, and 1 indicating that the transmitter should be enabled.

If all the parameters are in the valid ranges, the function should initialize the appropriate device as requested, and return a 0. If any of the parameters are outside the valid range, the function should return a -1, indicating that it was unsuccessful.

3. A tipping bucket rain gage works as follows: A funnel directs rainwater into a small bucket on a pivot. When 0.01" of rain falls, the bucket tips over and dumps out the water. This repeats for every 0.01" of rain. Write a C program which measures the amount of rain which falls in a day:
 - (a) Whenever the bucket tips, it generates an output pulse. These pulses are connected to the input pin of Pulse Accumulator A. Set up PACA to count the pulses.
 - (b) Use the timer subsystem to tell when 24 hours has passed. You might set up a Real Time Interrupt to run at the slowest rate possible, and count the number of interrupts until it equals 24 hours.
 - (c) Print the amount of rain which fell in 24 hours on the computer screen.