Participants:

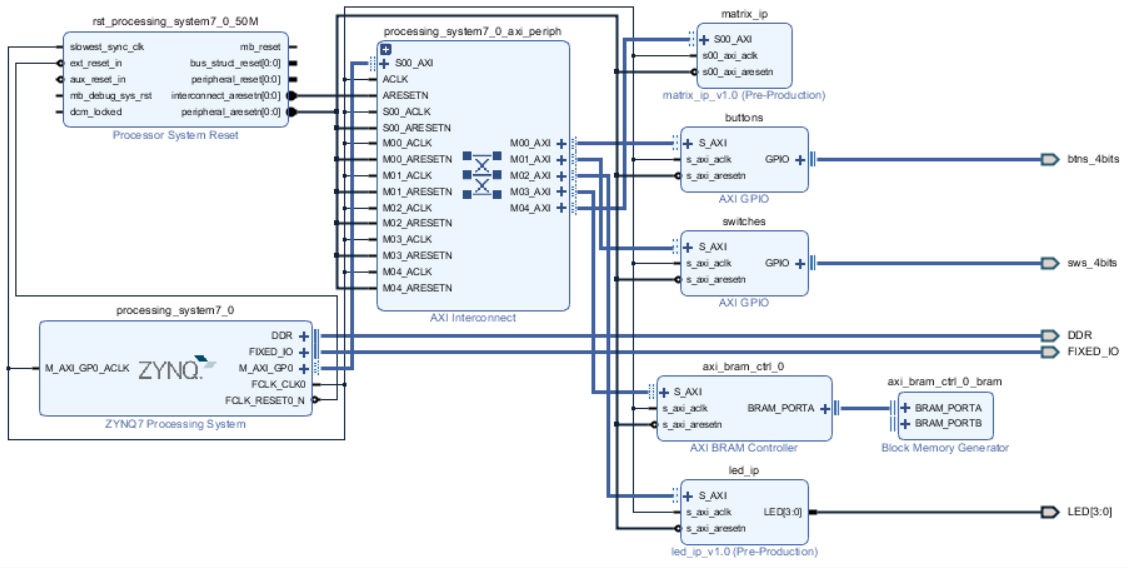
Jacob Munkholm, 20140479

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**Embedded Real Time Systems – Assignment 2**

For the exercises, the following design will be used:



The buttons and switches will be used in exercise 3 and 4, and the matrix\_ip will be used in exercise 5. The BRAM and led\_ip persists in the design created in the pre-exercises.

# 3) Create a Console Application

The main-program looks like this:

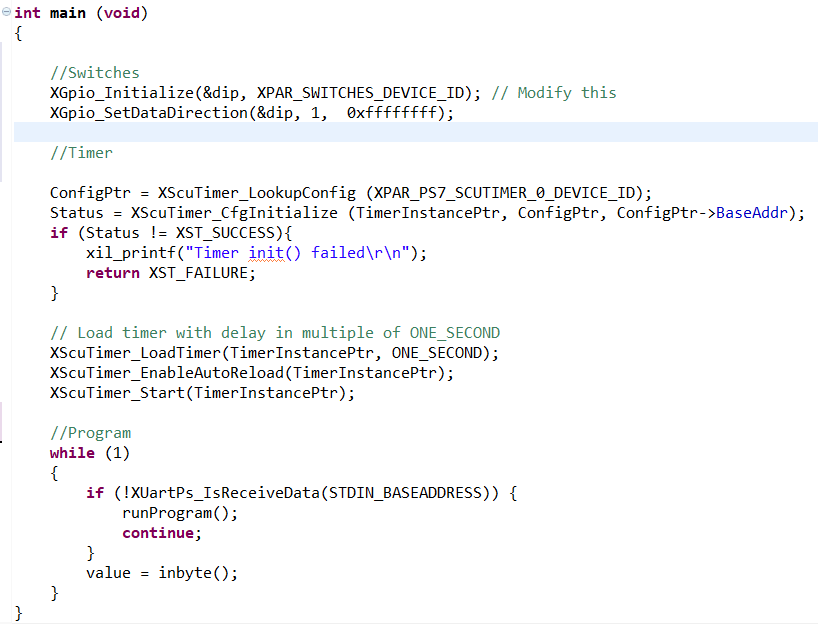


Figure 1 - main program

The main function can be split into two parts; initialization of hardware components (Led’s and timer) and an always-running loop. Every iteration of the loop checks whether data has been received from the uart. If a new value is received, the ‘value’ will be set to it, allowing for the user to switch between the different parts of the program. This functionality is created in the runProgram() function:

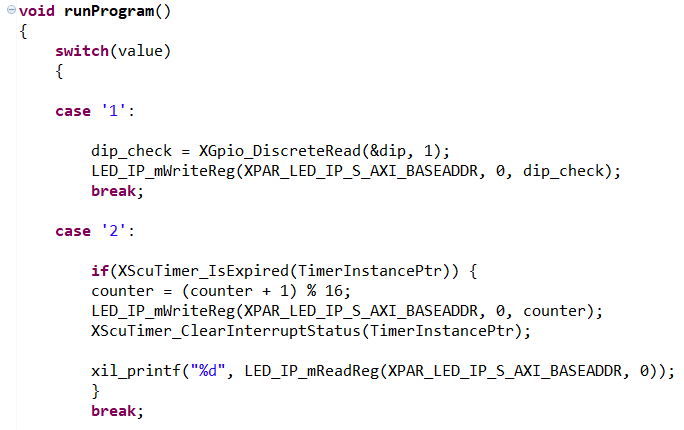


Figure 2 - runProgram() function

So every time the user writes from the UART, the program will check whether the value corresponds to the case values, and switch between them.

If the value is 1, the switches will be read, and the LED’s will be written to based on what switches are turned on/off.

If the value is 2, every time the timer expires the counter will increase up to 15 and then reset. The LED registers will then be written to, based on the value of the counter. As seen in figure 1, the timer is initialized with a value of one second (325000000 cycles), so it counts every second.

# 4) Create a Matrix Multiplication

# 5) Create a Hardware IP Acceleration

# 7) HLS exercise with SystemC