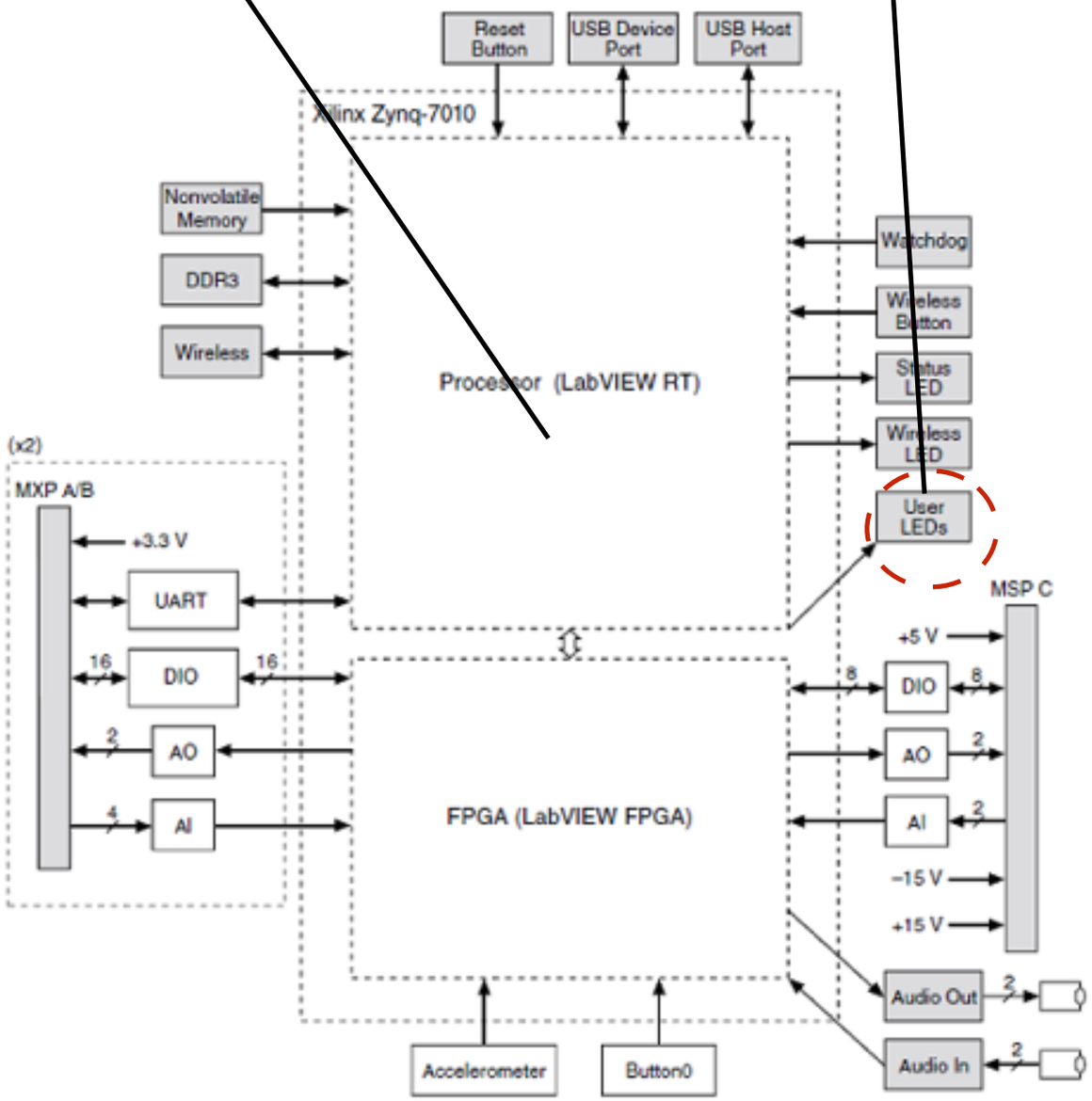
Merton/Sfwr Eng 4aa4 lab 4

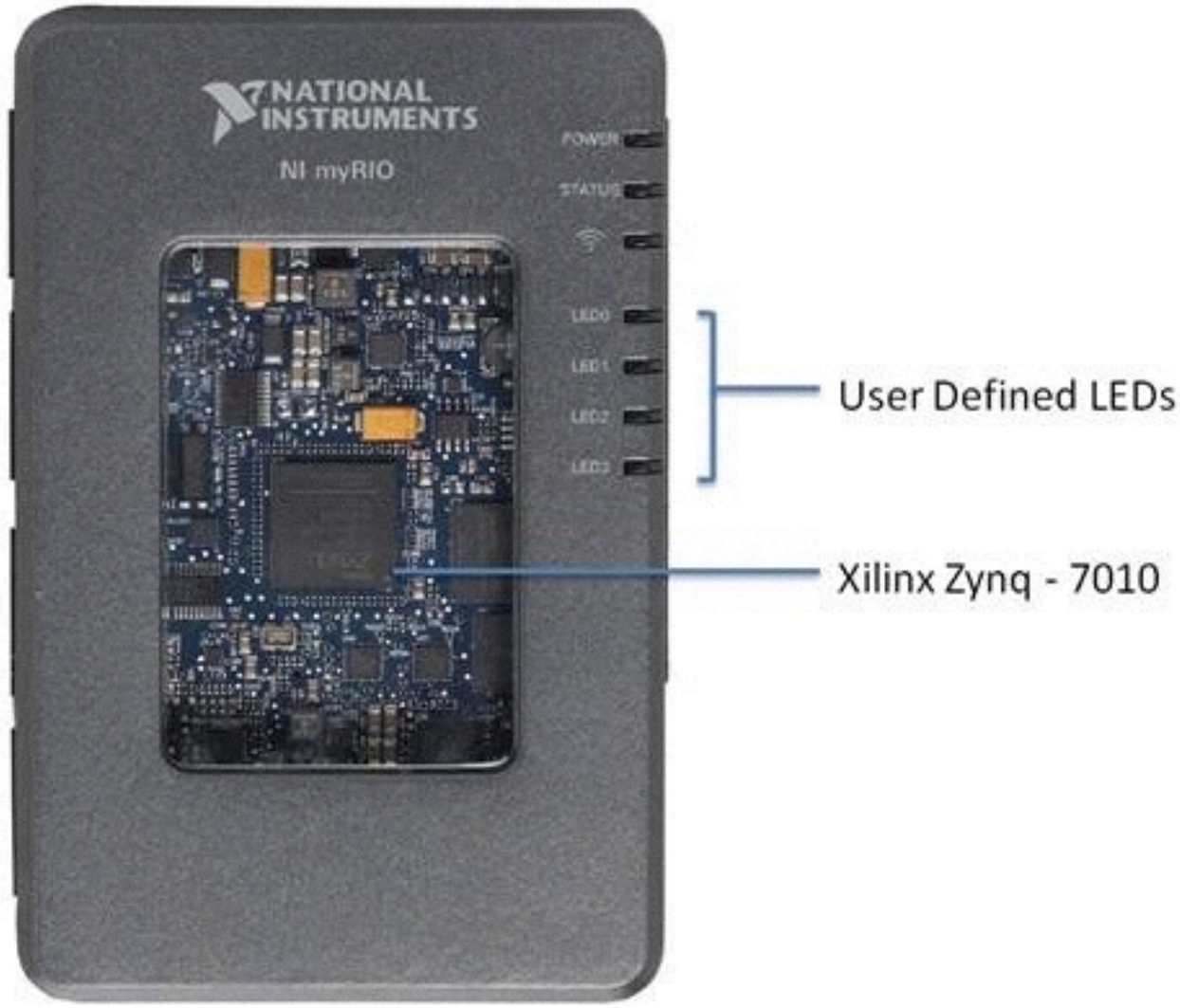
Design of real time task signal generation

Introduction

Processer

external device





Need to react with between the processor and external device

Goals

- Learn how to create periodic real time tasks for controlling certain devices of myRIO.

- Control LEDs
  - 1. Create a **periodic task** to generate a signal to blink one of the LEDs.
  - 2. Create a **threaded task** to generate a signal to blink the LEDs.
  - 3. Create a **timer thread** to generate a signal to blink LEDs.

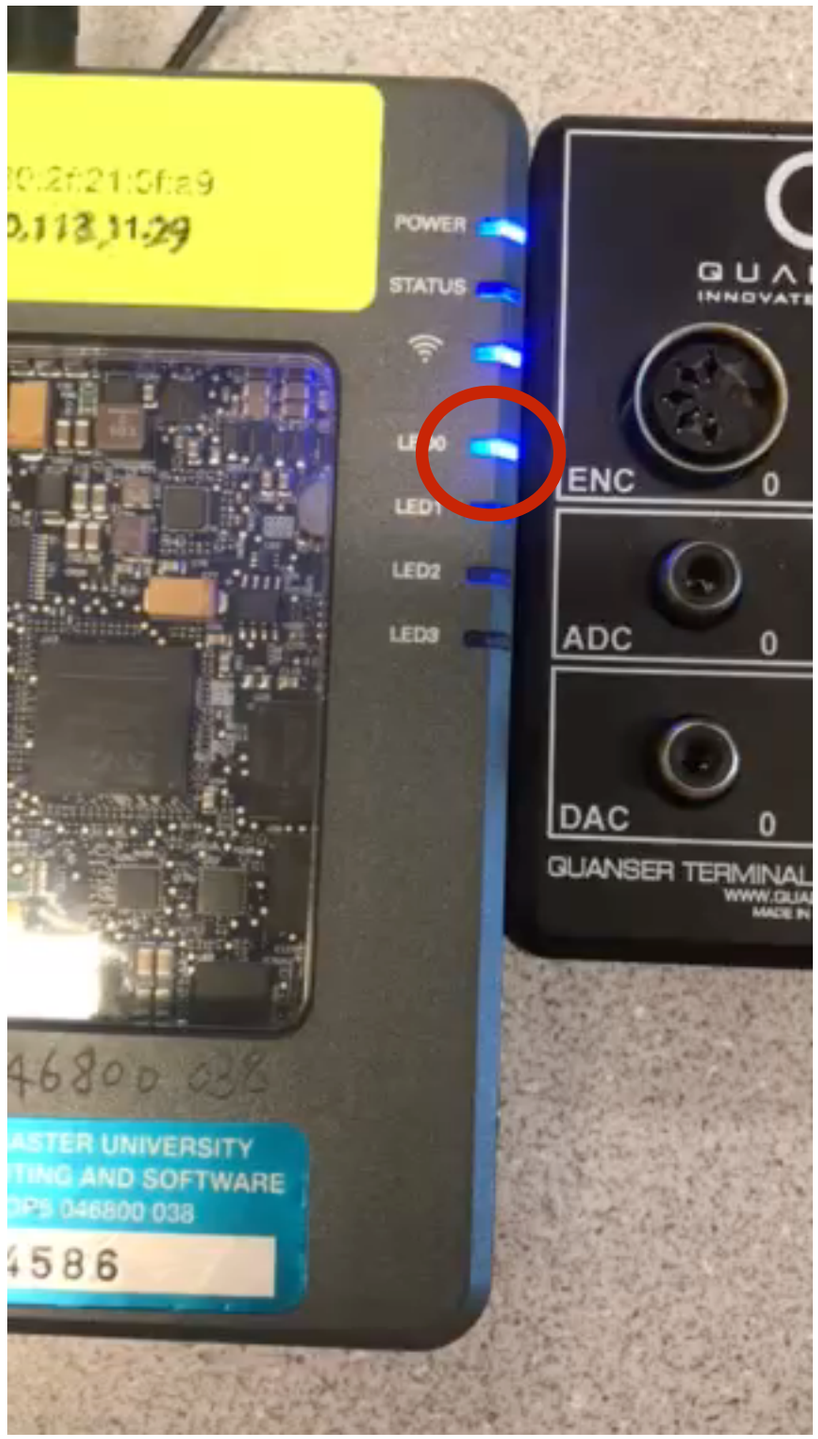
Preparations

Familiar with the lab 3.
Also, please read the following documents at your own convenience, in addition to the class notes:

- C_Support_for_myRIO_User_Guide6.0.pdf. Most of the software components mentioned in this document have already been installed and configured on lab computers.
- Getting Started with C Development Tool(Eclipse).pdf
- Document at this link: http://www.drdobbs.com/soft-real-time-programming-with-linux/184402031. Or, a PDF version can be found in folder of ”ref” for Lab 3 .
- Document at this link: https://hpc-tutorials.llnl.gov/posix/pthreads api/

Part 1: Blink an LED by using a periodic real time task

- 1: Use the ‘myRio template’ project.
- 2: Code the ‘main.c’, don’t forget to include two files “DIO.h” and “DIO.c” (**regard the Lab3 Part 3**)
- 3: Four bits to control the LED0 to LED3. (**0 means off** and **1 means on**)
- Let the LED0 blink, then show me.



Part 2: Blink the LEDs by using a threaded periodic real time task

- 1: Use the ‘myRio template’ project.
- 2: Code the ‘main.c’, Refer to **Lab3 Part 4** if necessary.
- 3: Let the LED0-3 blink by turn, then show me.

Part 3: Use a timer IRQ to blink the LEDs

- 1: Familiar with the example project named '**myRIO Example - TimerIRQ**'. (read the code and run it)

- 2: Write the suitable code to cause blinking of all LEDs(LED0 to LED3).(**each interrupt causes the change of LEDs**)

- 3: Run the C Executable on your NI Linux Real-Time Target and show me.

Marking scheme

- Part 1(40%)
- Part 2(30%)
- Part 3(30%)

- Show me the result during the lab
- Send me your code to lic222@mcmaster.ca
- One email per group, please also include your name and student number

Thank you